



**1st Annual UAB Huntsville Regional Medical Campus
Research Day**

Abstract and Poster Compendium



1st Annual UAB Huntsville Regional Campus Research Day

April 3, 2018

RESEARCH DAY SCHEDULE

Monday, April 2, 2018

4:00-6:00pm Poster Judging Session (3rd Floor)

Tuesday, April 3, 2018

7:30-10:00am	Poster Judging Session
10:00-11:00am	Tabulating Judges Scores
11:00-12:00pm	Group 1 Oral Presentations
12:00-12:30pm	Lunch (provided)
12:30-1:00pm	Keynote Speaker: Dr. Selwyn Vickers, Senior VP & Dean of UAB School of Medicine
1:00-1:15pm	Announcement of Poster Winners
1:15pm-2:15pm	Group 2 Oral Presentations
2:15pm	Group 1 and 2 Best Oral Presentation Winners Announced

*Posters will be available for viewing starting Monday, April 2nd, at 4:00pm

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Research Day Compendium Introduction 2018

It is with pride and enthusiasm that we introduce a compendium of the clinical vignettes and research projects accepted to the first annual Huntsville Regional Medical Campus Research Day competition. It was truly a privilege for us to have Dr. Selwyn Vickers, Senior Vice President and Dean, UAB School of Medicine, as the inaugural speaker for this event.

I am extremely proud of the hard work and enthusiasm that was shown by the faculty, residents, and students in preparing for and presenting at this conference. The participation of our community faculty and collaborations with the Auburn School of Pharmacy was gratifying. I look forward to future years of outstanding participation as we had this year. Please feel free to reach out to the authors of these papers if you have questions or want to investigate further.

This booklet contains the abstracts and posters that were accepted at the competition.

I would like to thank the following people for their extra efforts to make this research day a success: Dr. Farrah Ibrahim, Dr. Lanita Carter, Paula Cothren, Lisa Stewart, Alan Backer, Marion Montgomery, Tommy Hancock, and all community and UAB faculty members who acted as mentors and judges.

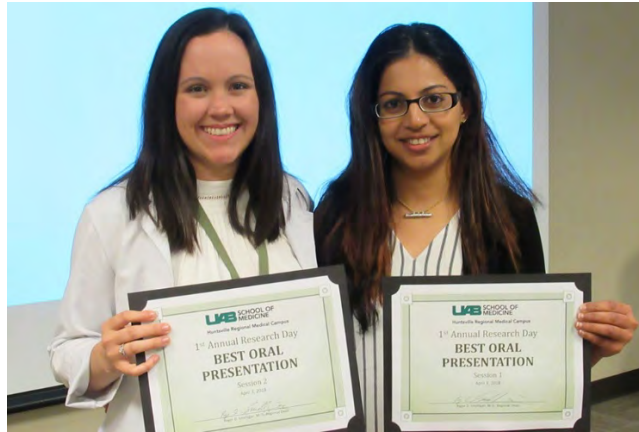
Sincerely,

Roger D. Smalligan, MD, MPH

Professor and Regional Dean

UAB Huntsville Regional Medical Campus

Awards



Oral Abstract Presentation Winners Nichole Marcantonio and Rohini Ramamoorthy

Oral Abstract Presentations

Session One - Microscopic polyangiitis induced disseminated intravascular coagulation and gastrointestinal vasculitis by Rohini Ramamoorthy, Elizabeth Thottacherry and James Smelser

Session Two - Headache – more than just a migraine and tension headache: A rare and treatable cause of headache by Nichole Marcantonio, Tim Anderson and Jitesh Kar

Clinical Vignette Poster Presentations

1st Place – Stroke more than just aspirin, echo and carotid: Adrenoleukodystrophy mimicking stroke by Tim Anderson and Jitesh Kar

2nd Place – *Streptococcus intermedius* causing necrotizing pneumonia and empyema by Mary Fok, Jesse Faulk and Alan Baggett

3rd Place – ‘A Bleeding Dilemma’ – Story of a periampullary mass by Bhavyaa Bahl, Rohith Vadlamudi, Parekha Yedla, Smita Shah and Roger Smalligan

Research Abstract Poster Presentations

1st Place – Evaluation of commercialized fecal microbiota transplant (cFMT) therapy for the treatment of recurrent *Clostridium difficile* infections by Jenna Lee, Brian Boyett, Jonathan Edwards and Taylor Steuber

2nd Place – Glycemic control with insulin glargine in the setting of renal impairment in hospitalized patients by Omer Iqbal, Taylor Steuber, Jasleen Bolina, Mary Hannah Walters and Bradley Wright

3rd Place – Evaluating physician perceptions of learning based on utilizing clinical pharmacy services by Lauren Brown, Joseph Nguyen, Aadil Lodhi, Miranda Andrus and Bradley Wright

Section I: Clinical Vignettes

Intra-vesical Bacillus Calmette-Guérin (BCG) related sepsis

Usman Zafar, MD, PGY3 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Mohammed Abdulhaleem, MD, PGY2 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Ali Hassoun, MD, Infectious Disease Specialist, Alabama Infectious Diseases Center, UAB Huntsville Regional Medical Campus; Farrah Ibrahim, MD, Associate Professor of Medicine, UAB Huntsville Regional Medical Campus

Learning objectives

Our patient developed systemic mycobacterium infection following instillation of BCG in spite of having traumatic catheterization. This step should have been delayed to another date to avoid systemic side effect. He was treated successfully with 3 drugs regimen of anti-mycobacterial therapy for total of 6 months and tapered dose of steroid.

Case Report

67-year-old male with PMH of Bladder cancer presents to the hospital with fever. Patient was diagnosed with transitional cell carcinoma of the bladder 4 years prior to his presentation which was managed with transurethral resections of the bladder (TURBT) and multiple intravesical administration of BCG with last dose was given one week prior to admission. At that time, he had traumatic catheterization during the procedure and received his BCG therapy. Next day, patient started to experience fever (Tmax of 102F), associated with rigors, nausea and vomiting. Patient prescribed Bactrim by his primary care physician but without improvement. Upon admission to the hospital, he was started on broad spectrum antibiotics with piperacillin/tazobactam, ethambutol, rifampin and isoniazid due to suspicion for mycobacterial infection.

His urine and blood cultures on admission were negative. On day 7, Patient condition worsens with fever up to 103F, new bilateral lung infiltrate, rash and worsening liver function tests. Patient was transferred to the ICU. Piperacillin/tazobactam was switched to daptomycin, meropenem and levofloxacin, and isoniazid was held (secondary to abnormal liver function test). His urine and blood AFB cultures were negative. Patient liver and skin biopsies showed granulomatous changes suggestive of disseminated *Mycobacterium bovis* infection. Patient was started on steroid, His condition improved and discharged on INH, ethambutol rifampin and for a total of 6 months, with a tapering dose of prednisone.

Discussion

Intravesical administration of Bacillus Calmette-Guérin (BCG), a live attenuated strain of *Mycobacterium bovis*, has become a mainstay of adjunctive therapy for superficial (non-muscle invasive) bladder cancer. Its mechanism of action as an immunotherapeutic agent in cancer is not fully known. BCG is typically instilled into the bladder every week for 6 weeks starting 2-6 weeks after TURBT and maintained for up to 3 years. Most common adverse reaction is cystitis which managed with observation, with or without a short course of fluoroquinolone or INH. More serious systemic infections (e.g., sepsis, pneumonitis, hepatitis, arthritis) have been reported, with the incidence has been lowered (1 in 15000) after the risk factors (traumatic catheterization, active cystitis, or persistent gross hematuria) were identified and controlled. Specimens should be obtained for staining for acid-fast bacilli, culture, and polymerase chain reaction (PCR) testing for mycobacterial DNA in any patient with suspected disseminated Bacillus Calmette-Guérin infection, even though the results can be negative in some cases. Treatment can be achieved with multidrug anti-mycobacterial therapy for 3 to 6 months with concomitant use of steroids to allay hypersensitivity related symptoms.

Objectives

- ❖ Recognize clinical presentation, and treatment approaches of sepsis due to intra-vesical BCG.

Case Presentation

- ❖ 67 YO M with PMH of Bladder cancer presents with fever.
- ❖ s/p transurethral resections of the bladder(TURBT) and multiple intravesical administration of BCG with last dose given one week prior to admission.
- ❖ He had traumatic catheterization during that procedure.
- ❖ Next day he started having fever (Tmax of 102F) associated with rigors, nausea and vomiting and is prescribed bactrim by his PCP.

Hospital Course

- ❖ He is started on piperacillin/tazobactam, ethambutol, rifampin and isoniazid due to suspicion for mycobacterial infection. Blood and Urine Cx + AFB were negative.
- ❖ Pip/tazo was switched to daptomycin, meropenem and levofloxacin due to worsening symptoms.
- ❖ INH was held due to abnormal liver chemistry tests.
- ❖ Liver and skin biopsies showed granulomatous changes suggestive of disseminated M. Bovis infection.
- ❖ His condition improved and he was discharged on INH, ethambutol, rifampin for 6 months, with a tapering dose of prednisone

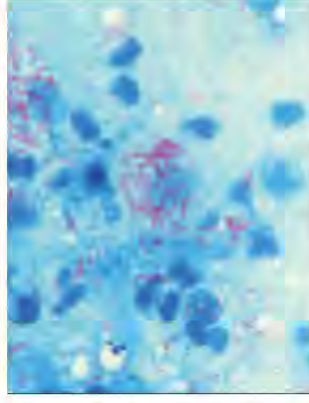
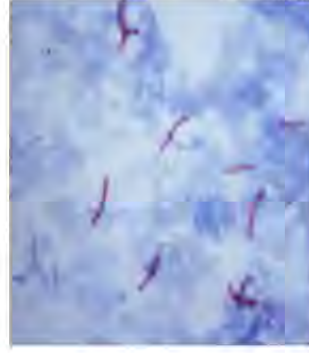


Fig. ZN staining of mycobacteria.

Conclusion

- ❖ Our patient developed systemic mycobacterium infection following instillation of BCG in the setting of traumatic catheterization.
- ❖ This step should have been delayed to avoid systemic side effects.
- ❖ He was treated successfully with triple regimen of anti-mycobacterial therapy for 6 months and tapered dose of steroid.

Discussion

- Intra-vesical BCG - adjunctive therapy for superficial bladder cancer
- Most common adverse reaction - cystitis – Rx – observation +/- fluoroquinolone or INH
- Serious systemic infections (e.g., sepsis, pneumonitis, hepatitis, arthritis) can occur.
- Incidence lowered due to control of risk factors (traumatic catheterization, active cystitis, or persistent gross hematuria).
- Diagnoses - AFB, culture, and PCR for mycobacterial DNA.
- Treatment - multidrug anti-mycobacterial therapy for 3 to 6 months with steroids for hypersensitivity symptoms.

Fibrolamellar Carcinoma with Multiple Liver Lesions in African-American Male Patient

Mohammed Abdulhaleem, PGY2 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Elizabeth Thottacherry, PGY1 Internal Medicine Resident, UAB Huntsville Regional Medical; Rosa M. Michel Ortega, Clinical Assistant Professor, Hematology/Oncology, The Cancer Center, Huntsville, AL; Farrah Ibrahim, Program Director, Associate Professor of Medicine, UAB Huntsville Regional Medical Campus

Learning objectives

To report a case of fibrolamellar carcinoma of the liver, a rare tumor has conventionally been considered to be a histologic variant of hepatocellular carcinoma, it has more recently been recognized as a distinct clinical entity with respect to its epidemiology, etiology, and prognosis. However, the diagnosis of FLC can be difficult to establish, which needs further confirmation with imaging and tissue biopsy

Case presentation

26 years old African-American male with no past medical history presented with right upper quadrant abdominal pain for 3 months associated with nausea, vomiting, fatigue, decreased appetite, and 30 pounds weight loss. Denies fever, jaundice, chest pain, or dyspnea. Physical examination was significant for right upper quadrant abdominal tenderness, hepatomegaly (liver span measured 5 cm below costal margin), without scleral icterus.

Laboratory revealed Hemoglobin of 11.2, alanine aminotransferase of 99, aspartate aminotransferase of 148, Alkaline phosphatase of 114, total bilirubin of 0.5, carcinoembryonic antigen of 1.7(normal <3.5 ng/ml), alpha-fetoprotein of 7.5(normal 0-8.7 ng/ml), and carbohydrate antigen 19-9 of 4.5 (normal <35 u/ml).

Computed tomography chest, abdomen and pelvis with contrast revealed multiple hepatic lesions, largest measured 14.9 cm in anteroposterior diameter with central scarring and internal calcification involving the right lobe, periportal and aortocaval lymphadenopathy, and bilateral pulmonary nodules with left hilar lymphadenopathy.

Liver core biopsy was consistent with fibrolamellar carcinoma (FLC) of the liver {hepatocyte paraffin 1(HepPar1) and cytokeratin (CAM) 5.2 positive, alpha fetoprotein negative}

Discussion

FLC is a very rare tumor, and accounts for less than 1 percent of all primary liver tumors in the United States. Median age of diagnosis is 33 years. It affects males and females equally. Patients with fibrolamellar carcinoma are overwhelmingly (>85%) non-Hispanic white people, with smaller numbers seen among Chinese-Americans (6%), and blacks (4%). Grossly, fibrolamellar carcinoma commonly forms a solitary, large, firm, well-circumscribed tumor (80-90%). It typically occurs in the absence of underlying liver inflammation or fibrosis. The diagnosis is typically made on the basis of clinical presentation and imaging characteristics; negative serum tumor markers such as alpha-fetoprotein (AFP) may also support the diagnosis with pathology being the gold standard. The most important prognostic factors are disease stage and respectability. Although patients often have advanced disease at diagnosis, 70 to 75 percent are amenable to complete resection, and approximately 40 to 70 percent are still alive 5 and even 10 years later.



Fibrolamellar Carcinoma With Multiple Liver Lesions In African-American Male Patient



Mohammed Abdulhaleem MD¹, Elizabeth Thottacherry MD¹, Rosa Michel Ortega MD² Farrah Ibrahim MD³

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²Hematology/Oncology specialist at The Cancer Center, Huntsville, AL.

³Program Director, UAB School of Medicine, Huntsville campus, Huntsville, AL.

Case Description

- A 26 year old African-American male with no past medical history presented with right upper quadrant abdominal pain for 3 months associated with nausea, vomiting, fatigue, decreased appetite, and 30 pounds weight loss. Denied fever, jaundice, chest pain, or dyspnea.
- Physical examination was significant for right upper quadrant abdominal tenderness, hepatomegaly (liver span measured 5 cm below costal margin), without scleral icterus.
- Lab tests revealed Hemoglobin of 11.2, alanine aminotransferase of 99, aspartate aminotransferase of 148, Alkaline phosphatase of 114, total bilirubin of 0.5, carcinoembryonic antigen of 1.7(normal <3.5 ng/ml), alpha-fetoprotein of 7.5(normal 0-8.7 ng/ml), and CA 19-9 of 4.5 (normal <35 u/ml).
- Computed tomography of the chest, abdomen and pelvis with contrast revealed multiple hepatic lesions (largest measured 14.9 cm in anteroposterior diameter with central scarring and internal calcification involving the right lobe), periportal and aortocaval lymphadenopathy, and bilateral pulmonary nodules with left hilar lymphadenopathy.
- Liver core biopsy was consistent with fibrolamellar carcinoma of the liver (hepatocyte paraffin 1(HepPar1) and cytokeratin (CAM) 5.2 positive).
- Treatment with surgical resection or liver transplant were not an option since he had metastasis to the lung. Other treatment options were discussed with him including systemic chemotherapy and trans-arterial chemo-embolization, but he chose to go back to Chicago for further treatment.

Discussion

- FLC is a very rare tumor, and accounts for less than 1 percent of all primary liver tumors in the United States.
- Median age of diagnosis is 33 years.
- Patients with fibrolamellar carcinoma are overwhelmingly (>85%) non-Hispanic white people, with smaller numbers seen among Chinese-Americans (6%) and blacks (4%).
- Grossly, fibrolamellar carcinoma commonly forms a solitary, large, firm, well-circumscribed tumor (80-90%).
- It typically occurs in the absence of underlying liver inflammation or fibrosis.
- The diagnosis is typically made on the basis of clinical presentation and imaging characteristics; negative serum tumor markers such as alpha-fetoprotein (AFP) may also support the diagnosis with pathology being the gold standard.
- The most important prognostic factors are disease stage and resectability of the tumor.
- Although patients often have advanced disease at diagnosis, 70 to 75 percent are amenable to complete resection, and approximately 40 to 70 percent are still alive 5 and even 10 years later.
- Surgical resection or transplantation is the standard of care for fibrolamellar carcinoma (FLC) for eligible patients without metastasis.
- Trans-arterial chemo-embolization (TACE) may be a useful option in patients who have unresectable disease.
- Chemotherapy for metastatic disease is as for metastatic typical hepatocellular carcinoma. Single-agent chemotherapy or combinations of chemotherapeutic drugs give responses of no more than 25%, with questionable benefit for overall survival.

Learning Objectives

- FLC, a rare tumor has conventionally been considered to be a histologic variant of hepatocellular carcinoma, it has more recently been recognized as a distinct clinical entity with respect to its epidemiology and etiology.
- The diagnosis of FLC can be difficult to establish, and needs further confirmation with imaging and tissue biopsy.
- Prognosis is better in most of the cases if compared to hepatocellular carcinoma.

References

- Seitz G, Zimmermann A, Friess H, Büchler MW. Adult-type hepatocellular carcinoma in the center of a fibrolamellar hepatocellular carcinoma. Hum Pathol. 2002 Jul. 33(7):765-9.
- Ichikawa T, Federle MP, Grazioli L, et al. Fibrolamellar hepatocellular carcinoma: pre- and posttherapy evaluation with CT and MR imaging. Radiology. 2000 Oct. 217(1):145-5
- Michael A Choti, MD, MBA, FACS Hall and Mary Lucile Shannon Professor and Chair, Department of Surgery, University of Texas Southwestern Medical Center

A rare case of Kaposi's Sarcoma in HIV negative male

Bhavini Kar, MD, PGY3 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Mohammed Abdulhaleem, MD, PGY2 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Farrah Ibrahim, MD, Associate Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning objectives

Kaposi Sarcoma is rarely seen in HIV negative patients, but it should be considered on differential when suspicious skin lesions are seen. Definitive diagnosis requires tissue biopsy. Its incurable and treatment directed toward symptomatic relief. Here we are presenting a rapidly growing Classic Kaposi Sarcoma in a Hispanic male who is HIV seronegative.

Case Description

Eighty-one-year-old Hispanic male with past medical history of hypertension, atrial fibrillation, COPD, deep venous thrombosis, pulmonary embolism and gastro esophageal reflux presented with multiple worsening painful skin lesions of both lower extremities and fever for three months. Patient denied any homosexual activity. Physical examination was significant for reddish brown, painful, papules and plaques on bilateral lower extremities. Lymphadenopathy was not detected. Laboratory revealed anemia, leukocytosis. Liver function test, urine analysis, rheumatoid factor, anti CCP antibodies, ANA, C-ANCA, P-ANCA, CD4, HIV, RPR, HSV PCR, coagulopathy studies were normal. Blood cultures did not show any growth. Imaging of chest, abdomen and pelvis were negative except for bilateral pleural effusion. Skin biopsy of the lesions showed multiple levels proliferation of spindle cell which formed nodules and outline vascular slit like spaces which dissect collagen and extend around adnexa to near subcutaneous deep dermal interface. Immunohistochemical staining for HHV-8 (Human Herpes Virus) was strongly positive. Histological features were suggestive of Kaposi Sarcoma. Due to age and multiple comorbidities, patient chose not to receive any treatment and discharged home with Home Hospice services.

Discussion

Kaposi sarcoma is a spindle-cell tumor thought to be derived from endothelial cell lineage. This condition carries a variable clinical course ranging from minimal mucocutaneous disease to extensive organ involvement. Human herpes virus 8 (HHV-8) have been identified in more than 90% of all types of Kaposi sarcoma lesions, suggesting a causative role for this DNA virus (transmitted in saliva). It can be primarily categorized into four types: epidemic of AIDS-related, immunocompromised, classic or sporadic, and endemic (African). Classic Kaposi sarcoma (CKS) occurs most often in older men of Mediterranean or Central/Eastern European ancestry, in whom the lesions usually occur on the distal extremities, particularly the lower legs and feet. CKS is frequently described as slow-growing, localized, and indolent, but it can become disseminated and/or grow rapidly, and can cause significant morbidity and mortality. Biopsy is required for definitive diagnosis. No definite cure is known with the major therapeutic goals of achieving symptom palliation, alleviating lymphedema, improving function, decreasing the size of cutaneous or visceral lesions, and delaying or preventing disease progression.

Objective:

- To report a rare case of Kaposi's Sarcoma in HIV negative male.
- Usually Kaposi Sarcoma are seen in immunocompromised & HIV patients but this case is in non HIV patient, which is very rare

Background:

- Kaposi sarcoma is a spindle-cell tumor thought to be derived from endothelial cell lineage.
- A variable clinical course ranging from minimal mucocutaneous disease to extensive organ involvement.
- Human herpes virus 8 (HHV-8) have been identified in more than 90% of all types of Kaposi sarcoma, suggesting a causative role for DNA virus
- This case is reported due to paucity of Kaposi's Sarcoma in Non HIV patient

History:

- 81 yrs-old Hispanic male
- PMH: HTN, A.fib, COPD, DVT, PE
- Chief Complaint: Multiple worsening painful skin lesions of both lower extremities
- No history of fever, chills, travel, chest pain, sick contacts, TB exposure or homosexual activity

Physical examination:

- Significant for reddish brown, painful, papules and plaques on bilateral lower extremities (Image Below)
- Lymphadenopathy was not detected

Laboratory Findings:

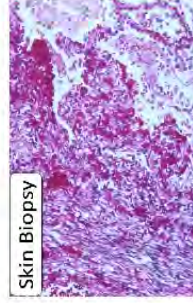
- CBC: Anemia, leukocytosis
- Liver function test, urine analysis: WNL
- Rheumatoid factor, anti CCP antibodies: WNL
- ANA, C-ANCA, P-ANCA, CD4, HIV, RPR: Negative
- HSV PCR, coagulopathy studies: Negative
- Blood cultures did not show any growth

Imaging:

- CT Chest, abdomen and pelvis were negative except for bilateral pleural effusion

Skin biopsy:

Multiple levels proliferation of spindle cell which formed nodules and outline vascular slit like spaces which dissect collagen and extend around adnexa to near subcutaneous deep dermal interface (Image on right - top). Immunohistochemical staining for HHV-8 (Human Herpes Virus) was strongly positive



Discussion:

- Kaposi Sarcoma can be primarily categorized into four types: epidemic of AIDS-related, immunocompromised, classic or sporadic, and endemic (African)
- CKS is frequently described as slow-growing, localized, and indolent, but it can become disseminated and/or grow rapidly, and can cause significant morbidity and mortality.
- No definite cure is known with the major therapeutic goals of achieving symptom palliation, alleviating lymphedema, improving function, decreasing the size of cutaneous or visceral lesions, and delaying or preventing disease progression.

References:

- PLoS One. 2011; 6(4): e18397. Published online 2011 Apr 12. doi: 10.1371/journal.pone.0018397 Non-AIDS Associated Kaposi's Sarcoma: Clinical Features and Treatment Outcome
Lena Jakob, Gisela Metzger, Ko-Ming Chen, and Claus Garbe*

A Rare Case of Symptomatic Pancreatic Heterotopia

Mohammed Abdulhaleem, MD, PGY2 Internal Medicine Resident, UAB Huntsville Regional Medical Campus; Jorge Arturo Diaz Castro, Hematology/Oncology Specialist at Clearview Cancer Institute, Huntsville, AL; Alan Baggett, MD, Assistant Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning objective

Ectopic pancreas is defined as pancreatic tissues lacking vascular or anatomic communication with the normal body of the pancreas. The most common sites for ectopic pancreas are the submucosal layer of the stomach and the small intestine. It is rare for heterotopic pancreas tissue to cause symptoms; however, every disease of the pancreas may develop in it. Symptomatic ectopic pancreas usually causes diagnostic difficulties. Although ectopic pancreas is a rare entity, clinicians should consider this as an important differential diagnosis of extramucosal gastric lesions as a simple excision can be potentially curative.

Case presentation

41-year-old man with no past medical history presents to the hospital with infraumbilical abdominal pain for 2 to 3 months duration. Pain was progressive, intermittent, 8-10/10 in intensity, radiating to the back, aggravated with food, and associated with constipation. Physical examination revealed mild tenderness to deep palpation at the epigastrium and left upper quadrant. CT abdomen and pelvis showed a 1.3* 1.6 cm soft tissue mass within the mesenteric fat in the left hemiabdomen which raised the concern for possible carcinomatosis and carcinoid tumor. Work up of for carcinoid syndrome including 24 hours 5HIAA, serum serotonin level and chromogranin A were negative. Also, patient underwent EGD and colonoscopy that showed some mild gastritis, left colon colitis and tubular adenoma that was resected. He eventually underwent a diagnostic laparoscopy that resulted in resection of 10 cm segment of his proximal small bowel including the mass. Pathology of the resected bowel revealed benign small intestinal mucosa with pancreatic heterotopia. Patient improved and was sent home in stable, satisfactory condition.

Discussion

Ectopic pancreas is also referred to as pancreatic heterotopia, heterotopic pancreas, and accessory or aberrant pancreas, is defined as pancreatic tissues lacking vascular or anatomic communication with the normal body of the pancreas. Ectopic pancreas is a relatively rare entity with an incidence of 0.2% at laparotomy and 0.5 to 13.7% on autopsies. Pancreatic rests are most frequently found in the distal stomach, duodenum, or proximal jejunum, but have also been reported within a Meckel's diverticulum, the gallbladder, bile ducts, and the minor and major papillae. While most patients with pancreatic rests are asymptomatic, some patients may develop abdominal pain, gastrointestinal bleeding, intestinal obstruction, or pancreatitis. Cases of malignant transformation have also been reported. The diagnosis can be made histologically from tissue obtained by biopsy. Endoscopic-guided fine needle aspiration is usually superficial and nondiagnostic as these tumors are covered with normal gastric mucosa. The recent advent of EUS has improved the sensitivity of diagnosis for these lesions by 80 to 100%. Radiological studies such computed tomography (CT) scan can sometimes assist in the diagnosis. EGD findings include the possibility of a submucosal nodule with an umbilicated appearance, however most of the time it is

indistinguishable from other neoplastic processes such as gastrointestinal stromal tumors, gastrointestinal autonomic nerve tumors, carcinoid tumors, lymphomas, and gastric cancers. The management strategy should be guided by symptoms and suspicion for malignancy. Asymptomatic lesions can be followed expectantly.



A Rare Case Of Symptomatic Pancreatic Heterotopia

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Case Description

- A 41 year old male with no past medical history presented to the hospital with infra-umbilical abdominal pain for 2 to 3 months duration.
- Pain was progressive, intermittent, 8-10/10 in intensity, radiating to the back, aggravated with food, and associated with constipation.
- Physical examination revealed mild tenderness to deep palpation at the epigastrium.
- Computed tomography (CT) scan abdomen and pelvis showed a 1.3* 1.6 cm soft tissue mass within the mesenteric fat in the left side of the abdomen which raised the concern for possible carcinoid tumor.
- Work up for carcinoid syndrome including 24 hours 5HIAA, serum serotonin level and chromogranin A were negative.
- Patient underwent EGD and colonoscopy that showed mild gastritis. He eventually underwent a diagnostic laparoscopy that resulted in resection of 10 cm segment of his proximal small bowel including the mass.
- Pathology of the resected bowel revealed benign small intestinal mucosa with pancreatic heterotopia.
- Patient improved and was sent home in stable, satisfactory condition.

Discussion

- Ectopic pancreas, also referred to as pancreatic heterotopia, heterotopic pancreas, accessory or aberrant pancreas is defined as pancreatic tissues lacking vascular or anatomic communication with the normal body of the pancreas.
- Ectopic pancreas is a relatively rare entity with an incidence of 0.2% at laparotomy and 0.5 to 13.7% on autopsies.
- Pancreatic rests are most frequently found in the distal stomach, duodenum, or proximal jejunum, but have also been reported within Meckel's diverticulum and gallbladder.
- While most patients with pancreatic rests are asymptomatic, some patients may develop abdominal pain, gastrointestinal bleeding, intestinal obstruction, or pancreatitis. Cases of malignant transformation have also been reported.
- The diagnosis can be made histologically from tissue obtained by biopsy. Endoscopic-guided fine needle aspiration is usually superficial and non-diagnostic as these tumors are covered with normal gastric mucosa. The recent advent of EUS has improved the sensitivity of diagnosis for these lesions by 80 to 100%. Radiological studies such as CT scan can sometimes assist in the diagnosis. EGD findings include the possibility of a submucosal nodule with an umbilicated appearance, however most of the time it is indistinguishable from other neoplastic processes such as carcinoid tumors, lymphomas and gastric cancers.
- The management strategy should be guided by symptoms and suspicion for malignancy. Asymptomatic lesions can be followed expectantly.

Learning Objectives

- It is rare for heterotopic pancreas tissue to cause symptoms; however, every disease of the pancreas may develop in it.
- Although ectopic pancreas is a rare entity, clinicians should consider this as an important differential diagnosis of extramucosal gastric and intestinal lesions as a simple excision can be potentially curative.

References

- Kim J Y, Lee J M, Kim K W. *et al. Ectopic pancreas: CT findings with emphasis on differentiation from small gastrointestinal stromal tumor and leiomyoma. Radiology.* 2009;252(1):92-100. [
- Cullen J J, Weydert C, Hinkhouse M M. *et al. The role of manganese superoxide dismutase in the growth of pancreatic adenocarcinoma. Cancer Res.* 2003;63(6):1297-1303.
- Ozcan C, Celik A, Güçlü C, Balık E. *A rare cause of gastric outlet obstruction in the newborn: pyloric ectopic pancreas. J Pediatr Surg.* 2002;37(1):119-120.
- of Texas Southwestern Medical Center

A Rare Case of Primary Peritoneal Carcinoma with Atypical Presentation

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Learning objective

Primary peritoneal carcinoma is a rare malignancy predominantly affects postmenopausal women and typically displays multicentric peritoneal and omental involvement. This malignancy is differentiated from its ovarian counterpart by the fact that it involves the extraovarian peritoneum significantly and the ovarian surface minimally or not at all. Common presentations include abdominal distention, and constitutional symptoms. Our patient presented with colovesical fistula. Treatment of this malignancy is very similar to that of epithelial ovarian cancer, which includes surgery followed by chemotherapy.

Case presentation

64 years old female with past medical history of Renal cell cancer status post partial nephrectomy, hypertension, hyperlipidemia, hysterectomy and bilateral salpingo-oophorectomy presented with pneumaturia. CT scan of the pelvis was significant for two abnormalities. First abnormality was lytic bone lesion involving the left anterior iliac bone with a biopsy of that area was consistent with metastatic renal cell cancer which treated with localized radiotherapy. The second abnormality which founded on CT pelvis showed air in the bladder secondary to colovascular fistula for which patient was referred to colorectal surgeon. She underwent low anterior resection of the colon. Pathology report of the surgical specimen showed focal atypical glandular proliferation with abundant associated psammomatous calcification consistent with psammocarcinoma. Immunohistochemical staining favored primary peritoneal carcinoma. CA 125 level was 111 U/mL (normal <38). Patient was referred to MD Anderson to receive further management including chemotherapy.

Discussion

Primary peritoneal cancer (PPC, or PPCa) is a rare cancer with incidence of two cases per one million each year. The cancer typically involves the cells lining the peritoneum or abdominal cavity that predominantly affects postmenopausal women. The mesothelium of the peritoneum and the germinal epithelium of the ovary arise from the same embryologic origin, hence many have morphologic features that are typical for epithelial ovarian carcinoma, such as papillary configuration or psammoma bodies. PPC may share a common biology with ovarian carcinoma. Occur more commonly in women with *BRCA1* mutations and occasionally in women from families at high risk for ovarian cancer, and elevated serum concentrations CA 125. Survival is poor for patients with PPC, with 100% mortality; the median survival reported is 12-25 months, even with extensive surgery and chemotherapy. Primary peritoneal carcinoma usually manifests as abdominal distention and diffuse nonspecific abdominal pain secondary to ascites. Direct visualization of the peritoneal surfaces along with palpation of the abdominal contents is by far the most sensitive modality for detecting peritoneal cancer. The standard imaging tests are notably insensitive for the detection of peritoneal tumors and is histologically indistinguishable from primary epithelial ovarian carcinoma. PPC is surgically staged according to the 2017 International Federation of Gynecology and Obstetrics (FIGO)/Tumor, Node, Metastasis (TNM) classification system. Treatment of this malignancy is

very similar to that of epithelial ovarian cancer, which includes combination chemotherapy after optimal cytoreductive surgery.



A Rare Case Of Primary Peritoneal Carcinoma With Atypical Presentation

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Case Description

- A 64 year old female with past medical history of Renal cell cancer status post partial nephrectomy, hypertension, hyperlipidemia, hysterectomy and bilateral salpingo-oophorectomy presents with pneumaturia.
- CT scan of the pelvis was significant for two abnormalities.
- First abnormality was a lytic bone lesion involving the left anterior iliac bone with, a biopsy of that area was consistent with metastatic renal cell cancer, which was treated with localized radiotherapy.
- The second abnormality on CT pelvis was air in the bladder secondary to colovesical fistula for which patient was referred to colorectal surgeon. She underwent low anterior resection of the colon.
- Pathology report of the surgical specimen showed focal atypical glandular proliferation with abundant associated psammomatous calcification consistent with psammocarcinoma. Immunohistochemical staining favored primary peritoneal carcinoma. CA 125 level was 111 U/mL (normal <38).
- Patient was referred to MD Anderson to receive further management with chemotherapy.

Discussion

- Incidence of primary peritoneal cancer (PPC) is approximately two cases per one million each year.
- The cancer predominantly affects postmenopausal women.
- The mesothelium of the peritoneum and the germinal epithelium of the ovary arise from the same embryologic origin, hence many have morphologic features that are typical for epithelial ovarian carcinoma, such as psammoma bodies.
- PPC may share a common biology with ovarian carcinoma. It occur more commonly in women with BRCA1 mutations and occasionally in women from families at high risk for ovarian cancer, and elevated serum concentrations CA 125.
- Survival is poor for patients with PPC, with 100% mortality; the median survival reported is 12-25 months, even with extensive surgery and chemotherapy.
- PCC usually manifests as abdominal distention and diffuse nonspecific abdominal pain secondary to ascites.
- Direct visualization of the peritoneal surfaces along with palpation of the abdominal contents is by far the most sensitive modality for detecting peritoneal cancer.
- The standard imaging tests are notably insensitive for the detection of peritoneal tumors and is histologically indistinguishable from primary epithelial ovarian carcinoma.
- PPC is surgically staged according to the 2017 International Federation of Gynecology and Obstetrics (FIGO)/Tumor, Node, Metastasis (TNM) classification system.
- Treatment of this malignancy is very similar to that of epithelial ovarian cancer, which includes combination chemotherapy after optimal cytoreductive surgery.

Learning Objectives

- Primary peritoneal carcinoma is a rare malignancy, predominantly affects postmenopausal women and typically displays multicentric peritoneal and omental involvement.
- This malignancy is differentiated from its ovarian counterpart by the fact that it involves the extraovarian peritoneum significantly and the ovarian surface minimally or not at all.
- Common presentations include abdominal distention, and constitutional symptoms. Our patient presented with colovesical fistula.
- Treatment of this malignancy is very similar to that of epithelial ovarian cancer, which includes surgery followed by chemotherapy

References

- Takano M, Yoshikawa T, Kato M, Aida S, Goto T, Furuya K, et al. Primary clear cell carcinoma of the peritoneum: report of two cases and a review of the literature. *Eur J Gynaecol Oncol*. 2009; 30(5):575-8.
- Sebbag G, Shmookler BM, Chang D, Sugarbaker PH. Peritoneal carcinomatosis from an unknown primary site. *Management of 15 patients. Tumori*. 2001 Mar-Apr; 87(2):67-73

A case of Acute Rheumatic fever

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Case

A 29-year-old male from Marshall Islands, with no past medical history, presented to the hospital with three days complaint of joint pain, severe limitation movement secondary to pain with one-day onset of retrosternal sharp and constant chest pain, while reporting recent history of sore throat. Exam showed vitals: temperature 98.6 F, PR: 90 b/min, RR: 18 C/min, BP: 120/84 mm-Hg, SpO₂: 100% breathing ambient air. Severely tender and hot large joints of all four extremities. Initial work up showed leukocytosis with elevated absolute neutrophil count, acute kidney injury, elevated cardiac enzymes and elevated liver function tests. Further work up showed elevated ASO titer. At this point patient met two major criteria for acute rheumatic fever (ARF) with evidence of a preceding group A streptococcal infection. He was started on appropriate treatment per AHA guidelines with Penicillin and Naproxen. The patient had an excellent response to the treatment and was discharged home.

Discussion

ARF is a nonsuppurative sequela that occurs two to four weeks following Group A Streptococcus pharyngitis. The mean incidence is ≤ 2 cases per 100,000 school-aged children in the United States and other developed countries. There are major and minor manifestations for the disease; these manifestations are used for diagnosis (Revised Jones Criteria). The five major manifestations are carditis, arthritis which is usually migratory polyarthritis, central nervous system involvement, subcutaneous nodules, and erythema marginatum. The four minor manifestations are arthralgia, fever, elevated acute phase reactants, and prolonged PR interval on EKG. Two major manifestations or one major plus two minor are sufficient for diagnosis of an initial episode of ARF in a patient with evidence of a preceding Group A Streptococcal infection. Goals of treatment are symptomatic relief of acute disease manifestations, eradication of group A beta-hemolytic streptococcus, and prophylaxis against future Group A streptococcal infection to prevent progression of cardiac disease. Anti-inflammatory agents, including salicylates and corticosteroids in appropriate dose, provide dramatic improvement in symptoms such as arthritis and fever. Patients with severe heart failure require anti-failure treatment. When carditis is complicated by marked valvular regurgitation causing severe hemodynamic compromise, valve surgery is life-saving and should not be delayed. Primary prevention refers to antibiotic treatment of group A streptococcus pharyngitis to prevent subsequent attacks of acute rheumatic fever. A single IM injection of benzathine penicillin or a 10-day course of penicillin V. secondary prevention, the long-term administration of antibiotic to prevent recurrences, is of proven benefit and cost effective. Benzathine penicillin 1.2 million units IM every 4 weeks or penicillin V 250mg orally twice daily. Prophylaxis is advised until age of 21 years or for at least five years after the last attack, whichever is longer.

Learning points

Acute rheumatic fever is said to be a disease that “licks the joints and bites the heart.” This underlines the fact that cardiac involvement is the most serious manifestation which may be life threatening if appropriate medical and surgical therapy is not instituted.

Objectives

Acute rheumatic fever is said to be a disease that "licks the joints and bites the heart." This underlines the fact that cardiac involvement is the most serious manifestation which may be life threatening if appropriate medical and surgical therapy is not instituted.

Case presentation

- 29 year old male from Marshall Islands, with no past medical history.
- Presented to the hospital with three days complaint of joint pain, severe limitation movement secondary to pain with one day onset of retrosternal sharp and constant chest pain, while reporting recent history of sore throat.
- Exam showed vitals: temp 98.6 F, PR: 90 b/min, RR:18 C/min, BP: 120/84 mm-Hg, SpO2: 100% breathing ambient air.
- Severely tender and hot large joints of all four extremities.
- Initial work up showed leukocytosis with elevated absolute neutrophil count, acute kidney injury, elevated cardiac enzymes and elevated liver function tests.
- Further work up showed elevated ASO titer. At this point patient met two major criteria for acute rheumatic fever (ARF) with evidence of a preceding group A streptococcal infection. He was started on appropriate treatment per AHA guidelines with Penicillin and Naproxen. The patient had an excellent response to the treatment and was discharged home.

Discussion

- Acute rheumatic fever is a nonsuppurative sequela that occurs two to four weeks following Group A Streptococcus pharyngitis and may consist of arthritis, carditis, chorea, erythema marginatum, and subcutaneous nodules.
- Damage to cardiac valves may be chronic and progressive, resulting in cardiac decompensation. Rheumatic fever and rheumatic heart disease are diseases of poverty and economic disadvantage.
- The mean incidence of ARF is 19 per 100,000 school-aged children worldwide, but it is lower (<2 cases per 100,000 school-aged children) in the United States and other developed countries. There are major and minor manifestations for the disease. These manifestations are used for diagnosis (Revised Jones Criteria):
 - A-The five **major** manifestations: 1)Carditis and valvulitis (50 to 70 %), 2)Arthritis which usually migratory polyarthritis predominantly involving the large joints (35 to 66 %), 3)Central nervous system involvement (Sydenham chorea) (10 to 30 %), 4)Subcutaneous nodules (0 to 10 %), 5)Erythema marginatum (<6 %).
 - B-The four **minor** manifestations: 1)Arthralgia, 2)Fever, 3)Elevated acute phase reactants, 4)Prolonged PR interval on EKG.
- There are two primary forms of presentation:1) the more common form is an acute febrile illness with joint manifestations and often carditis,2) the less common form is a neurologic/behavioral disorder with Sydenham chorea.
- The 2015 revision of the Jones criteria for low-risk populations: Two major manifestations or one major plus two minor are sufficient for diagnosis of an initial episode of ARF in a patient with evidence of a preceding Group A Streptococcal infection.



Reported worldwide prevalence of Acute Rheumatic fever 1991 through present

Treatment

- Goals of treatment are Symptomatic relief of acute disease manifestations, Eradication of group A beta-hemolytic Streptococcus, Prophylaxis against future GAS infection.
- Anti-inflammatory agents, including salicylates and corticosteroids (aspirin 4-8 g/day, prednisolone 1-2 mg/kg/day).
- There is no good evidence that steroids are superior to aspirin.
- Anti-inflammatory agents are usually used in high dose for 2 weeks and the decreased by 20% each week depending on clinical response and lab measurements.
- When carditis is complicated by marked valvular regurgitation causing severe hemodynamic compromise, valve surgery is life-saving and should not be delayed by trials of anti-inflammatory medications.
- Primary prevention can be achieved with a single IM injection of benzathine penicillin or a 10-day course of penicillin V.
- secondary prevention, the long term administration of antibiotic to prevent recurrences.
- Benzathine penicillin 1.2 million units IM every 4 weeks or penicillin V 250mg orally twice daily. Prophylaxis is advised until age of 21 years or for at least 5 years after the last attack, whichever is longer

References

- 1.The worldwide epidemiology of acute rheumatic fever and rheumatic heart disease. Michael D Sackler and Tracey R Hoke. doi: 10.2147/CLEP.S12977.
- 2-Up to date.

A rare case of Acute Disseminated Encephalomyelitis (ADEM)

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Case

A 22-year-old Caucasian man with h/o illicit drug use presented with decreased awareness, urinary incontinence and generalized weakness for two weeks which progressively worsened. Patient was non-verbal on admission. Per family he had diarrhea and vomiting four weeks prior to admission. Vitals were normal. Physical exam was unremarkable except for neurologic exam. Patient was nonverbal, followed some commands, had dilated pupils with sluggish reaction, normal muscle bulk and tone and moved all extremities but was not cooperative to allow full exam. Labs were normal and urine drug screen was negative. CT head and MRI brain without contrast suggested anoxic brain injury. Patient declined neurologically and became unresponsive even to painful stimulus and thus neurology was consulted. CSF analysis was non-revealing including infectious panels. EEG showed signs of encephalopathy without seizure activity and MRI brain with and without contrast showed white matter changes consistent with Acute Disseminated Encephalomyelitis (ADEM). High dose IV steroids were initiated and continued for seven days without benefit. Subsequently IV immunoglobulin treatment was initiated and patient responded well and was discharged to rehab.

Discussion

ADEM is an immune-mediated demyelinating CNS disorder with predilection to early childhood, less likely to be seen in adults. MRI typically demonstrates reversible, ill-defined white matter lesions of the brain and often also the spinal cord, along with frequent involvement of thalami and basal ganglia. Most cases report history of recent infection and/or vaccination. ADEM is characterized by an acute onset of encephalopathy in association with polyfocal neurologic deficits, sometimes preceded by prodromal symptoms. The clinical course of ADEM is typically rapidly progressive, with maximal deficits within two to five days. Frequent neurologic manifestations include pyramidal signs, ataxia, acute hemiparesis, optic neuritis or other cranial nerve involvement, seizures, spinal cord syndrome, and impairment of speech. The diagnosis of ADEM is considered in patients with acute multifocal neurologic signs and symptoms without a history of previously unexplained neurologic symptoms. There are no specific biomarkers or confirmatory tests to establish the diagnosis. MRI is the neuroimaging modality of choice. The most challenging aspect of caring for a patient with ADEM is differentiating this entity from a first attack of multiple sclerosis. Other entities to be considered in the differential include infectious meningoencephalitis, neurologic sarcoidosis, vasculitis, progressive multifocal leukoencephalopathy, and Behçet's syndrome. A typical treatment regimen consists of IV methylprednisolone at a dose of 30 mg/kg/d (maximally 1,000 mg/d) for five days, followed by an oral taper over 4–6 weeks. IVIG is used mostly in combination with corticosteroids or as a second-line treatment in steroid-unresponsive ADEM. Plasma exchange is recommended for therapy-refractory patients with fulminant disease. Most patients with ADEM improve with treatment, but complete recovery occurs in only 10 to 46 percent of adult patients, with motor deficits and/or cognitive impairment often persisting in the remainder.

Learning objectives

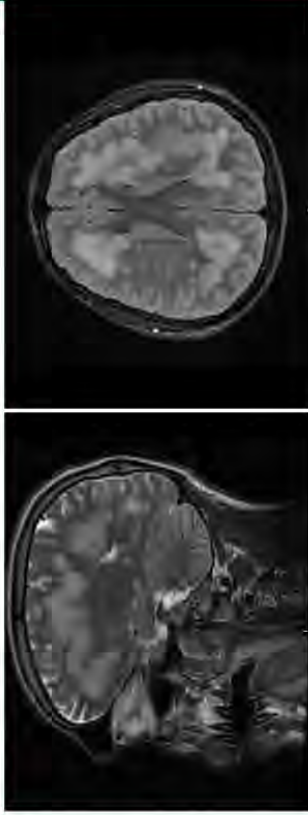
ADEM is a rare immune-mediated demyelinating CNS disorder most prevalent in children. It should also be suspected in adults presenting with rapidly progressive neurologic decline with no other obvious explanation of their illness.

Objectives

ADEM is a rare immune-mediated demyelinating CNS disorder most prevalent in children. It should also be suspected in adults presenting with rapidly progressive neurologic decline with no other obvious explanation of their illness.

Case presentation:

- A 22-year-old Caucasian man with h/o illicit drug use presented with decreased awareness, urinary incontinence and generalized weakness for two weeks which progressively worsened.
- Patient was non-verbal on admission. Per family he had diarrhea and vomiting four weeks prior to admission.
- Vitals were normal. Physical exam was unremarkable except for neurologic exam. Patient was nonverbal, followed some commands, had dilated pupils with sluggish reaction, normal muscle bulk and tone and moved all extremities but was not cooperative to allow full exam.
- Labs were normal and urine drug screen was negative.
- CT head and MRI brain without contrast suggested anoxic brain injury.
- Patient declined neurologically and became unresponsive even to painful stimulus and thus neurology was consulted.
- CSF analysis was non-revealing including infectious panels.
- EEG showed signs of encephalopathy without seizure activity and MRI brain with and without contrast showed white matter changes consistent with Acute Disseminated Encephalomyelitis (ADEM).
- High dose IV steroids were initiated and continued for seven days without benefit. Subsequently IV immunoglobulin treatment was initiated and patient responded well and was discharged to rehab.



MRI brain, right: sagittal view demonstrating supratentorial white matter changes and left: bilateral and asymmetrical white matter changes.

Discussion:

- ADEM is an immune-mediated demyelinating CNS disorder with predilection to early childhood, less likely to be seen in adults.
- MRI typically demonstrates reversible, ill-defined white matter lesions of the brain and often also the spinal cord, along with frequent involvement of thalami and basal ganglia.
- Most cases report history of recent infection and/or vaccination.
- ADEM is characterized by an acute onset of encephalopathy in association with polyfocal neurologic deficits, sometimes preceded by prodromal symptoms.
- The clinical course of ADEM is typically rapidly progressive, with maximal deficits within two to five days.
- Frequent neurologic manifestations include pyramidal signs, ataxia, acute hemiparesis, optic neuritis or other cranial nerve involvement, seizures, spinal cord syndrome, and impairment of speech.
- The diagnosis of ADEM is considered in patients with acute multifocal neurologic signs and symptoms without a history of previously unexplained neurologic symptoms.
- There are no specific biomarkers or confirmatory tests to establish the diagnosis.
- MRI is the neuroimaging modality of choice. The most challenging aspect of caring for a patient with ADEM is differentiating this entity from a first attack of multiple sclerosis.

Continued discussion

- Other entities to be considered in the differential include infectious meningoencephalitis, neurologic sarcoidosis, vasculitis, progressive multifocal leukoencephalopathy, and Behçet's syndrome.
- A typical treatment regimen consists of IV methylprednisolone at a dose of 30 mg/kg/d (maximally 1,000 mg/d) for five days, followed by an oral taper over 4–6 weeks.
- IVIG is used mostly in combination with corticosteroids or as a second-line treatment in steroid-unresponsive ADEM.
- Plasma exchange is recommended for therapy-refractory patients with fulminant disease. Most patients with ADEM improve with treatment, but complete recovery occurs in only 10 to 46 percent of adult patients, with motor deficits and/or cognitive impairment often persisting in the remainder.

References

- 1- Cortese J, Chaudhry V, So YT, et al. Evidence-based guideline update: Plasmapheresis in neurologic disorders: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Neurology 2011; 76:294.
- 2- Keegan M, Pineda AA, McClelland PL, et al. Plasma exchange for severe attacks of CNS demyelination: predictors of response. Neurology 2002; 58:143.
- 3- Uptodate.

“Abscessed”: Not Your Typical Skin Infection

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Learning Objectives

- Understand clinical presentations of rapidly growing mycobacteria that are non-pulmonary in origin.
- Educate health care professionals about the prevention of these infections.
- Discuss treatment options of rapid growing mycobacteria.

Case Presentation

28 year-old Caucasian female with no past medical history presented to Dermatology with a single right lower extremity skin lesion that had been worsening by increase in size and erythema over 4 months duration. The patient denied any pain, itching, or drainage, and she did not report any fevers, chills, or other systemic symptoms. Dermatology drained the lesion and placed the patient on a ten-day course of Bactrim DS 800 mg-160 mg tablets BID for abscess/cellulitis. Following I & D, multiple new lesions appeared on the right thigh and the patient was referred to Infectious Diseases. Culture grew *Mycobacterium abscessus* group bacteria.

Social History

The patient had recently received a manicure and pedicure at a nail salon prior to the onset of symptoms.

Home Medications

Bactrim DS 800 mg-160 mg tablets

Physical Exam

Multiple erythematous nodules on the right thigh that were painful to palpation.

Discussion

Mycobacterium abscessus is one of three species, including *Mycobacterium fortuitum* and *Mycobacterium chelonae*, known as rapidly growing mycobacteria (RGM). These species are named based on their ability to grow in subculture within one week, which is shorter than the 12-16 days needed to grow other species of mycobacteria. *Mycobacterium abscessus* is the most common RGM and is typically seen in patients with cystic fibrosis and bronchiectasis. However, this species can cause a number of different clinical manifestations, including skin and soft tissue infections. A retrospective case study at the Mayo Clinic revealed that *M. fortuitum* infections were more likely to present as a single skin lesion while *M. chelonae* and *M. abscessus* infections were more likely to present as multiple skin lesions. It was also found that patients with multiple skin lesions were more likely to be immunosuppressed. Some studies have revealed that these infections have been associated with nail salon whirlpool footbaths and tattooing.

Diagnosis of nonpulmonary disease caused by RGM is made by cultures of drainage material or tissue biopsy. Susceptibility testing should be performed because RGM are not susceptible to antituberculous agents, but they are susceptible to antibacterial agents. Regimens for skin and soft tissue infections caused by RGM should include two agents for a minimum of four months. The agents can be chosen from the following agents: Bactrim DS BID, Doxycycline 100-200 mg daily, Levofloxacin 500 mg daily, Clarithromycin 500 mg BID, or Azithromycin 250-500 mg daily. It is worth mentioning that *M. fortuitum* and *M. abscessus* species are becoming increasingly resistant to Clarithromycin.

References

- Griffith, D. E., MD, Von Reyn, C. F., MD, & Bloom, A., MD. (2017, March 2). Rapidly growing mycobacterial infections: Mycobacteria abscessus, chelonae, and fortuitum. Retrieved from https://www-uptodate-com.ezproxy3.lhl.uab.edu/contents/rapidly-growing-mycobacterial-infections-mycobacteria-abscessus-chelonae-and-fortuitum?search=mycobacterium%20abscessus&source=search_result&selectedTitle=1~32&usage_type=default&display_rank=1
- Mycobacterial Culture: Overview and Purpose by the Association of Public Health Laboratories. (n.d.). Retrieved February 12, 2018, from https://www.aphl.org/programs/infectious_disease/tuberculosis/TBCore/MycobacterialCulture_FINAL.pdf
- Wallace, R., Swenson, J., Silcox, V., & Bullen, M. (1985). Treatment of Nonpulmonary Infections Due to Mycobacterium fortuitum and Mycobacterium chelonae on the Basis of in vitro Susceptibilities. *The Journal of Infectious Diseases*, 152(3), 500-514. Retrieved from <http://www.jstor.org/stable/30105306>
- Uslan DZ, Kowalski TJ, Wengenack NL, Virk A, Wilson JW. Skin and Soft Tissue Infections Due to Rapidly Growing Mycobacteria Comparison of Clinical Features, Treatment, and Susceptibility. *Arch Dermatol*.2006;142(10):1287–1292. doi:10.1001/archderm.142.10.1287

* This vignette was chosen for oral presentation on Research Day. Contact Clark Alves at jalves@uabmc.edu for a copy of the PowerPoint.

'A Bleeding Dilemma' – Story of a Periampullary Mass

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Objectives

1. To learn about periampullary tumors and hemosuccus pancreaticus, a rare cause of obscure gastrointestinal bleed

Case Presentation

79-year-old African American male presented with complaint of two episodes of black tarry stools since 1 day. No abdominal pain, nausea, weight loss, appetite changes, diarrhea, hematemesis or hematochezia was reported. His multiple co morbidities included heart failure with reduced ejection fraction of 20%, dilated cardiomyopathy, chronic obstructive pulmonary disease, a recent stroke and history of DVT. He had significant smoking and alcohol abuse history, both of which he quit 5 years ago.

A year ago, he was evaluated for hematemesis with computed tomography (CT) scan of the abdomen and pelvis showing a 5.6 X 6.7 cm pancreatic head mass invading duodenum followed by an esophagogastroduodenoscopy (EGD) revealing a duodenal ulcer at the major duodenal papilla with no malignant or dysplastic cells on histology of the biopsy specimen and an unremarkable colonoscopy after which he failed to follow up.

Examination revealed an ill appearing, aphasic, malnourished male with tachycardia and hypotension. Initial testing showed a hemoglobin of 9.9, blood urea nitrogen of 30, lactate of 3.7, INR of 1.1 and total bilirubin of 0.3. After initial resuscitation with IV fluids and transfusions, an emergent EGD was performed during which a fungating, polypoid mass with ulceration at the major duodenal papilla was seen with intractable bleeding from ampullary opening that could not be controlled with epinephrine. Patient was taken for an emergent arteriogram which showed a hypervascular mass within the second part of duodenum and pancreatic head with active hemorrhage from superior pancreaticoduodenal branch of gastroduodenal artery (GDA) supplying the mass for which an embolization procedure was performed. Pathology of specimen biopsied during EGD revealed invasive adenocarcinoma. No further bleeding requiring transfusion was noted after the procedure and his hemoglobin remained stable.

Discussion

Periampullary tumors encompass malignancies arising from the duodenum, ampulla of vater, distal common bile duct and pancreas. Differentiating and determining the source of origin can be very challenging and may not be possible until histopathological evaluation of the entire resected surgical specimen is done. This is important due to differences in prognosis and implications associated with the primary tissue. We describe a case of periampullary tumor associated with hemosuccus pancreaticus that refers to bleeding from ampulla of vater arising in pancreatic duct. It is a rare and life threatening cause of gastrointestinal bleeding that can be easily missed unless suspected due to the intermittent nature of signs and symptoms and the location that makes visualization difficult. Active bleeding is very rarely seen on endoscopy as noted here and mostly involves splenic, gastroduodenal, pancreaticoduodenal, gastric

or hepatic artery. Although most commonly associated with pancreatitis, this condition is also seen to be associated with pancreatic tumors. Management aims to eliminate the source of bleeding and can be either interventional radiology mediated in form of embolization as done here or surgical. This case also reflects the high false negativity associated with endoscopic biopsy samples and the need for further evaluation despite such results in highly suspicious cases.

INTRODUCTION

- Primary ampullary carcinoma is a rare malignancy with an incidence of 4 in a million.
- 90% of these are adenocarcinomas [1] which mostly present as obstructive jaundice in up to 85% cases and obscure occult gastrointestinal bleed.

CASE DESCRIPTION

79-year-old African American male presented for evaluation of melena x 1 day
 No abdominal pain, nausea, weight loss, appetite changes, diarrhea, hematemesis or hematochezia

An year ago, he was admitted for evaluation of hematemesis and hematochezia with Hb of 8.9
 Work up at the time revealed:

1. Bidirectional endoscopy - large submucosal, ulcerated mass in the area of major duodenal papilla with benign histopathology of the biopsy specimen.
2. CT scan of abdomen and pelvis - 6.7x5.5 cm mass at pancreatic head causing pancreatic duct dilatation of 11 mm.
3. Endoscopic ultrasound (EUS) - prematurely terminated due to development of hypotension.

Patient was discharged after stabilization of hemoglobin and control of bleeding for outpatient gastroenterology evaluation within a week. He never followed up.

Past medical history - CAD, dilated cardiomyopathy, HFREF of 20%, COPD, large MCA stroke, DVT
 Social history - smoking and alcohol abuse. Quit both 5 years ago

Laboratory Investigation		Physical Exam
$ \begin{array}{c} 13.4 \\ 7.4 \quad 14 \\ 3.6 \quad 9 \quad 81 \\ 10.0 \quad 9.9 \quad 31.8 \\ 31.1 \end{array} $	$ \begin{array}{c} 0.3 \\ 81 \\ 31.8 \end{array} $	III appearing, afebrile, malnourished male with tachycardia, HR - 120 Hypotension, SBP - 82

DISCUSSION

- Periapillary tumors encompass malignancies arising from the duodenum, ampulla of Vater, distal common bile duct and pancreas.
- Differentiating and determining origin of such tumors is important due better prognosis and surgical outcomes in tumors of ampullary and duodenal origin. This can be very challenging and may not be possible until histopathological evaluation of the entire resected surgical specimen [2].
- Malignancies of Ampulla of Vater constitute 5-6% of pancreatic head tumors causing obstruction of either or both common bile duct and major pancreatic duct of which latter was noted in this case.
- The tumor was considered ampullary in origin and not pancreatic due to slower progression since initial detection. In contrast, pancreatic adenocarcinomas have an aggressive course.
- Acute gastrointestinal bleed is a rare manifestation of primary ampullary carcinoma seen as blood oozing out of duodenal papilla on a side viewing endoscope which also facilitates visualization and biopsy of the tumor within the ampulla [3].
- Management in a hemodynamically unstable patient requires CT angiogram to identify the bleeding vessel followed by invasive angiography for embolization, failing which surgery is considered next.

HOSPITAL COURSE

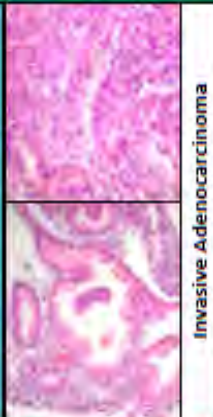
Initial Fluid Resuscitation
 IV fluids + packed red cell transfusions

EMERGENT UPPER ENDOSCOPY
 Using front B. side viewing endoscope



Fungating, polypoid mass within the ampulla of Vater with active bleeding that could not be controlled with epinephrine

BIOPSY: Histopathology



Invasive Adenocarcinoma

EMERGENT INVASIVE ANGIOGRAPHY
 Hypervascular mass within 2nd part of duodenum & pancreatic head with active hemorrhage from the supplying vessels including superior pancreaticoduodenal branch of gastroduodenal artery (GDA)

EMBOLIZATION OF GDA
 No further bleeding
 HSBH remained stable

CONCLUSION

1. Tumors in periampullary region represent a diagnostic challenge.
2. Differentiation of tumors in this region is necessary for management and prognosis.
3. A side viewing endoscope is essential for evaluation of the ampullary complex [4].
4. Endoscopic biopsy has a high false negative rate of 50% depending upon technique and site of sampling.

REFERENCES

1. Schrimacher P, Büchse MW. Ampullary adenocarcinoma - differentiation matters. BMC Cancer. 2008;8(1):251.
2. Sarmento JM, Magomay DM, Sam MMS, Farnell MB. Periapillary cancers: are there differences? Surg Clin North Am. 2001;81(1):543-55.
3. Jansen RM, Ranji AS, Alint JDA, Scudamore CH, Kozido EM. Obscure Gastrointestinal Bleeding from an Ampullary Tumour in a Patient with a Remote History of Renal Cell Carcinoma: A Diagnostic Conundrum. Canadian Journal of Gastroenterology. 1998;12(1):75-78.

Unrelenting Pain: A Scream for Evaluation

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Learning Objectives

1. To learn about Ewing's sarcoma- a rare malignancy
2. To understand the subtlety of presentation in Ewing's sarcoma
3. To understand – 'unrelenting pain is a scream for evaluation'

Case Presentation

A 24-year-old incarcerated Caucasian male was brought for evaluation of progressively worsening chest pain that began 2 weeks ago. The pain was substernal, activity independent, pleuritic and accompanied by fever, non-productive cough, and fatigue. Patient also reported weight loss of 30 lbs. during incarceration and diffuse backache since 6-8 months relieved with opioids that he had abused for years. Examination revealed diffuse tenderness on palpation of the chest and back without signs of inflammation. No lymphadenopathy or masses were appreciated. Flexion, abduction and external rotation at the left hip joint reproduced pain in the buttock. Initial testing showed an elevated C- reactive protein of 10.7, hemoglobin of 9.5 and LDH of 679. Iron panel suggested anemia of chronic disease with ferritin of 3995. Electrocardiogram showed sinus tachycardia and computed tomography (CT) angiogram was unremarkable. X-ray lumbar spine and pelvis were non-revealing. All causes of acute chest pain were ruled out. Infectious workup was unremarkable. Later in the course, he developed reduced sensation over left thigh along with worsening lower back pain which prompted a pelvic MRI that revealed an expanding left iliac wing abnormality with lesions noted throughout pelvis and femur. Subsequent CT guided biopsy showed small round blue cell tumor with positivity for synaptophysin and CD99. Fluorescent in situ hybridization (FISH) analysis showed EWSR-1 gene (22q11) rearrangement confirming the diagnosis of Ewing's sarcoma with widespread metastasis involving the sternum and ribs at presentation as noted on PET scan.

Discussion

Ewing's sarcoma is a small round blue cell tumor that belongs to Ewing sarcoma family of tumors (EST). It is the second most common primary bone malignancy among children and young adults with an incidence of 1 case per million for all ages in US. It usually presents as long-standing bone pain worse with activity and at night, localized swelling, palpable mass, pathological fractures, radiculopathy along with constitutional symptoms. Typically radiographic findings show bone lesions with permeative, "moth eaten" or "onion peel" appearance seen in 76-82% cases and an associated extraosseous component in 56-80%. This case represents a diagnostic dilemma in terms of the initial non-specific presentation with normal radiographic findings which delayed evaluation with MRI, the imaging modality of choice with STIR sequences that help suppress signals from fat and characterize the lesion better. The poor prognosis associated with bone and soft tissue tumors makes early diagnosis important. Definitive diagnosis is established with biopsy that shows characteristic round blue cells on histology, findings of positive CD99 and negative PAS on immunohistochemistry and EWSR-1 rearrangement on cytogenetics. This case

emphasizes the importance of evaluating unrelenting pain or pain with red flags as noted with the onset of radiculopathy in this case. It also conveys that physicians must look beyond the bias formed towards patients with drug seeking behavior and instead objectively evaluate the cause of such pain.

*** This vignette was chosen for oral presentation on Research Day. Contact Bhavya Bahl at bhavyabahl@uabmc.edu for a copy of the PowerPoint.**

Double Trouble and a Delay

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Learning Objectives

- 1) Recognize that sepsis is a clinical diagnosis without clear diagnostic markers.
- 2) Identify early manifestations of necrotizing fasciitis

Case Presentation

A 20-year-old female presents with 12 hours of progressive abdominal pain, lightheadedness, dyspnea, and chills 5 days status post C-section at 35 weeks for preterm labor with breech presentation. On exam, vitals were T 103.3, BP 87/44, HR 175, RR 18, and SpO₂ 100% on room air. The patient appeared ill. Although her Pfannenstiel incision looked clean and dry without erythema, the patient reported diffuse abdominal pain from her umbilicus to the incision. Labs showed WBC 15.4k, Hgb 11, CRP 15, and lactic acid 1 (<1 normal). Abdominal CT revealed some subcutaneous fluid and scant air, consistent with postoperative changes.

In the ED, the patient initially received 2 L of normal saline, but no antibiotics, apparently due to her normal lactic acid level. The admitting team provided empiric antibiotics and further IV hydration. The patient improved initially, but by morning her pain had worsened. Lactate had also risen to 3.4. Since her abdominal pain was now out of proportion to exam and her incision erythematous, trauma surgery was consulted for possible necrotizing fasciitis. Emergent laparotomy revealed necrotizing infection of the anterior abdominal wall. Wound cultures grew MRSA. After repeated debridement and abdominal wall reconstruction with mesh, the patient recovered and was discharged home.

Discussion

This patient presented with two related life-threatening conditions. Sepsis, initially the most apparent problem, requires aggressive management with early IV fluids and broad-spectrum antibiotics. Initially, treatment was delayed because of the normal lactate level. However, sepsis is a clinical diagnosis based on vitals, exam, labs, and imaging findings, not on a long list of diagnostic criteria. While an elevated lactate level is associated with a poorer prognosis in sepsis, lactate is not a diagnostic marker.

Necrotizing fasciitis, another medical emergency, requires a high clinical suspicion since the initial manifestations may be vague. In this case, physical exam was initially misleading. Since the infection began in deep tissues, our patient did not display the classic erythema, grayness, and bullae. The subcutaneous inflammation and air on her CT, findings suggestive of necrotizing fasciitis, were also consistent with her history of recent surgery. Close follow-up of this patient, along with early surgery when she deteriorated, resulted in prompt diagnosis and treatment of her infection. This case illustrates that, in necrotizing fasciitis, pain may precede all cutaneous findings. Clinicians should consider necrotizing soft tissue infection in any patient who presents with tachycardia, hypotension, and severe pain.

*** This vignette was chosen for oral presentation on Research Day. Contact Bethany Johnson at blj0006@uab.edu for a copy of the PowerPoint.**

Micronodular Splanchnic Fat Necrosis Mimicking Carcinomatosis on Exploratory Laparoscopy

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Learning Objectives

Present a case of unusual intraoperative findings, and discuss a possible etiology.

Case Presentation

A 64yo East Indian male with a past history of hypertension, type II diabetes, and multiple sclerosis was brought to the ED by his wife for several weeks of increasing confusion and weakness that had sharply worsened in the last 24 hours. His only medications were lisinopril, HCTZ, and metformin. He does not currently use insulin. On exam, an acutely ill, poorly responsive male was found to have Kussmaul's respirations and an amputated first toe. His blood glucose measured >800 with an anion gap of 34, and he was admitted with a diagnosis of DKA. Upon reaching the floor, his condition deteriorated to the point of needing intubation, mechanical ventilation, vasopressors, and a transfer to the ICU on hospital day 1. After receiving supportive care and treatment for DKA, he was transferred back to the floor on hospital day 7. As his hospital course progressed, his anion gap and blood glucose returned to normal, though he continued to lose weight and have a persistently altered mental status. Various complications arose and resolved over the next 14 days, including a small bowel obstruction, suspected clinically and supported radiographically. At this point, general surgery was consulted. An incidental finding on abdominal CT was a large amount of omental fat stranding, concerning for carcinomatosis given the patient's continuing failure to thrive. Exploratory laparoscopy was performed. Upon inspection of the abdomen, too many to count implants of what was thought to be metastatic cancer were visualized throughout the abdominal cavity, adherent mostly to the parietal peritoneum and omentum. They were gray-white in color and measured up to 0.2cm. Biopsy was taken, and histopathologic analysis of these lesions revealed that they were focal areas of fat necrosis, negative for malignancy. After further diagnostic workup not pertaining to his surgical findings, his symptoms were eventually attributed to an acute exacerbation of his MS, and he was discharged home.

Discussion

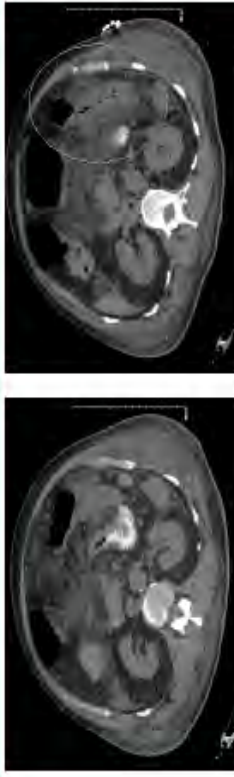
A thorough literature review revealed no obvious etiology for the intraoperative findings. Reports exist of patients with similar findings after pancreatitis, but the necrosis in those cases involved a small number of lesions several centimeters in size. One hypothesis involves the administration of vasopressors early in the patient's hospital course. The patient presumably has severe microvascular disease, considering his hypertension and diabetes were sufficiently advanced to necessitate a toe amputation. Administration of norepinephrine to a patient with such microvascular disease could cause vasoconstriction within the splanchnic circulation to the point where small areas of necrosis developed, and were subsequently visualized on laparoscopy.

H&P

- 64yo M East Indian immigrant brought to ED by wife for weeks of increasing confusion, weakness, worse in past 24h.
- PMH: HTN, DM, MS.
- Meds: ACEi, HCTZ, and metformin.
- Social Hx: Local dentist, no history of substance abuse
- PE: acutely ill. Obtunded. HR regular, Kussmaul's respirations, lungs CTAB. Abdomen protuberant, nontender, BS+, no masses. Amputated R 1st toe
- Labs: BG >800; Na 125; K 5.3; Cr 2.4; pH 7.1; AG 34; Venous pH 7.11; pO2 29; pCO2 36

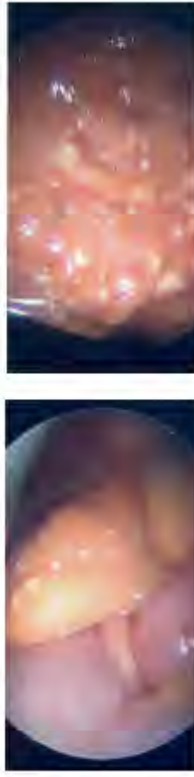
Hospital Course

- Day 1 – Admit to MICU, started on DKA protocol, broad spectrum antibiotics for possible urosepsis
- Day 2 – Early AM pt became unresponsive, code 0 called, ROSC achieved, required ~100mg phenylephrine over 24h to keep MAP >65
- Day 10 – Transferred to floor, still moderately confused
- Day 15 – Abdominal CT ordered re: SBO symptoms. Results concerning for carcinomatosis.
- Day 22 – Normal colonoscopy
- Day 26 – Exploratory laparoscopy performed re: failure to thrive, CT results, elevated CA 19-9
- Day 34 – Discharged home



Radiologic Findings (CT)

- Circumferential wall thickening consistent with colitis
- Moderate intrapelvic ascites
- Omental/mesenteric inflammatory change and nodularity of unknown significance, cannot rule out carcinomatosis or atypical pancreatitis (Serum lipase wnl on day 8)



Intraoperative Findings

- On inspection of the abdomen, too many to count implants of what was thought to be cancer were visualized on the omentum, parietal peritoneum, and bowel including the perirectal sigmoid. They were dull white in color and similarly sized.
- A small amount of fluid over the spleen and in the pelvis was noted and sampled.
- Liver was free of implants, but did have two large, dark lesions on its surface thought to be hemangiomas.

Pathologic Findings

- Omentum, Peritoneum – benign adipose tissue with multifocal areas of fat necrosis measuring up to 2mm in greatest dimension.
- Liver wedge biopsy – Subcapsular hemangioma, minimal portal inflammation
- Peritoneal, pelvic fluid – hypocoellular, rare mononuclear cells and fresh hemorrhage.
- All specimens negative for malignancy.

Discussion

- A thorough literature review revealed no documented etiology for the findings in this patient. Little has been published concerning non-pancreatic fat necrosis.
- This patient was very medically complex, and had a prolonged hospital course, prompting consultation of 8 separate subspecialists.
- A possible explanation for his findings involves administration of phenylephrine for hypotension early on in the hospital course. Vasopressor-induced splanchnic vasoconstriction in a patient already confirmed to have severe microvascular disease could lead to widespread microinfarcts and subsequent fat necrosis.
- Upon experimental administration of vasopressors, total bloodflow to the intestinal mucosa was unchanged, though the total flow through the splanchnic circulation was decreased.¹ These findings could be explained by an autoregulatory mechanism present in the splanchnic microcirculation that sacrifices flow to the muscularis in order to maintain mucosal perfusion.²
- We hypothesize that similar regulation of vascular beds supplying mesentery and intestinal serosa could produce these findings.

Conclusion

In a patient known to have severe microvascular disease 2/2 HTN, uncontrolled DM, admission of vasopressors may have caused micronodular necrotic deposits that resemble metastatic cancer on gross examination of the peritoneal cavity.

- References**
1. Nguyen A, Thomas A, & Rickstar, S. (2008). The effect of vasopressors on splanchnic blood flow: phenylephrine vs. norepinephrine. *Critical Care Medicine*, 36(3), 722-725.
 2. Krist, V., Hillbrand, L., & Sagarison, G. (2006). Effects of microvascular blood flow in the gastrointestinal tract in sepsis. *Critical Care Medicine*, 34(5), 1456-1463.

Disseminated Congenital HSV: Recognition and Prevention

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Learning Objectives

1. Recognize congenital HSV (herpes simplex virus)
2. Recognize the importance of preventive counseling for expectant mothers

Case Presentation

A 3-month-old boy presented to the ED after mother noticed progressively worsening rash on trunk, axilla, groin, palms, and soles of 3-day duration. He was taken to his pediatrician, who, suspecting possible HSV, swabbed a lesion for PCR and recommended taking the patient to the ED.

Upon review of birth history, mother revealed a primary HSV outbreak three weeks prior to delivery. She was treated with valacyclovir. It is unclear if delivering physician was aware, as the standard in this case would be treatment with acyclovir 200mg QID from outbreak through delivery. Patient was delivered at 37 weeks via vaginal delivery. At delivery, patient was noted to have microcephaly, hypotonia, minimal to no cry, red lesions on trunk, arms, neck, and peeling skin on legs. The following labs were negative: HSV from skin, blood, and CSF, CMV, VZV, syphilis, and toxoplasmosis. EEG was grossly abnormal and showed seizure like activity. MRI of the brain revealed periventricular calcifications. Chorioretinitis was noted. Suspecting disseminated HSV, the patient was started on acyclovir 20mg/kg TID, along with levetiracetam 36.5mg/kg BID.

The patient was admitted to the pediatric unit. Physical exam revealed vesicular lesions scattered across trunk, some confluent and crusted, in axillae, groin, and on palms and soles of feet, left sole with clustered/ hemorrhagic vesicles, L arm with crusted vesicles in various stages of healing. Baseline seizure activity was noted on EEG. The mother admitted to missing occasional doses of acyclovir and levetiracetam. The patient was treated with both medications via IV as inpatient, and lesions began to improve slowly, and seizure activity decreased. A G-tube was placed due to inadequate suck-reflex. During the hospital stay, results from the HSV swab returned positive for HSV 2. The patient stabilized in the hospital and was sent home with appointments to follow up with ID and primary care.

Discussion

Neonatal HSV is rarely seen, and is estimated to be around 10:100,000 live births worldwide by the WHO. It should be suspected in patients with mucocutaneous vesicles, CSF pleocytosis, seizures, abnormal neuroimaging, respiratory distress, abnormal LFTs, and conjunctivitis. Laboratory diagnosis is made via viral cultures of lesions, stool, CSF, and urine, PCR of CSF and blood, and enzyme immunoassays for HSV antigens. The high risk of death requires prompt diagnosis. It was fortunate that our patient was treated with acyclovir despite HSV labs initially returning negative.

This case also brings into consideration the importance of patient counseling. It is estimated that only 5% of neonatal HSV is contracted in utero (85% peripartum, 10% postnatal). Elective C-section is recommended with active lesions at the time of delivery, and when there are no visible lesions, but viral

detection tests result positive. A C-section virtually eliminates intrapartum transmission. It is imperative to thoroughly counsel patients on reporting any infections acquired during pregnancy, in order to properly treat the patient and prevent spread to the neonate.

*** This vignette was chosen for oral presentation on Research Day. Contact Jay Dasigi at jdasigi@uab.edu for a copy of the PowerPoint.**

Leiomyomatosis Peritonealis Disseminata – Acute Kidney Injury of Rare Etiology

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Learning Objectives

- Leiomyomatosis peritonealis disseminata
- Uncommon etiology for a classic presentation of post renal acute kidney injury

Case Presentation

77-year-old Japanese American female presented to the ED with a chief complaint of gradually reducing urine output for 1-2 weeks. She reported a decrease in frequency and volume per void – presenting with near zero urine production. Patient noted associated fever, chills, decreased appetite, and diarrhea of five-day duration. In addition, she reported lower back pain that was dull, bilateral, without radiation, and no alleviating or provoking factors. She denied dysuria and described urine as yellow and non-bloody.

At this point, the patient's HPI sounded consistent with a genitourinary disease (UTI, pyelonephritis, nephrolithiasis, renal or bladder cancer). However, the patient's past medical history was notable for leiomyomatosis peritonealis disseminata (LPD) with multiple abdominal mass resection surgeries and partial colectomy two years prior. Physical exam significant for mild abdominal distension, diffuse lower abdomen tenderness, multiple palpable nodules, mild CVA tenderness, 2+ non-pitting edema, and mottling of lower extremities from knees to toes.

Laboratory investigation revealed Na⁺ 121, K⁺ 6.3, Cl⁻ 94, HCO₃⁻ 11, BUN 64, Cr 3.0, and WBC of 16.7. Urine culture was positive for pan sensitive E. Coli. CT Abdomen and Pelvis revealed dilation of bilateral renal calyces, pelvis, and ureters likely secondary to bilateral ureteral obstruction from three large pelvic masses (RLQ: 11-12 cm, LLQ: 6-7cm, Presacral 9-10cm) and two retroperitoneal lymphadenopathies (3.1 x 2.2 cm, 2.7 x 2.2 cm). Patient was treated with antibiotics for her UTI and had bilateral nephrostomy tubes placed. The patient's condition improved and she was discharged home with a creatinine of 1.6.

Discussion

LPD (or disseminated peritoneal leiomyomatosis) is characterized by multiple nodules of the pelvic and peritoneal surfaces. It may present similar to metastatic ovarian or peritoneal carcinoma, requiring biopsy for histological diagnosis. The masses are generally benign and less than 5% undergo malignant transformation. Some evidence suggests a hereditary component, although there was no family history in this case. Fewer than 200 cases of LPD have been reported. Highest occurrence is in reproductive-age women, although there are reports of post-menopausal women (even without uterine leiomyomas) and a few men. LPD is generally asymptomatic and discovered incidentally. Asymptomatic disease does not require treatment, but symptomatic individuals may require surgical resection. As in this case, LPD masses can reoccur. Initiation of postmenopausal hormone therapy after oophorectomy has been linked to reoccurrence. Estrogen lowering therapy may cause regression of LPD lesions for a short period of time.

Although the common etiologies for post renal AKI are prostatic disease and bilateral nephrolithiasis, this was an unusual case of LPD causing bilateral ureteral obstruction that had good resolution.

Diagnostic Workup

- Leiomyomatosis peritonealis disseminata (LPD)
- Uncommon etiology for a classic presentation of post renal acute kidney injury (AKI)

RLQ: 11-12 cm (Figure 2),

LPD (or disseminated peritoneal leiomyomatosis)

- Pelvic nodules consisting of fusiform smooth muscle cells
- Estrogen is believed to promote growth
- Fewer than 200 cases of LPD have been reported
- Highest occurrence is in reproductive-age women, although there are reports of post-menopausal women and a few men

77-year-old Japanese American female

- Presented to the ED with a chief complaint of gradually reducing urine output for 1-2 weeks
- Associated fever, chills, decreased appetite
- Lower back pain that was dull, bilateral, without radiation, and no alleviating or provoking factors
- Denied dysuria and described urine as yellow and non-bloody

The patient has a past medical history of LPD with multiple abdominal mass resection surgeries and partial colectomy. On physical exam she had mild abdominal distention with diffuse lower abdomen tenderness and multiple palpable nodules. She also had non-pitting edema from her knees to toes.

Diagnostic Workup

T: 101.5 F, BP: 139/65, HR: 68, RR: 19, SpO2: 93% (2L)

U/A: Culture: >100,000 CFU/mL E. Coli (PS)

CT Abd/Pelvis: Bilateral dilated calyces, pelvis, ureters (Figure 1).

- Ureteral obstruction secondary to:
 - Large bilateral pelvic masses: RLQ: 11-12 cm (Figure 2), LLQ: 6-7 cm (Figure 3), Presacral: 9-10 cm (Figure 4)
 - Retroperitoneal lymphadenopathy: 3.1 x 2.2 cm, 2.7 x 2.2 cm

~~100~~
~~121 94 64~~
~~6.3 11 3.0~~
~~12.6~~
~~16.7~~
~~605~~
~~39.0~~

Hospital Course

The patient was treated with antibiotics for her urinary infection. Her creatinine decreased to 1.6 after placement of bilateral nephrostomy tubes and subsequent ureteral stenting. She was discharged home to follow-up in one month with Nephrology and Gyn Onc. Plan was to start an aromatase inhibitor as an outpatient.

Discussion

Leiomyomatosis peritonealis disseminata

- Characterized by multiple nodules of the pelvic and peritoneal surfaces as seen in this patient
- May present similar to metastatic ovarian or peritoneal carcinoma, requiring biopsy for histological diagnosis
- Generally benign and less than 5% undergo malignant transformation
- Some evidence suggests a hereditary component, although there was no family history in this case
- LPD is generally asymptomatic and discovered incidentally
- Asymptomatic disease does not require treatment, but symptomatic individuals may require surgical resection
- Surgery will likely resolve mass effect symptoms, but nodules may recur
- Initiation of postmenopausal hormone therapy after oophorectomy has been linked to recurrence due to increases in estrogen
- Estrogen lowering therapy may cause regression of LPD lesions

References

- Ando I, Kusuruki S, Ota T, Sugimoto Y, Matsukawa S, Ogishima D. Long-term efficacy and safety of atazanavir inhibitor use for HIV type 1 infection in patients with disseminated *Coccidioides immitis*. *J Infect Dis* 2010; 202: 1439-1485.



Figure 1



Figure 2



Figure 3

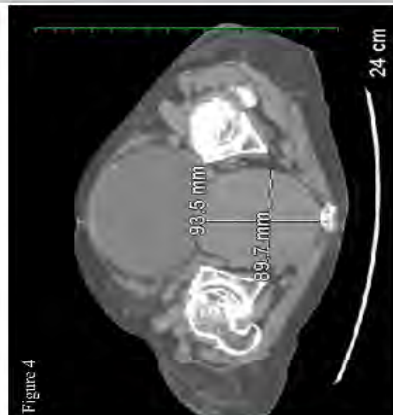


Figure 4

Eosinophilia causing peripheral neuropathy

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Learning objectives

Assess the cause of eosinophilia

Recognize manifestations of eosinophilia

Case Presentation

75-year-old Caucasian male with past medical history of right eye melanoma status post resection presented to the emergency department due to a two-week history of weakness and numbness in lower extremities. Patient first developed lower extremity muscle weakness two weeks prior and then developed decreased sensation that began in his feet and ascended to mid-leg bilaterally. Patient denied any recent fevers, weight loss, diarrhea, or skin lesions. He had decreased vibratory and sharp sensation of lower extremities to the level of mid-shin with symmetrical lower extremity weakness (3/5). Initial labs revealed WBC count of $25 \times 10^3/\mu\text{L}$, hemoglobin of 15.1 g/dL, and absolute eosinophil count of $9.5 \times 10^3/\mu\text{L}$ (normal $0-0.5 \times 10^3$). Vitamin B12 and TSH were normal. Nerve conduction study of lower extremities revealed primary axonal sensory motor polyneuropathy. Strongyloides antibody, c-ANCA, p-ANCA, and HIV were negative. IgE was 229 IU/mL. Bone marrow biopsy revealed markedly increased eosinophil precursors but no monotypic B-cell or abnormal T-cell population identified. Patient was diagnosed with idiopathic hypereosinophilic syndrome (HES) and started on IV steroids. His symptoms mostly resolved after one week of therapy.

Discussion

Hypereosinophilia is defined as tissue hypereosinophilia or an absolute eosinophil count of > 1500 cells/ μL on two separate exams separated by one month.

When hypereosinophilia is associated with organ damage in the absence of other identifiable causes it is termed hypereosinophilic syndrome (HES). HES can be subdivided into primary HES, in which there is an underlying clonal process, or secondary HES, in which there is polyclonal eosinophil expansion. HES with no known cause is termed idiopathic HES. Presenting symptoms vary, but skin, lung, and gastrointestinal tract are most commonly involved. Less commonly, HES causes cardiac and neurologic findings. Less commonly, HES causes cardiac and neurologic findings. Neurologic findings in HES are least common, accounting for 4% of signs and symptoms in HES. Neurologic disease includes cerebral thromboemboli, encephalopathy, and peripheral neuropathy. Peripheral neuropathy is thought to account for half of the neurologic manifestations of HES.

Work-up for underlying etiology begins by ruling out secondary causes, such as helminth infection, drug reaction, and collagen-vascular disease. Myeloid neoplasms should be ruled out with peripheral smear and bone marrow biopsy. Therapy is directed towards underlying cause. Idiopathic HES can be treated with prednisone, hydroxyurea, or interferon-alpha for steroid non-responders.

* This vignette was chosen for oral presentation on Research Day. Contact Jesse Faulk at jfaulk@uab.edu for a copy of the PowerPoint.

Superior Vena Cava Syndrome as a Medical Emergency

Jeremy Johnson, MD, PGY1, Department of Family Medicine, UAB Huntsville Regional Medical Campus;
Elena Roumaya, MD, PGY1, Department of Family Medicine, UAB Huntsville Regional Medical Campus;
Parekha Yedla, MD, Associate Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning Objective

Developing a complete differential diagnosis for acute airway compromise secondary to swelling.

Case History

A 45-year-old female presents to the emergency department in acute respiratory distress. The patient required an emergency tracheostomy that was complicated by a tension pneumothorax. Decompression was achieved with a right thoracotomy tube, after which she was stable and admitted to the ICU. She has a history significant for end-stage renal disease with a remote history of indwelling venous access catheter for dialysis. Physical exam revealed no evidence of swelling or fluid retention other than the bilateral upper extremities and face. A work up for angioedema was normal. A CTA of the chest followed by confirmatory angiography revealed severe stenosis of the superior vena cava. Attempts to pass a catheter beyond the stenosis to perform balloon angiography or stenting failed. The patient declined open repair and was discharged from the hospital with a tracheostomy. Follow up demonstrated continued improvement in the upper extremity and facial swelling. The patient had a similar emergency department presentation in 2015.

Discussion

Superior vena cava syndrome (SVCS) is a constellation of symptoms caused by obstruction of blood flow through the superior vena cava. Most often caused by thoracic malignancy, SVCS is becoming more common, due to the increased use of indwelling catheters and minimal invasive procedures. SVCS has no agreed upon diagnostic criteria and refers instead to a constellation of signs and symptoms caused by the compression, stenosis, or occlusion of the superior vena cava. Causes can be both malignant and benign, as in our case, with the former remaining the most common. Rarely does SVCS present as a life-threatening medical emergency, however, if it does, as with extreme head and neck swelling, the correct diagnosis is paramount in determining the appropriate critical care treatment for the patient once stabilized. Treatment of SVCS is generally initially supportive and guided by the underlying etiology. Thrombotic events are generally treated with anticoagulation and oncologic emergencies are guided by the tumor type and staging. Traditional open surgical repair to relieve the obstruction through bypass grafting with spiral saphenous vein, femoral vein, polytetrafluoroethylene (PTFE) graft, or Dacron graft has more recently been replaced with better tolerated and lower risk endovascular recanalization through balloon angioplasty or stenting.

Conclusion

In patients with a history of hemodialysis-catheter placement SVCS must always be in the differential when presenting with isolated upper extremity and/or facial swelling. Advances in technology and technique have shown a shift in treatment of SVCS from higher-risk open procedures to minimally invasive

endovascular interventions, though in symptomatic patients who fail endovascular therapy all options must be considered.

Introduction

- A 45 yo F presents to ED in respiratory distress. She was found to have significant airway edema. She was initially treated with IV diphenhydramine, inhaled racemic epinephrine, IV solumedrol, and IV famotidine.
- VS: Afebrile, BP 227/128, Pulse 95, RR 18, SpO2 98% on RA
- PE: swelling to bilateral upper extremities and face; sublingual swelling with displacement of tongue
- She deteriorated during evaluation requiring emergency tracheostomy complicated by a tension pneumothorax. Decompression was achieved and the patient was transferred to the ICU. After being weaned from the ventilator and removal of the chest tube the patient was transferred to the floor. Angioedema work up was performed which was negative. At this time the etiology of the swelling remained unknown. Follow up questioning revealed a history significant for an indwelling venous catheter due to end stage renal disease requiring dialysis. A CT Angiography of the chest revealed the stenosis of the superior vena cava. Vascular surgery was unable to pass a catheter beyond the area of stenosis and the patient deferred open repair. She was discharged home with a tracheostomy and outpatient follow-up revealed resolution of the swelling.



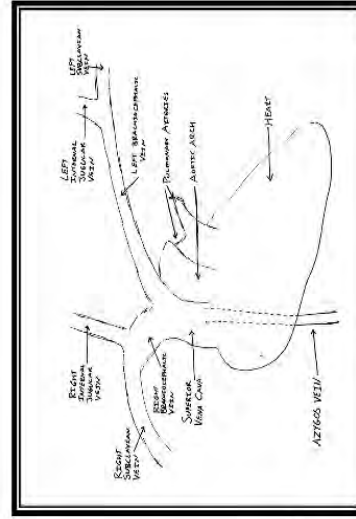
Figure 1. Superior vena cava stenosis.

As exhibited in Figure 1, CT angio of the chest revealed a high grade stenosis of the superior vena cava at the junction of the right brachiocephalic vein.

This is further illustrated by the dilatation of the left brachiocephalic vein in Figure 1 along with the dilated collateral vessels in Figure 2 and the dilated superficial chest wall vessels in Figure 3.



Figures 2 (above) and 3 (below). Dilated collateral vessels of the chest wall.



The sketch to the right illustrates the basic anatomical relationships between the superior vena cava, heart, and surrounding vasculature. When evaluating a patient for SVCS it is important to remember these relationships and look for signs of increased collateralization and dilation of proximal vessels.

Discussion

- Superior Vena Cava Syndrome (SVCS) is a constellation of symptoms caused by obstruction of blood flow through the superior vena cava
- Most commonly caused by thoracic malignancy
- Increasing prevalence due to indwelling catheters
- No agreed upon diagnostic criteria
- Severe head and neck swelling leading to airway compromise makes SVCS a potential medical emergency
- Treatment based on underlying cause and ranges from anti-coagulation to oncologic intervention and from endovascular options to open surgical repair

Conclusion

- SVCS must always be on the differential when evaluating isolated head, neck, and upper extremity swelling in patients with a h/o indwelling venous catheter placement
- Technological advancements have made treatment more amenable to endovascular options reducing patient risk

References

- Moskalev M, De Crespigny A, Valle P, Scoville E. Superior vena cava syndrome in hemodialysis patients: end-stage renal disease as a risk factor. *Brenn J. Supp. 2018; 2018: 100-101.*
- Sharma C, Singh J, Singh P, Singh P, Singh P, Singh P. Superior vena cava syndrome: A review of the literature. *J Cancer Res Ther. 2018; 2018: 100-101.*
- Thompson J, Karmali J, Karmali J, Karmali J, Karmali J, Karmali J. Superior vena cava syndrome: A review of the literature. *J Cancer Res Ther. 2018; 2018: 100-101.*
- Sharma C, Singh J, Singh P, Singh P, Singh P, Singh P. Superior vena cava syndrome: A review of the literature. *J Cancer Res Ther. 2018; 2018: 100-101.*
- Sharma C, Singh J, Singh P, Singh P, Singh P, Singh P. Superior vena cava syndrome: A review of the literature. *J Cancer Res Ther. 2018; 2018: 100-101.*
- Sharma C, Singh J, Singh P, Singh P, Singh P, Singh P. Superior vena cava syndrome: A review of the literature. *J Cancer Res Ther. 2018; 2018: 100-101.*

Atypical Leptospirosis: An overlooked cause of aseptic meningitis

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Learning objective

Leptospirosis, probably the most common zoonosis in the world which is underdiagnosed and underreported. Incidence rate of leptospirosis is about 20 to 25 per 100000 nationwide. It is caused by pathogenic *Leptospira* species. Clinical presentations range from nonspecific fevers to fulminant diseases such as Weil's syndrome. However, cases of isolated CNS involvement with aseptic meningitis are very rare. Diagnosis confirmation is difficult because of the challenges associated with isolating the organism and positive serologic testing. A comprehensive understanding of the clinical presentation of leptospirosis and risk factors for exposure to leptospira are required for early diagnosis, in order to initiate appropriate treatment immediately. We report one such patient, which highlights the importance of considering leptospirosis as the diagnostic possibility and importance of knowing occupational history and animal exposures.

Case presentation

Here we present one male patient with anicteric leptospirosis that manifested as aseptic meningitis. He recovered well after an early investigation and treatment for leptospirosis based on suspected relevant risk factors and clinical manifestations.

Conclusion

To facilitate optimal use of antibiotic treatments and prevent lethal complications of leptospirosis, we report this case of leptospirosis, which highlights the importance of knowing the occupational history and environmental exposures of patients living in leptospirosis-endemic areas and presenting meningeal signs.

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Objective:

- Leptospirosis is the most common zoonosis in the world which is underdiagnosed and underreported .
- We report this case of leptospirosis, which highlights the importance of knowing the occupational history and environmental exposures of patients living in leptospirosis-endemic areas and presenting with meningeal signs.

Background:

- Incidence:** 20-25 per 100,000 nationwide
- Causative agent :** spirochetes of the genus *Leptospira*.
- Transmission:** to humans via environmental water contaminated with the urine of mammals
- Risk Factors:** occupational and recreational activities involving contact with animals
- Clinical presentation:** Undifferentiated fever to fatal disease. Anicteric leptospirosis is the most common manifestation, occurring in 80 % of cases

Case Presentation:

- 42 year old previously healthy male, farmer by occupation, presented with fever, chills, myalgia, arthralgia, severe bi frontal headache associated with nausea, vomiting, photophobia and intermittent confusion.
- Day 1** :Lab: thrombocytopenia, bilirubinemia, proteinuria
- CSF: Neutrophilic pleocytosis and Normal glucose. TNC:577, Neutrophils: 74 percent, Glucose: 38 , Protein: 95
- Diatherix Panel for Meningitis /encephalitis: Positive for HSV2
- Empirically started on acyclovir, ceftriaxone and vancomycin on admission
- Day 2** : Patient stated he was exposed to sick cows secretion and pond water while fetching water for cows
- HSV 1 and HSV 2 IgG and IgM AB: Negative
- CSF culture: Negative
- Given h/o exposure to sick animals following labs ordered
- Leptospira Antibody IGM: Positive**
- Q fever Ab: Negative
- Brucella Ab: Negtaive
- With significant improvement patient was sent home on doxycycline for 10 days

Transmission of leptospirosis



Discussion:

- Bacteraemic phase,** leptospire can be cultured from the blood, CSF, and other tissues, but not from urine
- Immune phase:** lymphocytic pleocytosis occurs, with total cell counts usually below 500 cells/ μ l, and diagnosis can be made through immunological tests
- CSF is characterized by protein levels of 50–100 mg/dl and generally normal glucose concentrations
- Complications:** CNS manifestations, including hemiplegia, intracranial bleeding, cerebellitis, movement disorders, myelitis, and acute flaccid paralysis such as Guillain-Barré syndrome, mononeuritis, facial palsy, and neuralgias
- Treatment:** Doxycycline for 7 days as outpatient or Ceftriaxone or cefotaxime as inpatient

References:

- South Med J. 1989 Oct;82(10):1285-8. Leptospirosis: a forgotten cause of aseptic meningitis and multisystem febrile illness. Szeberet SJ¹, Schleupner CJ.
- Atypical leptospirosis: An overlooked cause of aseptic meningitis. Kar Bhavini, Bahl Bhavya, Yedla Parekha, Ivey K. Research output: Contribution to Journal Article

Atrial Myxoma: A rare cause of Cardioembolic Stroke

Bhavini Kar, MD, PGY3, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Farrah Ibrahim, MD, Program Director, Associate Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Learning Objectives

To report a case of ischemic stroke due to atrial myxoma and the treatment of atrial myxoma. Primary cardiac tumors are extremely rare with an incidence less than 0.02%, with approximately 75% being benign. Atrial myxoma are the most common type of benign cardiac tumors. Their presentation can vary from being asymptomatic, to causing cardiovascular symptoms, to systemic embolization. Neurological complications including ischemic stroke are seen in 25-30% of patients with cardiac myxoma. The treatment of majority of ischemic strokes due to cardioembolic causes includes anticoagulation but stroke due to cardiac myxoma needs surgical resection.

Case Summary

A 62 years old right handed female with past medical history of hypertension was brought to the emergency room (ER) for evaluation of altered mental status and difficulty with speaking. She was last seen normal two days prior to arrival. Her past medical, surgical, and medication history was non-significant except for hypertension. Her vital signs were in normal range. Systemic examination was unremarkable. Her initial neurological examination revealed an alert, active person who could not verbalize or follow commands consistently (expressive and receptive aphasia). On neurological examination, she had right facial droop, spastic hemiparesis affecting the right arm and leg was noted. Her reflexes were brisk on right upper and lower extremities with extensor plantar reflex on right side. Coordination test was limited on right side due to severe weakness. She was not able to walk due to severe right hemiparesis.

Results

Patient had an extensive laboratory work up which did not show any abnormality. Computed Tomography (CT) of Head without contrast revealed hypodensity in left temporal and parietal area suggestive of subacute ischemic infarct. Magnetic Resonance Imaging brain without contrast revealed multiple areas of true restricted diffusion involving left temporal, parietal lobe and frontal lobe, suggestive of acute ischemic stroke in left middle cerebral artery territory. To determine the etiology of acute stroke, electrocardiogram, 2D echocardiography, CT angiogram of head and neck, were obtained, all tests results within normal limits. Eventually a transesophageal echocardiography was done which revealed a 3 cm pedunculated mass attached to anterior wall of the left atrium. Patient was anticoagulated with full dose of lovenox. Patient underwent surgical resection of the mass, biopsy revealed myxoma. Patient underwent intense physical and speech therapy and her right sided deficits improved significantly along with her aphasia.

Discussion

Primary cardiac tumors are extremely rare but it can cause neurological complications like stroke. Treatment of cardioembolic stroke is usually anticoagulation but cardioembolic stroke due to atria myxoma needs a surgical treatment - removal of myxoma to prevent future strokes.

Objective:

- To report a case of ischemic stroke due to atrial myxoma and the treatment of atrial myxoma

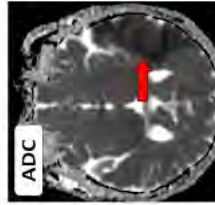
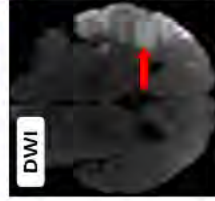
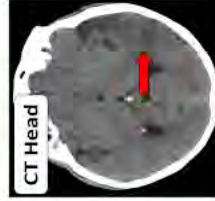
Background:

- Primary cardiac tumors are extremely rare with an incidence less than 0.02%, with ~ 75% being benign
- Atrial myxoma are the most common type of benign cardiac tumors
- Their presentation can vary from being asymptomatic, to causing cardiovascular symptoms, to systemic embolization
- Neurological complications including ischemic stroke are seen in 25-30% of patients

Case Summary:

- 62 years old RH female
- PMH: HTN, TIA, Schizophrenia
- AMS, difficulty speaking
- Vitals signs: Normal
- Systemic exam: WNL
- Neuro examination
 - Global aphasia
 - Right facial droop
 - R – hemiparesis
 - Spastic tone
 - Brisk reflexes - R

Neuroimaging



CT head showed hypodensity on left temporal lobe. True restricted diffusion on DWI & ADC images on left temporal lobe, MCA territory

Vascular Imaging



CTA head and neck with contrast: No stenosis of ICA or MCA territory on left

Cardiac Imaging



TEE showing left atrial mass/thrombus. CT Chest showing mass in Left Atrium

Pathology/Biopsy



Microscopically: Scattered cell within mucopolysaccharide stroma are seen

Hospital Course:

- TEE on Day 3
- LA mass/thrombus
- Anticoagulation 3 weeks
- Repeat TEE: No change in size of mass/thrombus
- CVTS consulted
- CT Chest: Mass
- Surgical resection
- Biopsy: Myxoma

Discussion:

- Primary cardiac tumors are extremely rare but it can cause neurological complications like massive stroke, aneurysm and death
- Atrial myxoma are the most common type of benign cardiac tumors
- Treatment of cardioembolic stroke is usually anticoagulation but cardioembolic stroke due to atria myxoma needs a surgical treatment
- TEE is 100 sensitive to evaluate thrombus vs mass, pathology is confirmatory

References:

1. CMAJ. 2003 Nov 11; 169(10): 1049–1051. practice - Atrial myxoma as a cause of stroke: case report and discussion
2. Open Cardiovasc Med J. 2008; 2: 115–117. Stroke from A Large Left Atrial Myxoma

Headache – more than just a migraine and tension headache: A rare and treatable cause of headache

Nichole Marcantonio, MS3, UAB Huntsville Regional Medical Campus; Tim Anderson, DO, PGY1, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Objective

To report a rare cause of secondary headache disorder, cerebral venous sinus thrombosis which was presented as a migraine type of headache but severe in intensity.

Background

Cerebral venous sinus thrombosis (CVST) is a rare cause of stroke that can present with a variety of symptoms. Headache is the most frequent symptom, (gradual, acute, or thunderclap onset), and may occur with or without vomiting, papilledema, and visual problems. Other symptoms may include focal neurological deficits, focal or generalized seizures, and encephalopathy with altered mental status or coma. CVST is challenging to diagnose; head CT is normal in up to 30% of cases, and most findings are nonspecific.

Case Presentation

We present a case of 64-year-old female with the chief complaint of severe bi-frontal throbbing headache with nausea since one week. Her headaches were daily, aggravated by movements, sensitive to light and sound, no visual aura, no improvement with over the counter medications and sumatriptan. Patient's past medical history includes migraines, Parkinson's disease, anxiety, depression, hypertension, breast cancer and ovarian cancer in remission. On examination, vitals were within normal range except blood pressure was mildly elevated. Systemic examination was unremarkable. Neurological examination showed patient was in distress due to pain, mild dysarthria, and tremors which were present at baseline as per family.

Diagnostic Test Results

Computed Tomography (CT) study of headache did not show any intracranial hemorrhage. CT angiography study did not show any evidence of aneurysm but showed hyper dense region of the right transverse sinus, concerning for dural sinus thrombosis. Her finding of venous sinus thrombosis was confirmed on Magnetic Resonance Venography (MRV) of head. She was then placed on a heparin drip, her symptoms started improving with anticoagulation and symptomatic headache control medications.

Discussion

CVST is an important differential in any case presenting with severe headache symptoms or neurological symptoms. Although uncommon (estimated incidence of <1.5 per 100,000 annually), prognosis is good, with complete recovery or minor residual symptoms, in about 80% of patients, if diagnosed and treated. Patients with history of malignancy, prior stroke or bleeding disorder, or hypercoagulable state or patients on birth control pills, CVST should be an important differential diagnosis to consider. Following diagnosis through neuroimaging studies, initial anticoagulation is recommended with subcutaneous low molecular weight heparin or intravenous heparin. It may be necessary to take measures to control increased intracranial pressure and impending herniation, including decompressive surgery. After the acute phase,

anticoagulation with warfarin is recommended, for a minimum of three months, with a target INR of 2-3. Newer anticoagulation safety and efficacy are not studies in treatment of CVST.

*** This vignette was chosen for oral presentation on Research Day. Contact Nichole Marcantonio at nichole4@uab.edu for a copy of the PowerPoint.**

Double Whammy: An Artery of Percheron Infarct as a Result of a Patent Foramen Ovale

Lucas D. McGee, BS, UAB Huntsville Regional Medical Campus; Anjaneyulu Alapati, MD, Clerkship Director, Neurology Program, UAB Huntsville Regional Medical Campus

Learning Objective

- To increase awareness of artery of Percheron infarcts

Case Presentation

A 46-year-old Caucasian male presented to the emergency department (ED) after being found in an altered mental state in his home. Upon arrival to the ED, he provided confused answers to questions and was able to follow only simple commands. Past medical history was notable for well-controlled hypertension, bipolar disorder, and Meniere's disease. Initial physical exam revealed mild facial droop on the right side and nystagmus in the eyes. CT scan of the head documented subacute lacunar infarction in the thalamus. He was given aspirin and IV fluids in the ED. Neurology was then consulted and MRI with and without contrast was ordered. These studies revealed restriction diffusion in the midbrain and *bilateral* thalamus, suggestive of an artery of Percheron infarct. Formal neurologic exam revealed a confused patient with mild expressive aphasia and disconjugate gaze. Strength was 3/5 in all extremities and sensation was intact. Due to the unknown onset of symptoms, the patient was not a candidate for tPA therapy. Carotid imaging, echocardiogram, and transesophageal echocardiogram (TEE) were all performed to determine a possible source of stroke. TEE revealed a small patent foramen ovale (PFO). Transcranial Doppler with bubble study was then performed, revealing a grade 5 PFO. This finding, along with the patient's young age and relatively low risk for stroke, lead us to believe that the infarct was of cardioembolic origin secondary to PFO and right to left shunt. Patient remained hypersomnolent. Neurology's plan for this patient is to initiate clopidogrel and a baby aspirin and wait for the patient's mental status to improve. If excessive drowsiness continues, neurostimulants will be used to try and revive the patient. Once the patient emerges from his hypersomnolent state, he will be transferred to an inpatient rehabilitation facility for further management.

Discussion

There are four normal variants of the neurovascular anatomy to the thalamus and midbrain. Most common is Variant I, in which each perforating artery arises from each left and right posterior cerebral artery. Rarely, individuals will display Variant IIb, in which the bilateral perforating thalamic arteries arise from a single arterial trunk called the artery of Percheron (AOP). It is believed that AOP infarcts make up only 0.1% to 0.3% of all ischemic infarcts. Early detection of AOP infarction is often difficult because its sequelae often imitate other neurological conditions, such as inflammation, infection, and malignancy. Typical characteristics of an AOP infarct include altered mental status, vertical gaze palsy, hypersomnolence, and memory impairment. Early recognition of AOP occlusion may help with the institution of acute stroke management and lead to more favorable outcomes. However, initial radiographic assessment in these patients is often deemed normal. In addition, many physicians are unfamiliar with the diagnosis of AOP infarct due to the rare nature of this neurovascular variant. Therefore, case reports such as this one may serve as an effective means to increase the awareness of AOP infarcts among physicians and improve patient outcomes.

Double Whammy: An Artery of Percheron Infarct as a Result of a

Patent Foramen Ovale

Lucas D. McGee, BS; Anjaneyulu Alapati, MD
UAB Huntsville Neurology

Objective

- To increase awareness of artery of Percheron infarcts

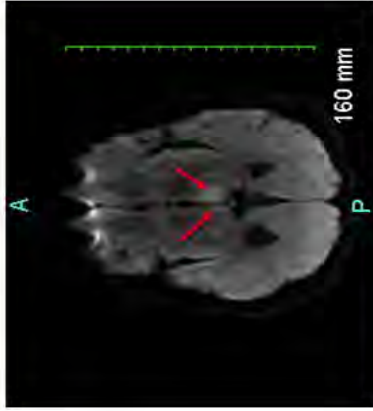
Case Presentation

- A 46-year-old Caucasian male presented to the emergency department (ED) after being found in an altered mental state in his home. Upon arrival to the ED, he provided confused answers to questions and was able to follow only simple commands. Past medical history was notable for well-controlled hypertension, bipolar disorder, and Meniere's disease. Initial physical exam revealed mild facial droop on the right side and nystagmus in the eyes.

Hospital Course

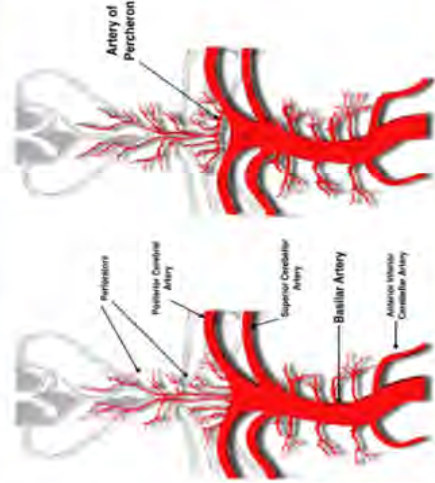
- CT scan of the head without contrast was ordered in the ED
 - Documented subacute lacunar infarction.
- Patient was given aspirin and IV fluids in the ED.
- Neurology was then consulted.
 - Formal neurologic exam revealed a confused patient with mild expressive aphasia and dysconjugate gaze. Strength was 3/5 in all extremities and sensation was intact.
- MRI with and without contrast was ordered.
 - Revealed restriction diffusion in the midbrain and *bilateral* thalamus, suggestive of an artery of Percheron infarct.
- Due to the unknown onset of symptoms, the patient was not a candidate for tPA therapy.
- Carotid imaging, echocardiogram, and transesophageal echocardiogram (TLEE) were then ordered to determine a possible source of stroke.
 - TLEE revealed a small patent foramen ovale (PFO). Transcranial Doppler with bubble study was then performed, revealing a grade 5 PFO. This finding, along with the patient's young age and relatively low risk for stroke, led us to believe that the infarct was of cardioembolic origin secondary to PFO and right to left shunt.
- Patient remained hypersomnolent. Neurology's plan for this patient is to initiate clopidogrel and a baby aspirin and wait for the patient's mental status to improve. If excessive drowsiness continues, neurostimulants will be used to try and revive the patient. Once the patient emerges from his hypersomnolent state, he will be transferred to an inpatient rehabilitation facility for further management.

Imaging Studies



Diffusion-weighted MRI

Normal Anatomy vs AOP



Discussion

- There are four normal variants of the neurovascular anatomy to the thalamus and midbrain. Most common is Variant I, in which each perforating artery arises from each left and right posterior cerebral artery. Rarely, individuals will display Variant IIb, in which the bilateral perforating thalamic arteries arise from a single arterial trunk called the artery of Percheron (AOP).
- It is believed that AOP infarcts make up only 0.1% to 0.3% of all ischemic infarcts. Early detection of AOP infarction is often difficult because its sequelae often initiate other neurological conditions, such as inflammation, infection, and malignancy. Typical characteristics of an AOP infarct include altered mental status, vertical gaze palsy, hypersomnolence, and memory impairment.
- Early recognition of AOP occlusion may help with the institution of acute stroke management and lead to more favorable outcomes. However, initial radiographic assessment in these patients is often deemed normal. In addition, many physicians are unfamiliar with the diagnosis of AOP infarct due to the rare nature of this neurovascular variant.
- Therefore, case reports such as this one may serve as an effective means to increase the awareness of AOP infarcts among physicians and improve patient outcomes.

References

- Alnamun M, Suman A, Arshad S, Kumar S. A Case of Midbrain and Thalamic Infarction Involving Artery of Percheron. *Journal of Clinical Medicine*. 2015;4(3):369-374. doi:10.3390/jcm4030369.
- Sandvig A, Lundberg S, Neuwirth J. Artery of Percheron infarction: a case report. *Journal of Medical Case Reports*. 2017;11(1). doi:10.1186/s13256-017-1375-3.
- Lamot U, Ribanic I, Popovic KS. Artery of Percheron infarction: review of literature with a case report. *Radiology and Oncology*. 2015;49(2):141-146. doi:10.2478/raon.2014.0037.
- Zhou Y, Fox D, Anand A, Elhaj A, Kapoor A, Najibi F, ... Jayaram-Trouth A. (2015). Artery of Percheron Infarction as an Unusual Cause of Korsakoff's Syndrome. *Case Reports in Neurological Medicine*. 2015; 1-6. doi:10.1155/2015/927809

Features and Management of Mixed Large Cell Neuroendocrine Carcinoma of the Lung

Hazim Muhammad, MS3, UAB Huntsville Regional Medical Campus; Alan Baggett, MD, Assistant Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning Objectives

- Understand the diagnostic and presenting characteristics of mixed large cell neuroendocrine lung carcinomas
- Formulate a treatment plan for a large cell neuroendocrine carcinoma

Case Presentation

This patient was a 59-year-old Caucasian male with a 30+ pack year history of smoking who presented with a Chief Complaint of a headache. He described a mild headache accompanied by forgetfulness and generalized weakness of 1 month duration. He denied any chest pain, shortness of breath or night sweats. He stated that he was told by friends on occasion that he had some drooping of his face but denied any other focal neurological deficits. He received an MRI at the VA which showed an intracranial mass. He then presented to Huntsville Hospital where a chest X-ray showed a suspected primary peripheral lung lesion.

Neurosurgery and Oncology were consulted. The patient had a right sided 5 cm frontal lobe lesion that Neurosurgery was willing to remove; however, the patient refused brain surgery. The lung lesion was biopsied and the patient was diagnosed with Stage IV mixed large cell neuroendocrine carcinoma of the lung. After discussion with palliative care, the patient decided to receive palliative radiation therapy and symptom control. After a one month stay he was discharged to the VA for further care.

Discussion

Large Cell Neuroendocrine Carcinomas (LCNEC) are a rare subtype of lung cancer with an incidence between 2.1% to 3.5% of resected lung cancers. Most cases are seen in males (80%) whose median age is between 62-68 and have a positive smoking history. These tumors are similar to non-small cell lung cancers (NSCLC) and are in fact usually treated the same way. However, LCNEC are usually located in the periphery of the lungs whereas NSCLC are found centrally. Even though these tumors are classified as neuroendocrine due to the presence of neuroendocrine markers such as chromogranin A, synaptophysin, and neural cell adhesion molecule (NCAM), they rarely present with paraneoplastic syndromes. This patient's tumor was chromogranin positive, as well as synaptophysin, CD-56, TTF-1, and p63 positive. Another key feature in this tumor's diagnosis is the presence of necrosis and a high mitotic rate. This patient's tumor had such extensive necrosis that the first biopsy of the tumor showed mainly necrosis. A second biopsy was required to properly assess the tumor cells. Due to the high mitotic rate, the 5-year survival is between 13%-57% for all stages. After complete tumor resection, recurrence is 64% within one year and 91% within three years.

Treatment is extrapolated from NSCLC. Thus, surgical resection with adjuvant chemotherapy is the treatment of choice. The preferred chemotherapy regimen is a combination of cisplatin and etoposide.

Sources

Sakurai, Hiroyuki. "Large-cell neuroendocrine carcinoma of the lung: surgical management." *Thoracic*

surgery clinics (1547-4127), 24 (3), p. 305.

Glisson, Bonnie. "Large cell neuroendocrine carcinoma of the lung" UpToDate.

Objectives

1. Understand the diagnostic and presenting characteristics of mixed large cell neuroendocrine lung carcinomas
2. Formulate a treatment plan for a large cell neuroendocrine carcinoma

Background

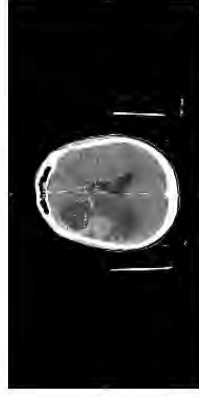
- Large Cell Neuroendocrine Carcinomas (LCNEC) are a rare subtype of lung cancer with an incidence between 2.1% to 3.5% of resected lung cancers. Most cases are seen in males (80%) whose median age is between 62-68 and have a positive smoking history¹

Case Presentation

- 59 yo Caucasian male
- CC: Headache and generalized weakness
 - PMH: non-contributory
 - Generalized throbbing headache with forgetfulness and generalized weakness for 1 month. 40+ pack year history of smoking
 - Brain lesion on CT at VA clinic
 - Vitals: T 98 °F
BP 133/69
HR 73
RR 20
SpO₂ 98% on RA
 - Exam:
 - Thin male in no acute distress
 - CN II-XII intact except for left lower facial droop
 - 4/5 strength in left upper extremity. No other focal neurological deficits

Initial Diagnostic Workup

- 8.11 16.2 257 47 CMP within normal limits
- CT Head w/o contrast: Multiple ring enhancing lesions compatible with metastatic disease and midline shift
 - Chest X-ray: 6 cm right lobe mass, no effusion
 - CT Chest w/o contrast: 5 cm spiculated lesion in right upper lobe consistent with lung carcinoma



CT Head (Left) and CT Chest (Right) showing metastatic lesions

Hospital Course

- Patient had received Head CT at the VA which showed a left sided brain lesion. Presented to Huntsville Hospital on 11/27/17
- Imaging in ED suggested metastatic disease
- Patient was admitted and placed on Keppra for seizure prophylaxis
- Interventional Radiology was consulted and performed a biopsy on the peripheral lung lesion on Hospital Day 2
 - Initial biopsy showed extensive necrosis and was repeated
 - Biopsy confirmed Stage IV Large Cell Neuroendocrine Carcinoma of the lung
- Neurosurgery, Hem/Onc, and Rad Onc were consulted
 - Neurosurgery recommended continuing Keppra and stated availability for tumor resection
 - Hem/Onc and Rad Onc recommended palliative radiation
- Patient refused surgery but accepted radiation doses
- On 12/29/17 patient was discharged to the VA

Discussion

- Diagnosis of LCNEC:
 - Biopsy often shows extensive necrosis due to high mitotic rate
 - Neuroendocrine markers such as chromogranin A, synaptophysin, and neural cell adhesion molecule (NCAM) are present²
 - Rarely present with paraneoplastic syndromes
 - This patient's tumor was chromogranin positive, as well as synaptophysin, CD-56, TTF-1, and p63 positive
 - Tumor is very similar to small cell lung cancers (SCLC)
- Differs from SCLC because it is found peripherally
- Due to the high mitotic rate, 5 year survival is between 13-57% for all stages²
- Treatment:
 - Large scale studies on treatment of LCNEC have not been done
 - Treatment is extrapolated from SCLC
 - Treatment of choice is a chemotherapy regimen of cisplatin and etoposide²

References

1. Sakurai, Hiroyuki. "Large-cell neuroendocrine carcinoma of the lung: surgical management." *Thoracic surgery clinics (1547-4127)*, 24 (3), p. 305.
2. Glisson, Bonnie. "Large cell neuroendocrine carcinoma of the lung" UpToDate.

Excessive sweating as a presenting syndrome of an acute stroke – Hemihyperhidrosis as a Result of Pontine Stroke

Parit Patel, Medical Graduate, University of Nairobi, Kenya; Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Objective

To report a rare case of dysautonomic syndrome; hemihyperhidrosis, as result of an ischemic stroke in the pons.

Background

Stroke is a leading cause of disability in United States. Stroke have various presenting symptoms including, weakness, numbness, vision and speech problem but autonomic symptoms like hemihyperhidrosis is a very rare symptom of stroke. Hemihyperhidrosis is a unique presentation of pontine strokes.

Case Summary

We report a case of a 72-year-old right-handed Caucasian male, whose past medical history is significant for uncontrolled hypertension, hyperlipidemia, type II diabetes mellitus and atrial fibrillation. He started having sudden onset of right sided excessive sweating on face, chest, abdomen and arm and leg. As his symptoms continue to get worse, he went to his primary care physician who referred the patient to Neurologist after 3 weeks. Patient denies any other symptoms like weakness, vision or speech problem or numbness. His systemic examination was unremarkable. His neurological examination did not reveal focal neurological deficits but he had excess of sweating only on his right side of his body.

Diagnostic test results

Patient had a non-contrast computed tomography (CT) head which did not show any abnormality. His magnetic resonance imaging (MRI) of brain that showed a hyperintense lesion on left pons on T2-FLAIR image. His magnetic resonance angiography (MRA) of head and neck did not show any vascular stenosis or occlusion. His echocardiography study showed normal ejection fraction and no evidence of patent foramen ovale (PFO).

Discussion

Stroke is a leading cause of disability in United States and it is a preventable condition provided we can identify symptom and risk factors early. Identifying various presenting symptoms including rare symptoms like hemihyperhidrosis is very important in recognizing stroke early and help to treat and prevent strokes. Hemihyperhidrosis has been seen in stroke patients with lesions on the contralateral side of pons, medullar or hypothalamus. It is thought that sweating is controlled by inhibitory neurons originating in the cortex projecting to the ipsilateral hypothalamus. Efferent fibers from the preoptic hypothalamus travel via the tegmentum of the pons and medullary raphe to the lateral horn of the spinal column making a connection with the sympathetic sudomotor neurons on the contralateral thoracic spinal column. A lesion that is able to interrupt this sympathoinhibitory pathway may result in hemihyperhidrosis.

Objective:

- To report a rare case of dysautonomic syndrome; hemihyperhidrosis, as result of an ischemic stroke in the pons.
- Rare presenting symptom of the most common disabling condition

Background:

- Stroke is the leading cause of disability in adult population in USA
- Stroke is a preventable condition
- Treatment for stroke is mainly in an acute setting and time dependent
- Stroke have various presentations, common symptoms include weakness, tingling, numbness, speech and vision problem but rare symptoms like autonomic symptoms could be presenting feature of stroke
- Various autonomic dysfunctions have been described including orthostatic hypotension, and hyperhidrosis.
- Knowing rare symptoms helps to identify possible stroke which will help to decide for acute treatment

Case Summary

- 72 year old Right Handed Caucasian Male
- Acute onset Right sided excessive sweating
- No weakness, numbness, vision or speech problem
- PMH: HTN, HLD, DM, Atrial Fibrillation
- Neurological examination:
 - AAO*3
 - CNS: 2-12 intact
 - Motor: Normal tone, strength 5/5, no drift
 - Sensory: Intact to touch, pin prick, vibration
 - Excessive sweating on right side of body**
 - Reflexes: 2+ symmetric
 - Cerebellar: No dysmetria
 - Gait: Normal

Diagnostic Tests Results:

- CT Head: No ICH
- MRI of Brain: Subacute left pontine stroke (Image below)**
- MRA head and neck: No vascular stenosis/aneurysm
- Echocardiogram with bubble study: Normal EF, no PFO
- LDL:
- A1c:

Neuroimaging



Discussion:

- Differentials for hemihyperhidrosis are stroke patients with lesions on the contralateral side of pons, medullar or hypothalamus. It is also associated with tumors, demyelinating lesions of the frontal lobe, thalamus and hypothalamus.
- It is thought that sweating is controlled by inhibitory neurons originating in the cortex projecting to the ipsilateral hypothalamus. Efferent fibers from the preoptic hypothalamus travel via the tegmentum of the pons and medullary raphe to the lateral horn of the spinal column making a connection with the sympathetic sudomotor neurons on the contralateral thoracic spinal column.
- Interruption of sympathoinhibitory neuron - hemihyperhidrosis

References:

- Kim B-S, Kim Y-L, Lee K-S. Contralateral Hyperhidrosis After Cerebral Infarction. *Stroke*. 1995;26(5):896-IP-899. <http://stroke.ahajournals.org/content/26/5/896.abstract>
- Awada A, Annmar A, al-Rajeh S, Borolosi M. Excessive sweating: an uncommon sign of basilar artery occlusion. *J Neurol Neurosurg & Psychiatry*. 1991;54(3):277-IP-278. <http://jnnp.bmi.com/content/54/3/277.abstract>

Frontotemporal Epilepsy presenting as Phantosmia

Parit Patel, Medical Graduate, University of Nairobi, Kenya; Jitesh Kar, Assistant Neurology Professor, UAB Huntsville Regional Medical Campus

Objective

To present a rare case of phantom smell, in a patient with frontotemporal epilepsy.

Background

Phantosmia/Olfactory hallucination is an infrequent presenting complaint among patients who have a wide range of neurological pathologies including Parkinson's Disease, Tumors, strokes and psychiatric disorders. This however has been rarely evaluated and managed. Occasionally epilepsy patient can have abnormal smell as an aura or presenting feature of epileptic disorder.

Case summary

We report a case of a 25-year-old female, who presented with abnormal smell sensation - 'ammonia' smell sensation in the complete absence of any odors. Her symptoms were going on since 8 to 10 years, gradual in onset, progressively worsening. Over last 6 months her symptoms became severe and started affecting her on daily basis. She denied any history of migraine headache, sinus infection, nasal surgery or trauma in past. She denies any febrile seizure as a child or any infection. Her neurological exam was within normal without any focal deficits. Systemic examination was unremarkable as well.

Diagnostic workup

She had Computed Tomography (CT) of her head which did not show any abnormality. Her Magnetic Resonance Imaging (MRI) of Brain did not show any evidence of structural abnormality, no evidence of mesial temporal lobe sclerosis. Her electroencephalographic study showed sharp waves predominantly in Frontotemporal lobe, bilaterally, more on left side. Patient was started on antiepileptic medication levetiracetam and her abnormal smell sensation improved significantly.

Discussion and management

Phantosmia are rare auras which can occur in conjunction with other auras like gustatory auras, nausea and fear or it can be a symptom of partial seizure. These are simple partial seizures whose origin is in the mesial temporal lobe structures. Most of reported cases involve unpleasant smells, however there are cases of pleasant smells though rare. The mainstay of management is antiepileptic drug however there has been success in patients who undergo temporal lobectomy if mesial temporal sclerosis identified on imaging.

Objective:

- Recognize phantosmia/ abnormal smell as a rare presentation of partial seizure
- To understand different auras for seizure

Background:

- An aura is a simple partial seizure which primarily occurs with intact awareness of the event
- Numerous aura variants have been described and they involve motor, sensory, cognitive or emotion centers.
- Sensory auras are the most common and vivid in description.
- They involve the 5 primary senses i.e. olfaction, tactile, visual, auditory and gustatory.
- Involvement of the olfactory centers can lead to production of Phantom smells.
- Phantosmia/Olfactory hallucination is also an infrequent presenting complaint among patients who have a wide range of other neurological pathologies including Parkinson's Disease, Tumors, strokes and psychiatric disorders.
- These causes are rarely evaluated, should be considered as differential diagnosis.

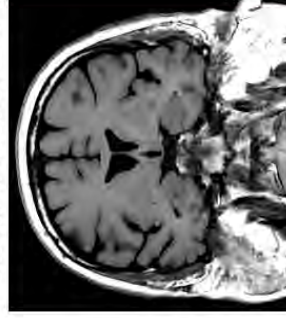
Case Presentation:

- 25 yo Caucasian female
- Presents with abnormal smell sensation in the complete absence of any physical odors
- Symptoms have been present for 8 years but have now gradually worsened, affecting her daily activities on a daily basis
- Denies headaches, sinus infections, nasal surgery or trauma
- Denies a history of seizures in the past
- Systemic examination was unremarkable
- Neurological examination:
 - AAO *3
 - CNS: 2-12 intact
 - Motor: Normal tone, strength 5/5, no drift
 - Sensory: Intact to touch, pin prick, vibration
 - Reflexes: 2+ symmetric
 - Cerebellar: No dysmetria
 - Gait: Normal

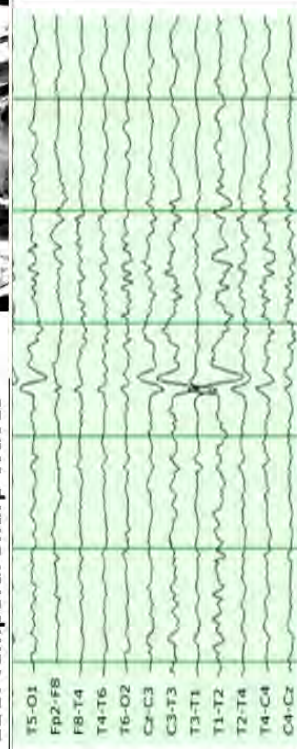
Diagnostic Work Up:

- CBC, metabolic panel: Normal
- Electrolytes: Normal
- CT scan Head: No abnormality
- MRI brain: No abnormality
- EEG: B/L temporal, frontal sharps
- P.S. EEG below is NOT actual pts EEG

MRI of Brain: No MTS



EEG: Temporal Sharp Waves



Discussion:

- Phantosmia are rare auras which can occur in conjunction with other auras like gustatory auras, nausea and fear or it can be a symptom of partial seizure.
- These are simple partial seizures where consciousness is not lost unless they generalize.
- Most of reported cases involve unpleasant smells, however there are cases of pleasant smells though rare.
- The foci of origin for unpleasant smells is the mesial temporal lobe or the olfactory bulb. Pleasant smells originate from the insula.
- 10-20% of focal seizures can manifest on scalp EEG, and this range only increases with intracranial EEG but not always.
- The mainstay of management is antiepileptic drug however there has been success in patients who undergo temporal lobectomy if mesial temporal sclerosis identified on imaging.

References

1. Acharya, V. M., Acharya, J. M., & Luders, H. M. (1998). Olfactory epileptic auras. *Neurology*, 51(1), 56-61
2. Ghazala Perven, Norman K So. Epileptic auras: phenomenology and neurophysiology. *Epileptic Disorders*. 2015;17(4):349-362. doi:10.1684/epd.2015.0786

Cardiac Complications of Bronchogenic Cyst

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Jeremy Johnson, MD, PGY1, Department of Internal Medicine, UAB Huntsville Regional Medical Campus;
Farrah Ibrahim, MD, Associate Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning Objective

Describe a rare but often life threatening congenital anomaly of the tracheobronchial tree presenting in adulthood.

Introduction

Bronchogenic cysts are congenital foregut derived anomalies of the tracheobronchial tree. With an incidence in approximately 1 in 10,000 to 35,000 bronchogenic cysts are rare and the natural progression is still poorly understood. While advances in imaging techniques and technology allow increasing abilities for antenatal diagnosis, it remains of debate the treatment of asymptomatic lesions, while symptomatic lesions require surgical excision as curative intervention.

Case Presentation

A 32-year-old African American Female presented with shortness of breath, dyspnea on exertion, substernal non-radiating chest pain, and cough for 2 weeks. During the emergency department evaluation, imaging revealed a large mediastinal mass resulting in significant compression of the right pulmonary artery. Subsequent echocardiogram revealed an impending cardiac tamponade. She became unstable and developed atrial fibrillation with rapid ventricular response. Pericardiocentesis removed 500 ml of fluid, and she was stable enough for definitive drainage and transtracheal biopsy of the mediastinal mass. She then underwent a cervical mediastinoscopy at which time the cystic structure was drained and fluid specimens were obtained. She was shortly extubated and after an uneventful hospitalization discharged for outpatient follow-up. Prior to her follow up and within 30 days of discharge the patient returned with identical symptoms and recurrence of the cyst. A planned excision of the cyst was delayed by hypoxia and a second pericardial window was performed with drainage of the pericardial effusion prior to definitive surgery and excision of the bronchogenic cyst. She was extubated shortly after surgery and recovered well with no post-operative complications allowing for early ambulation and removal of her chest tubes within 4 days of surgery and discharge from the hospital shortly after without recurrence of atrial fibrillation, pericardial effusion, or shortness of breath.

Discussion

Bronchogenic cysts account for 10-15% of all primary mediastinal masses. 90% of bronchogenic cysts are asymptomatic. When symptomatic the vast majority of patients experience symptoms related to infection or tracheobronchial compression. Though rare, patients can experience symptoms of cardiac dysfunction and compromise. Large cysts are able to exert compressive forces upon the pericardium, atria, and pulmonary arteries causing a decrease in preload, cardiac irritation leading to cardiac arrhythmias, and tamponade symptomology secondary to pericardial effusions. Many surgical methods are available for treatment including mediastinoscopy, video-assisted thoracic surgery (VATS), and open thoracotomy. Due to the involvement of surrounding structures and difficulty in complete resection, with the goal always

being complete resection, thoracotomy has been shown to be superior to VATS in preventing post-resection recurrence. As experience with VATS increases this difference continues to decrease. Although it may take several years to reappear, several cases of bronchogenic cysts recurrence have been reported usually following incomplete resection.

Conclusion

As in our case, with an unstable patient, a two-stage approach with initial mediastinoscopy and decompression followed by open resection once stable appears to offer the safest and most effective treatment.

*** This vignette was chosen for oral presentation on Research Day. Contact Elena Roumaya at eroumaya@uabmc.edu for a copy of the PowerPoint.**

West Nile Virus associated Brachial Plexopathy

Noora Siddiqui, MS3, UAB Huntsville Regional Medical Campus; Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Learning Objective

To report a rare case of brachial plexopathy in an immunocompetent patient due to West Nile Virus (WNV) infection. WNV is the most frequent cause of arbovirus infection in the USA. Only 20% of infected individuals are symptomatic. Less than 1% of symptomatic individuals display West Nile neuroinvasive disease. We report a rare case of WNV-associated brachial plexopathy without encephalitis in a young immunocompetent individual.

Case Summary

38-year-old right-handed Caucasian female, who presented with right upper extremity weakness and fever of three weeks duration. Her symptoms were gradual in onset and progressively worsening. Her illness began with acute onset of fever, chills, bilateral ear pain, sinus congestion, followed by dizziness, and generalized weakness, more in her upper extremities, worse on right side. She previously presented to a different hospital with the fevers and flaccid right upper extremity weakness, transferred to our center for higher level of care. Systemic examination was unremarkable. Her neurological examination showed flaccid weakness in her right upper extremity in multiple groups of muscles including deltoid, biceps, triceps, forearm and hand muscles. Her reflexes were absent. She underwent extensive lab work up including complete blood count, comprehensive metabolic panel, autoimmune work up, HIV, RPR, Hepatitis panel, which all were unremarkable. Her neuroimaging studies including Magnetic Resonance Imaging (MRI) of Brain, Cervical and Thoracic Spine were unremarkable. Nerve conduction studies and electromyography studies confirmed brachial plexopathy on her right arm but were limited due to swelling of the right hand. Chest X ray did not show any mass in upper lobe of right lung. Her cerebrospinal fluid studies showed elevated proteins 96 mg/dl with normal glucose, cell count and cytology. Additional studies including meningitis encephalitis panel, cryptococcal antigen and culture of cerebrospinal fluid were negative. Cerebrospinal fluid WNV antibody titers were elevated. Patient was started on five days of intravenous immunoglobulin and her condition improved with movement of her right hand. After continued improvement, she was discharged with outpatient physician and occupational therapy.

Discussion

Brachial plexopathy is a very challenging diagnosis and requires detailed neurological examination along with nerve conduction studies and electromyography. Various causes of brachial plexopathy includes trauma, tumor, metastasis, infection, inflammatory disease and paraneoplastic syndrome. Infectious causes like viral brachial plexopathy is rare. WNV is the most frequent cause of arbovirus infection in USA but only less than 1% can have neuroinvasive disease. In patients with brachial plexopathy, it is important to remember one of the causes is WNV infection. Treatment with intravenous immunoglobulin has been successful in recovery, as reported on few case reports in literature.

Objective:

- To report a rare case of brachial plexopathy in an immunocompetent patient due to West Nile Virus (WNV) infection.

Background:

- WNV is the most frequent cause of arbovirus infection
- Only 20% of infected individuals are symptomatic
- Less than 1% of symptomatic individuals neuroinvasive disease.
- We report a rare case of WNV-associated brachial plexopathy without encephalitis in a young immunocompetent individual.

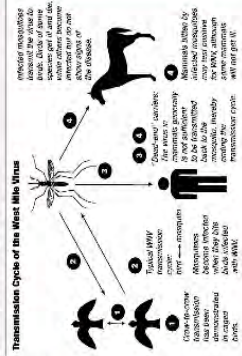
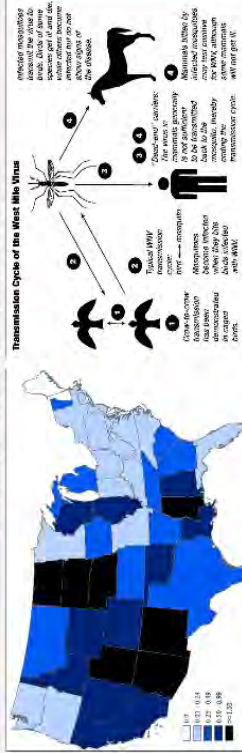
History & Exam:

- 38 year old female
- Right arm weakness
- Since 3 weeks, fever onset
- Transfer from OSH
- PMH: Seizure, PSA
- Febrile 100.6 F
- AAO*3
- Flaccid in Right UE
- Right upper extremity – multiple group of muscles weakness (proximal, distal)
- Reflexes: 1+ bilaterally
- Sensory: Reduced in right upper extremity

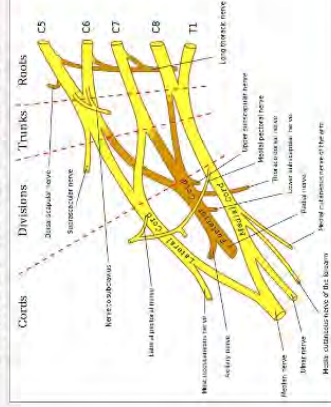
Diagnostic Tests Results:

- Basic laboratory work up: Normal range
- MRI of Brain with and without contrast: Unremarkable
- MRI of C, T and LS spine with and without contrast: WNL
- CSF: Proteins 96 (High), Glucose, Cell Count: Normal
- CSF Meningitis Panel: Negative
- CSF cytology, gram stain culture: Normal
- Nerve conduction studies: Absent SNAP in right medial motor, ulnar sensory, median sensory nerves. Technical issues due to swelling. No conclusions could be drawn.
- Electromyography studies: Absent fibrillations and + sharp waves in right first dorsal interosseous, biceps, triceps, deltoid, and lower cervical paraspinal muscles. No definite evidence of denervation process.
- MRI of Right Brachial Plexus: No abnormality

WEST NILE VIRUS



BRACHIAL PLEXUS



Discussion:

- Brachial plexopathy is a very challenging diagnosis requiring detailed neurological examination along with EMG/NCS.
- Various causes of brachial plexopathy include trauma, tumor, metastasis, infection, inflammatory disease and paraneoplastic syndrome.
- WNV is the most frequent cause of arbovirus infection
- Only less than 1% have neuroinvasive disease.
- In patients with brachial plexopathy, it is important to remember one of the causes is WNV infection.
- Treatment with intravenous immunoglobulin has been successful in recovery as reported on few case reports in literature.

References:

- BMJ Case Rep. 2016 Mar 30;2016, pii: bcr2016214428. doi: 10.1136/bcr-2016-214428. **West Nile virus-associated brachial plexopathy.** Chahil M¹, Nguyen Tp¹.
- Ann Neurol. 2006 Sep;60(3):286-300. **West Nile virus neuroinvasive disease.** Davis LE¹, DeBiasi B, Goade DE, Haaland KY, Harrington JA, Harnar JB, Pergam SA, King MK, DeMasters BK, Tyler KL.

When All Else Fails: A Case for Doxycycline in Pertussis

Mary Smithson, MS4, UAB Huntsville Regional Medical Campus; Roger D. Smalligan, MD, Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; David Kimberlin, MD, Professor, Department of Pediatrics-Infectious Disease, UAB, Birmingham, AL; Lea Eiland, MC, Clinical Professor, Department of Pharmacy Practice, Auburn University Harrison School of Pharmacy, Huntsville, AL; Pippa Abston, MD, Assistant Professor, Department of Pediatrics, UAB Huntsville Regional Medical Campus

Learning Objectives

- 1) Identifying pertussis in the community
- 2) Identifying polypharmacy in children and possible medication interactions
- 3) A novel therapy for pertussis
- 4) Importance of primary care physicians as first line for these diseases and treatments

Case Presentation

A 13-year-old male with moderate persistent asthma and depression presented with congestion and cough. His cough was spasmodic with post-tussive gagging. No fevers were reported. Physical exam: clear oropharynx, no wheezing and no other abnormalities. Patient's prior physician had advised avoiding pertussis vaccination due to a seizure after DTaP at 7 months. Nasopharyngeal swab was positive for *Bordetella pertussis* by PCR. The patient was on paliperidone, imipramine, and hydroxyzine prescribed by his psychiatrist. There is a black box warning for interaction between paliperidone and macrolides due to risk of QT prolongation, and imipramine and hydroxyzine may increase this risk. He had a history of severe rash with TMP-SMX and a history of "allergic reaction" to amoxicillin. His pediatrician considered referral for penicillin skin-testing and rapid desensitization; however, the need for timely treatment and concern for exposing others made that option nonviable. Also, amoxicillin has reported in vitro activity against pertussis but in vivo activity is questionable. Both pediatric infectious disease and a PharmD were consulted. Doxycycline 100 mg BID for 10 days was recommended based on historical use and documented in vivo evidence of efficacy. An ECG was obtained to evaluate QT status, considering his multiple medications, and the QT was normal. A follow up nasopharyngeal culture obtained after treatment, 17 days after initial presentation and 24 days after onset of symptoms, was negative. The patient reported improvement in symptoms. A Tdap was strongly advised.

Discussion

Pertussis has increased from 4,570 cases in 1990 to 32,971 in 2014. With the increase of pertussis, treatment to shorten duration of symptoms and decrease transmission is important. Due to the rise in polypharmacy, pediatricians may encounter patients unable to use standard recommended treatments. Macrolides have been effective in the treatment of pertussis, but in patients unable to take a macrolide, TMP-SMX is recommended. This case illustrates another alternative when these first two lines cannot be used: doxycycline. This case also reminds physicians of recognizing potential drug-drug interactions such as prolonged QT syndrome.

Mary Smithson¹, Roger Smalligan¹, David Kimberlin², Lea Eiland³, Pippa Abston¹
¹ Pediatrics, UAB-Huntsville, ² Pediatric ID-UAB, ³ Auburn Hammon School of Pharmacy-Huntsville

Introduction

Macrolides, especially azithromycin, have been effective in the treatment of pertussis and are commonly used as first line treatment. For patients unable to take a macrolide, TMP-SMX is recommended¹. Presented is a patient with pertussis unable to take any of these medicines.

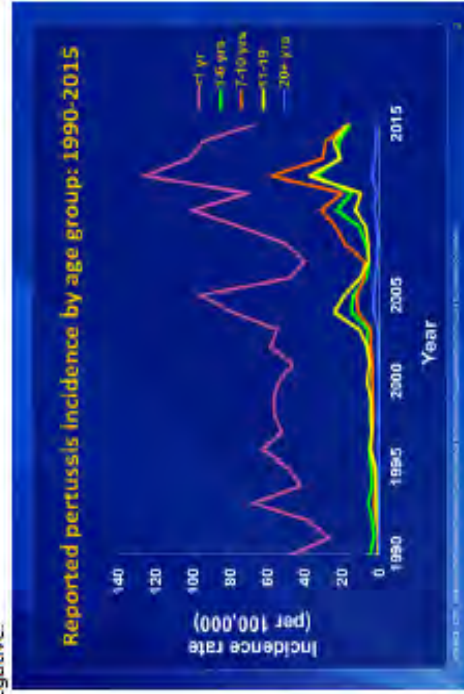
Age Group	Primary Agent Azithromycin	Alternate Agent TMP-SMX
Infants (aged ≥ 6 months) and children	10 mg/kg in a single dose on day 1 then 5 mg/kg per day for 5 days (maximum: 500 mg) on days 2-5	10 mg/kg in a TMP 8 mg/kg per day, SMZ 40 mg/kg per day in 2 divided doses for 14 days
Adults	500 mg in a single dose on day 1 then 250 mg per day on days 2-5	TMP 320 mg per day, SMZ 1,600 mg per day in 2 divided doses for 14 days

Case Report

- A 13-year-old male presented with mild congestion and worsening cough for one week.
- Coughing had become spasmodic with post-tussive gagging
- Prior physician had advised against pertussis vaccination due to a non-febrile seizure after Dtap at 7 months old.
- Physical exam: no wheezing, a clear oropharynx, and no other abnormalities
- Tested positive for *Bordetella pertussis* PCR from the nasopharynx.

Treatment Decision

- Patient was taking paliperidone, imipramine, and hydroxyzine. There is a black box warning for interaction between paliperidone and macrolides due to risk of QT prolongation. Imipramine and hydroxyzine may increase this risk as well.
- He had a history of severe rash with TMP-SMX and a history of "allergic reaction" to amoxicillin. Also, although amoxicillin has reported *in vitro* activity against pertussis, this may not correlate with *in vivo* activity.
- The pediatrician contacted a pediatric infectious disease specialist (DK) and an academic PharmD (LE) for advice, who recommended doxycycline 100 mg BID for 10 days, due to previous historical use with *in vivo* evidence of efficacy.²
- A follow up nasopharyngeal culture obtained after treatment, 17 days after presentation to the pediatrician and 24 days after onset of symptoms, was negative.



Discussion

- Pertussis has increased in incidence from 4,570 cases in 1990 to 32,971 in 2015.³
- With this increase, antibiotic treatment to shorten duration of symptoms and decrease transmission is important.
- The duration of positivity has been reported up to 58 days in some patients⁴ and 66% of patients were still positive after 21 days.⁵
- Our negative result after 24 days of symptom onset along with clinical improvement support the use of doxycycline when 1st and 2nd line antibiotic use is not possible.

Discussion (cont.)

- Due to increasing polypharmacy in children, pediatricians encounter patients unable to use standard treatments and must be aware of viable alternatives.
- Primary care providers are first line in treating these diseases, making it important for them to look for drug interactions and potential complications.
- After treatment, a Toap was strongly recommended for this patient.

Conclusions

This case describes the use of doxycycline for a child with pertussis who was unable to use a macrolide or TMP-SMX. This also brings to light the importance of a primary care physician recognizing potential drug interactions such as prolonged QT syndrome.

References

- "Recommended Antimicrobial Agents for the Treatment and Postexposure Prophylaxis of Pertussis: 2005 CDC Guidelines." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention. www.cdc.gov/mmwr/preview/mmwrhtml/mm5414a1.htm.
- Jermolova, H. "Pertussis Complications and Mortality during the Period 1994 to 1997." *Acta Paediatrica*, vol. 47, no. 1, 1998, pp. 56-64, doi:10.1111/j.1469-7727.1998.tb00785.x.
- "Pertussis (Whooping Cough)." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 7 Aug. 2017. www.cdc.gov/pertussis/about-reporting.html.
- Stone, B. L., et al. "Duration of *Bordetella pertussis* Polymerase Chain Reaction Positivity in Confirmed Pertussis Illness." *Journal of the Pediatric Infectious Diseases Society*, vol. 3, no. 4, 2014, pp. 347-349, doi:10.1093/pids/pit004.
- Blaser, P., et al. "Real-Time PCR Measurement of Pertussis of *Bordetella pertussis* DNA in Nasopharyngeal Secretions during Antibiotic Treatment of Young Children with Pertussis." *Journal of Clinical Microbiology*, vol. 40, no. 11, Mar. 2002, pp. 3636-3638, doi:10.1128/jcm.40.11.3636-02.

Knowledge that will change your world

Infant Anorexia: A Case Study of Oral Aversion Disorder

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Learning Objectives

1. Recognize the presentation of behavioral OAD, specifically infant anorexia.
2. Apply the necessary treatment for behavioral OAD.

Case Presentation

A.B. is an 11-month-old male who presented at age 5 weeks for spitting up. He was born by term uncomplicated vaginal delivery and lives with his biological parents and sister (8 years) in a nurturing home. He was initially exclusively breastfed and regained his birth weight by 3 weeks. He was gaining weight (7th and 12th percentiles for weight- and length-for-age) and was started on reflux prevention techniques. At 2 months, Mom started supplementing with formula secondary to decreased breast milk supply, and he took bottles well. At 4 months, he was lagging behind on both weight and length curves (1st and 8th percentiles). He was diagnosed with failure to thrive and gastroesophageal reflux disease (GERD) and given thickened formula and ranitidine. At 5 months, A.B. began pushing bottles away, continued spitting up others, but still met developmental milestones. After changing to high-calorie formula, weight and length remained unchanged, and referral was made to Pediatric Gastroenterology. He underwent a modified barium swallow and upper endoscopy; findings included mild esophagitis, no gastritis, no anatomic abnormality. Despite no proof of GERD, he began Nexium therapy and concentrated elemental formula and gained 0.5 kg. However, two weeks later, after loss of 0.2 kg and hospital admission, nasogastric tube was placed. Extensive workup was collected and negative, including assessment for electrolyte abnormalities, aspiration, malrotation, milk protein allergy, thyroid disease, mucosal disease, and more, ruling out medical etiologies. After intolerance of the nasogastric tube, gastrostomy tube was placed. The diagnosis of behavioral oral aversion disorder (OAD) was made. After beginning nutrition via gastrostomy tube and interdisciplinary therapy, A.B.'s growth improved to 17th and 20th percentiles, and he became a thriving infant who is regaining interest in oral feeds.

Discussion

OAD is a fairly common diagnosis in pediatric patients, although not well addressed in literature. Causes of OAD fall into 3 main categories: medical, neurological, and behavioral. After a comprehensive negative medical workup, A.B. was diagnosed with behavioral OAD. Infant anorexia is a subset of behavioral OAD that has been described in gastroenterology case reports and named in psychiatric literature. Diagnostic criteria include 1) age of onset less than 3 years, 2) duration at least one month, 3) growth deficiency, 4) lack of hunger signs or food interest with otherwise normal social interaction, 5) no underlying medical illness, and 6) no inciting traumatic event. Correct diagnosis is imperative for behavioral OAD treatment, which requires a multidisciplinary approach with these members: caregiver, primary care physician (physical health), clinical psychologist (development), dietitian (food intake, nutritional status), speech-language pathologist (oral-motor development), and occupational therapist (sensory processing). This mode of treatment is significantly different than the treatment of medical and neurological OAD. Therefore, prompt, correct diagnosis is essential for recovery from behavioral OAD. Because of the rarity

of infant anorexia, the inclusion of this case report in medical literature would help accurately diagnose and effectively treat OAD.

References

- Byars, K. C., Burklow, K. A., Ferguson, K., O'Flaherty, T., Santoro, K., & Kaul, A. (2003). A Multicomponent Behavioral Program for Oral Aversion in Children Dependent on Gastrostomy Feedings. *Journal of Pediatric Gastroenterology and Nutrition*, 37(4), 473-480.
- Edwards, S., DO, Davis, A. M., PhD, MPH, Ernst, L., CCC-SLP, Sitzmann, B., MA, CCC-SLP, Bruce, A., PhD, Keeler, D., RN, . . . Hyman, P., MD. (2015). Interdisciplinary Strategies for Treating Oral Aversions in Children. *Journal of Parenteral and Enteral Nutrition*, 39(8), 899-909.
- Steinburg, C., MD. (2007). Feeding disorders of infants, toddlers, and preschoolers. *BC Medical Journal*, 49(4), 183-186.

Objectives

1. Recognize the presentation of oral aversion disorder, specifically infant anorexia.
2. Apply the necessary treatment for behavioral OAD.

History

- 11 month male with normal prenatal course, born via term vaginal delivery without complications, and regained birth weight at 3 weeks
- Initially exclusively breastfed
- Lives with biological parents and eight year old sister in nurturing home

Case Presentation

- 5 weeks age – Presented for spitting up → at 7th and 12th percentiles (weight and length for age) → was given reflux prevention techniques
- 2 months – Mom began supplementing with formula secondary to decreased breast milk supply → took bottles well
- 4 months – Lagging behind on growth curves (1st and 8th weight and length) → diagnosed with failure to thrive and gastroesophageal reflux disease (GERD) → given thickened formula and Ranitidine
- 5 months – Began pushing bottles away, continued spitting up, meeting milestones → changed to high-calorie formula → weight and length unchanged → Referral to Pediatric Gastroenterology
- 6 months – Further workup → Modified barium swallow, upper endoscopy → showed no GERD or anatomic abnormality → began Nexium and elemental formula
- 7 months – Minimal weight gain → hospitalized, further extensive workup (negative), nasogastric feeding tube placed, gastrostomy tube (g-tube) placed
- **Diagnosed with oral aversion disorder (OAD)**
- 8 months – Receiving nutrition via g-tube, began interdisciplinary therapy, growth improved to 17th and 20th percentiles, and is now a thriving infant regaining interest in oral feeds

Discussion

- OAD – Fairly common pediatric diagnosis, although not well addressed in literature, 3 main categories:
 1. Medical
 2. Neurological
 3. Behavioral
- Infant anorexia – subset of behavioral OAD, must meet 6 diagnostic criteria:
 1. Age of onset < 3 years
 2. Duration ≥ 1 month
 3. Growth deficiency
 4. Lack of hunger signs or food interest with otherwise normal social interactions
 5. No underlying medical illness
 6. No inciting traumatic event
- Correct diagnosis of behavioral OAD imperative for treatment, which requires multidisciplinary team approach:
 - ❖ Caregiver
 - ❖ Primary care physician
 - ❖ Clinical psychologist
 - ❖ Dietitian
 - ❖ Speech-language pathologist
 - ❖ Occupational therapist

Conclusion

- Prompt, correct diagnosis is imperative for behavioral OAD, as treatment differs significantly from medical or neurological OAD.
- Infant anorexia can only be diagnosed after excluding medical and neurological causes and after meeting the remaining criteria.
- The advancement of clinical medicine is achieved by using case reports to help guide diagnosis of rare diseases, such as infant anorexia.

References

1. Biers, K. C., Barklow, K. A., Ferguson, K., O'Flaherty, T., Santora, K., & Kaul, A. (2003). A Multicenter Program for Oral Aversion in Children: Dependent on Gastrostomy. *Feedings: Journal of Pediatric Gastroenterology and Nutrition*, 37(4), 473-480.
2. Edwards, S., DO, Davis, A. M., PhD, MPH, Ernst, L., CCC-SLP, Starmann, B., MA, CCC-SLP, Bruce, A., PhD, Keebler, D., RN, ... Hyman, P., MD. (2015). Interdisciplinary Strategies for Treating Oral Aversions in Children. *Journal of Parental and Enteral Nutrition*, 39(8), 899-909.
3. Steinburg, C., MD. (2007). Feeding disorders of infants, toddlers, and preschoolers. *BC Medical Journal*, 49(4), 183-186.

A Stevens-Johnson Syndrome Scare

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Learning Objectives

- Uncommon presentation of recurrent herpes simplex virus 1 (HSV1) infection
- Clinical manifestations of Stevens-Johnson Syndrome (SJS)
- Genetic predisposition for SJS
- Importance of taking a detailed past medical history

Case Presentation

This is an 8-year-old Caucasian female who presents to the pediatric clinic with blisters in her mouth, pain with swallowing, decreased appetite, and low-grade fever. Four days before presentation, patient had onset of fever, aches, nasal congestion, and cough. Parents took patient to urgent care at this time where she was diagnosed with an influenza infection by positive swab and treated with Tamiflu. Patient's symptoms were improving until the night before presentation to clinic when patient began developing painful blisters in her mouth, which were progressing. Patient is drinking fluids but does not want to eat. Patient was diagnosed with primary episode of oral HSV approximately five years ago per her parents (no confirmatory testing) but has had no other outbreak since that time. Current blisters in the patient's mouth do not look like previous HSV infection. Family history is positive for father having cold sores and mother having Stevens-Johnson Syndrome. Physical examination was significant for several aphthous ulcers in the oral cavity and two patches that appeared to be desquamating, about 1 cm each. A 1.5cm erythematous ulcer was also noted on the hard palate. This presentation was initially thought to be possible Stevens-Johnson Syndrome (SJS) but upon further examination was felt to be a recurrent HSV infection. Acyclovir was started and an HSV PCR was performed, which subsequently resulted positive for HSV type 1.

Discussion

This presentation suggests HSV infection due to the father having a recent case, symptoms being exaggerated due to viral suppression, and the possibility of misdiagnosis with primary HSV infection previously. With primary HSV infection, lesions can present in various locations—oral mucosa, soft palate, tongue, floor of the mouth—and may even extend to the lips and cheeks. In contrast, this presentation suggests SJS because some lesions were larger than typically seen with HSV, one lesion in particular appeared to be desquamating, SJS has been reported with both influenza and Tamiflu in case studies, and there is a known familial predisposition to SJS from a drug reaction based on certain HLA genotypes. HSV infection should be on the differential of a SJS diagnosis. Common presenting signs of Stevens-Johnson Syndrome are upper and lower lips may be swollen and erythematous with erosions and hemorrhagic crusts, oral mucosa involved with painful erosions, bilateral conjunctival injection that progresses to conjunctival erosions, erosions of the penile, vaginal and/or perianal mucosa, and urogenital, esophageal, and tracheal surfaces may be involved in severe cases. These symptoms are usually preceded by a prodrome of fever, malaise, and upper respiratory infection symptoms a few days before presentation of cutaneous lesions.

Objectives

1. Recognize uncommon presentation of recurrent herpes simplex virus 1 (HSV1) infection
2. Learn clinical manifestations of Stevens-Johnson Syndrome (SJS)
3. Learn the genetic predisposition for SJS
4. Recognize the importance of taking a detailed past medical history

Background

- The prevalence of HSV1 increases with age¹
- Primary HSV1 infection in the oral cavity presents as gingivostomatitis, and is generally more involved than recurrent infections¹
- In otherwise healthy individuals, recurrent HSV1 is usually limited to mild cutaneous and/or mucocutaneous disease¹
- SJS is commonly caused by a reaction to a medication including antibiotics, analgesics, and anticonvulsants²
- Various viral infections (herpes, HIV) can precede the development of SJS²
- SJS symptoms are usually preceded by a prodrome of fever, malaise, and upper respiratory infection symptoms a few days before cutaneous lesions appear

Case Presentation

8 yo Caucasian female presents with blisters in her mouth, pain with swallowing, decreased appetite, and low-grade fever. Patient was diagnosed with the influenza virus by positive swab 4 days before presentation, and was prescribed Tamiflu, which she began taking that day. Viral symptoms were improving until the night before presentation to pediatric clinic, when she began developing painful blisters in her mouth and around her lips, which were progressing and led parents to bring patient to the clinic.

- PMH:
 - Recent influenza infection one week prior
 - Primary HSV1 infection 5 years earlier
- FamHx:
 - Father has history of HSV1 infection/cold sores
 - Mother has history of Stevens-Johnson Syndrome illness in 2016
- Vitals:

T: 98.2°F	BP: 84/62	HR: 96
RR: 32	SpO ₂ 99% on RA	
- Exam:
 - Uncomfortable-appearing child
 - Lips showed abnormalities, with several forming ulcers on and around the lips
 - Several aphthous ulcers inside the oral cavity, with 2 patches that appeared to be desquamating, about 1cm each in size
 - 1.5cm erythematous ulcer was also noted on the hard palate

Initial Diagnostic Workup

- Because this presentation was thought to be most consistent with HSV1 infection after examination, the patient was prescribed Acyclovir
- HSV PCR was performed, which subsequently resulted positive for HSV1



Mucosal changes in SJS³



Aphthous ulcers⁴

Discussion

Suggestive of HSV infection:

- father had a recent case
- symptoms being exaggerated due to viral suppression
- possibility of misdiagnosis with primary HSV infection earlier

Suggestive of SJS:

- some lesions were larger than typically seen with HSV
- two lesions in particular appeared to be desquamating
- reported with both influenza and Tamiflu in case studies
- familial predisposition to SJS from a drug reaction based on certain HLA genotypes (variations of HLA-B)

Common presenting signs of Stevens-Johnson Syndrome:

- lips may be swollen and erythematous with erosions and hemorrhagic crusts
- oral mucosa involved with painful erosions
- bilateral conjunctival injection and conjunctival erosions

References

1. Arduino PG, Porter SR. 2006. Oral and perioral herpes simplex virus type 1 (HSV-1) infection: review of its management. *Oral diseases* 12, 254-270
2. National Institutes of Health: National Center for Advancing Translational Sciences. 2016. Stevens-Johnson Syndrome. Genetic and Rare Diseases Information Center.
3. Walls A, Burgin S. 2011. Stevens-Johnson Syndrome. *VisualDx.com*.
4. Wong V, Burgin S, Allen C, Woo S. 2010. Aphthous ulcers. *VisualDx.com*.

Metastatic recurrence of breast cancer in an uncommon location

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Learning Objectives

- Recognize an uncommon presentation of recurrent metastatic breast cancer
- Describe various patterns of recurrence of breast cancer, especially after 10 years of adjuvant chemoendocrine therapy

Background

Breast cancer is the most commonly diagnosed cancer worldwide. In the United States alone, there are approximately 266,000 cases diagnosed and 40,000 deaths attributed to breast cancer each year. Mortality due to breast cancer has dropped almost 40% from 1989 to 2015 likely due in part to improved screening and the advent of adjuvant therapies. Because of this increased survivorship and an aging population, breast cancer survivors account for an astounding 3.6% of the U.S. population. The clinician's familiarity with patterns of relapse and optimization of current adjuvant therapies can lead to early detection of relapsed breast cancer and improved treatment, thereby improving outcomes for a sizable proportion of the U.S. population.

Case Description

A 65-year-old female, with past medical history of breast cancer, type II diabetes mellitus, and hypothyroidism, presented to her primary care doctor's office due to a two-month history of a progressively enlarging, painless abdominal mass, accompanied by a four-month history of anorexia and a 15-pound weight loss over the same period. She was initially diagnosed with breast cancer of the left breast and was treated with single subcutaneous mastectomy 31 years prior to presentation. 17 years later, she was diagnosed with a hormone receptor positive primary breast cancer of the contralateral breast. She was treated with mastectomy and Adriamycin-based adjuvant chemotherapy followed by 10 years of adjuvant endocrine therapy. She completed endocrine therapy 3 years prior to presentation. In clinic, physical exam was notable for abdominal distention and a large, pulsatile periumbilical abdominal mass. Due to suspicion for AAA, she was directly admitted to the hospital. An ultrasound showed no abnormalities of the abdominal aorta but revealed multiple hypoechoic masses throughout the liver. Basic labs done at the time were remarkable only for a mild normocytic anemia. Abdominal/pelvic computed tomography scan showed a large mass replacing the entire pancreas, multiple lesions within the liver and vertebral bodies, and free fluid within the peritoneum. Due to suspicion for a primary pancreatic malignancy, a CA 19-9 was performed and showed moderate elevation. A few days later immunohistochemistry and pathology of the masses and peritoneal fluid demonstrated metastatic adenocarcinoma of the breast. She is currently undergoing repeated cycles of fulvestrant, and anti-estrogen-receptor agent, and palbociclib, a cell-cycle inhibitor.

Discussion

This case illustrates metastatic recurrence of a hormone receptor positive breast cancer after adjuvant chemoendocrine therapy. The pancreas is an unusual site of distant metastasis for a primary breast malignancy. Here we review the reported recurrence patterns of hormone receptor positive breast cancer after chemoendocrine therapy, including its presentation as a pancreatic mass. We hope this will aid the

primary care clinician-oncologist team in the management of hormone positive breast cancer and in the recognition of its recurrence.

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Objectives

1. Recognize an uncommon presentation of metastatic breast cancer
2. Describe various patterns of breast cancer recurrence

Background

- Breast cancer is the most commonly diagnosed cancer in the world with 266,000 cases diagnosed and 40,000 deaths in 2014 in the US alone¹
- 1989-2015: 40% decrease in breast cancer mortality¹
- Improved screening
- Advent of adjuvant therapies
- As of January 2018, there were 3.1 million women living with a history of breast cancer¹

Case Presentation

- A 65-year-old Caucasian female presented to her PCP's office
- PMH: Type II diabetes, hypothyroidism, breast cancer now in remission
 - 2 month history of progressively enlarging, painless midline abdominal mass
 - 4 month history of anorexia and 15-pound weight loss
 - Physical Exam
 - Vital Signs:
 - T – 97.9 F
 - HR – 78 bpm
 - BP – 127/73 mmHg
 - RR – 20/min
 - SpO2 – 100% on RA
 - Thin, but well-nourished
 - Distended abdomen with large, nontender, pulsatile, periumbilical mass

An abdominal aortic aneurysm was suspected and the patient was admitted to the hospital for further workup with orders for an abdominal ultrasound

Chart Review

- 31 years prior: breast cancer of the L-breast (unknown stage and receptor status) treated with L-subcutaneous mastectomy
- 14 years prior: new ER+/PR+, HER2- invasive lobular carcinoma of the R-breast with 3/10 axillary LNs involved
 - R-mastectomy → adjuvant chemotherapy → 5 years of tamoxifen → 5 years of letrozole (completed 3 years prior)
- At a follow-up with her oncologist two years prior to presentation no radiographic or laboratory evidence of breast cancer was found

Diagnostic Workup

Day 1

- Labs unremarkable except for mild microcytic anemia and modestly elevated AST & alkaline phosphatase
- Abdominal ultrasound: no abnormality of the aorta, multiple hypochoic masses present in liver
- Abdominal CT: large (8x7x6cm) pancreatic mass replacing entire pancreas, encasing the portal vein, and leading to significant mass effect on portions of the duodenum; multiple liver lesions;

Day 2

- CA 19-9: 124.6 (~4x upper limit of normal)

Day 3

- CT chest: several small nodules scattered throughout the lungs
- Whole body bone scan: numerous osteoblastic metastases
- CT-guided liver biopsy: metastatic adenocarcinoma consistent with breast primary

Day 7

- Upper endoscopic ultrasound with FNA of pancreatic mass: metastatic adenocarcinoma consistent with breast primary



CT abdomen shows multiple hepatic nodules (yellow) and mass obliterating normal pancreatic anatomy (red)



Immunohistochemistry of the pancreatic mass showing strong uptake of GATA-3 antibodies

Follow-Up

The patient was begun on repeated cycles of fulvestrant and palbociclib. Her treatment has been complicated by recurrent ascites requiring paracentesis

Discussion

- Breast cancer survivors are at 60% higher risk of developing a second primary contralateral breast cancer²
- Risk influenced by histology, receptor status, age, family history of breast cancer, and genetics²
- Metastases to the pancreas only represent 1-2% of all pancreatic neoplasms³
- 5% of these are primary breast neoplasms³
- Tumors originating from the kidney, lung, and colon are all more common³
- Presenting symptoms³:
 - 50% - abdominal pain
 - 20% - obstructive jaundice
 - 20% - asymptomatic
 - 10% - weight loss
- Extended therapy with letrozole after 5-years of tamoxifen leads to a 42% reduction in breast cancer recurrence compared to tamoxifen alone⁴
- Prolonged duration of endocrine therapy may lower rates of breast cancer recurrence in some patients

References

1. Siegel, R. L., et al. (2018). "Cancer statistics, 2018." CA Cancer J Clin 68(1): 7-30.
2. Saltzman, B. S., et al. (2012). "Estrogen receptor, progesterone receptor, and HER2-neu expression in first primary breast cancers and risk of second primary contralateral breast cancer." Breast Cancer Res Treat 135(3): 849-855.
3. Alzahrani, M. A., et al. (2012). "Metastases to the pancreas: the experience of a high volume center and a review of the literature." J Surg Oncol 105(2): 156-161.
4. Goss, P. E., et al. (2005). "Randomized trial of letrozole following tamoxifen as extended adjuvant therapy in receptor-positive breast cancer: updated findings from NCIC CTG MA.17." J Natl Cancer Inst 97(17): 1262-1271.

Infective Endocarditis (IE) mimicking cancer

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Goals and objectives

Recognize various Clinical manifestation of Endocarditis

Blood cultures is essential work up in patients with recurrent fever

Simultaneous right and left-sided endocarditis emphasizes the importance of careful assessment for ventricular septal defects or extra-cardiac shunts in individuals in patient without risk factors

Case Report

66 YO M was admitted with 6 months history of worsening dizziness, weakness, loss of appetite and unintentional 70 lb. weight loss. He had recurrent fever up to 101F, night sweats and significant fatigue. Initially His carotid Doppler and transthoracic ECHO were normal. His ENT evaluation was unrevealing as well. For his B symptoms, oncology evaluation to rule out malignancy including CT chest abdomen & pelvis showed splenomegaly. Bone marrow biopsy showed mildly hypercellular marrow with granulocytic and megakaryocytic hyperplasia with increased storage iron that suggested either a collagen vascular disease or infection with anemia of chronic inflammation. HIV and viral Hepatitis serology were negative. Endocrine and autoimmune workup were negative. One week before admission he had recurrent episode of dizziness and shortness of breath, therefore he is admitted for cardiac work up, His Examination is significant for cachexia, BP 100/50, PR 110/min and pan systolic murmur at the left sternal edge. His labs were remarkable for Hb of 7.4, WBC 3.7, ESR 71, CRP 6.5, creatinine 1.7 and microscopic hematuria. MRI of the Brain showed restricted diffusion in inferior pons likely indicative of stroke. Blood cultures on admission showed *Streptococcus viridans*. A Trans-Esophageal Echo showed vegetations on the Aortic and Tricuspid valve and perimembranous VSD. Patient was treated with Ceftriaxone for 4 weeks. His symptoms resolved, labs normalized, and he regained 50lb within 2 months of finishing treatment.

Discussion

The Challenges posed by Infective endocarditis are significant. It is heterogeneous in etiology, clinical manifestations, and course. *Staphylococcus* species has become the predominant causative organism followed by *Streptococcus* species¹. Risk factors for IE include age>60 years, male sex, injection drug use, poor dentition and comorbid conditions that increase the likelihood of infection including structural heart disease, presence of prosthetic heart valve, history of infective endocarditis, presence of intravascular device, chronic hemodialysis, and HIV infection². Fever is the most common symptom (up to 90% of patients)³. The diagnosis should be suspected in patient with fever and above risk factors⁴. The diagnosis is established based on clinical manifestations, blood cultures (or other microbiologic data), and echocardiography. Therapy is based on the causative organism, the valve involved, prosthetic vs native valve⁵. Our patient had significant weight loss concerning for malignancy, left and right sided endocarditis which is rarely reported in patients without prior history of iv drug use or previous IE and therefore is required to have further evaluation for VSD or extra-cardiac shunt.



Infective Endocarditis (IE) mimicking cancer

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LEARNING OBJECTIVES

- ❖ Recognize various Clinical manifestations of Endocarditis
- ❖ Blood cultures are essential work-up in patients with recurrent fever
- ❖ Simultaneous right and left-sided endocarditis emphasizes the importance of careful assessment for ventricular septal defects or extra-cardiac shunts in patients without risk factors

❖ HIV and viral Hepatitis serologies were negative. Endocrine and autoimmune workup was negative.

❖ His examination was significant for cachexia, BP 100/50, PR 110/min and pan systolic murmur at the left sternal edge. His labs were remarkable for Hb of 7.4, WBC 3.7, ESR 71, CRP 6.5, creatinine 1.7 and microscopic hematuria.

❖ MRI of the Brain showed restricted diffusion in inferior pons likely indicative of stroke.

❖ Blood cultures on admission showed *Streptococcus viridans*. Trans-Esophageal Echo showed vegetations on the Aortic and Tricuspid valve and perimembranous VSD.

❖ Patient was treated with Ceftriaxone for 4 weeks. His symptoms resolved, labs normalized, and he regained 50lb within 2 months of finishing treatment.

CASE INFORMATION

❖ 66 YO M is evaluated for 6 months history of worsening dizziness, weakness, loss of appetite, unintentional 70 lb. weight loss with recurrent fever up to 101°F, night sweats and significant fatigue.

❖ Initial carotid Doppler and transthoracic ECHO were normal. ENT evaluation was unrevealing as well.

❖ For his B symptoms, oncology evaluation to rule out malignancy including CT chest abdomen & pelvis showed splenomegaly.

❖ Bone marrow biopsy showed mildly hypercellular marrow with granulocytic and megakaryocytic hyperplasia with increased storage iron that suggested either a collagen vascular disease or infection with anemia of chronic inflammation.

DISCUSSION

❖ IE is heterogeneous in etiology, clinical manifestations, and course.

❖ *Staphylococcus* species are predominant causative organism followed by *Streptococcus* species

❖ Risk factors include age > 60 years, male sex, injection drug use, poor dentition and other comorbid conditions.

❖ Fever is the most common symptom (up to 90% of patients). The diagnosis should be suspected in patient with fever and above risk factors

❖ Therapy is based on the causative organism, the valve involved, prosthetic vs native valve.

❖ Our patient had significant weight loss concerning for malignancy, left and right sided endocarditis which is rarely reported in patients without prior history of IV drug use or previous IE and therefore is required to have further evaluation for VSD or extra-cardiac shunt.

REFERENCES

- ❖ Trends in infective endocarditis Pant S, et al; J Am Coll Cardiol. 2015;65(19):2070.
- ❖ Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century; Arch Intern Med. 2009;169(5):463.
- ❖ Infective endocarditis. Cahill TJ, Prendergast BD; Lancet. 2016;387(10021):882. Epub 2015 Sep 1.
- ❖ Experimental bacterial endocarditis. II. Survival of a bacteria in endocardial vegetations. Durack DT, Beeson PB; Br J Exp Pathol. 1972;53(1):50.

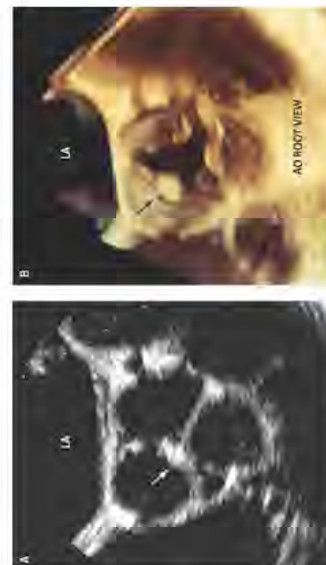


Fig. Vegetation on the aortic root on TEE

A rare case of acquired hemophilia A in myelodysplastic syndrome

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Learning objective

We describe a case of an acquired FVIII inhibitor secondary to Myelodysplastic Syndrome (MDS). While nearly 20% of patients with MDS develop autoimmune disorders, we identified only two published cases of an acquired factor VIII inhibitor in association with MDS.

Case report

73-year-old man with past medical history of COPD, tobacco abuse, and peripheral arterial disease presented with a 3-month history of pancytopenia. He had dyspnea on exertion, melena, and weight loss of 50 lbs. in the last 10 months. His medications on admission were statin and aspirin. Physical exam revealed a pale, clammy gentleman, with a heart rate of 85 bpm, blood pressure 135/64, and insignificant abdominal examination. There was no palpable lymphadenopathy. Colonoscopy, upper GI endoscopy, and capsule endoscopy were normal. Vitamin B12, folate, and autoimmune markers were all negative. Complete Blood Count showed hemoglobin of 7.1g/dl (Normal range: 14-17g/dL), platelet count of $97 \times 10^9/L$ (Normal range: $150-450 \times 10^9/L$), WBC of $2.8 \times 10^9/L$ (Normal range: $4.0-10 \times 10^9/L$), and absolute reticulocyte count of 0.85. Bone marrow aspirate showed a hypercellular marrow with 60 % cellularity with megaloblastoid changes which is consistent with MDS. Coagulation studies showed prolonged activated Partial Thromboplastin Time (aPTT) of 46.7 seconds (Normal range: 25-35 s) which wasn't correctable on mixing with normal plasma. Additionally, Prothrombin Time (PT) was 14.6 seconds (Normal range: 11-13 s) and factor VIII (FVIII) level was 5%, suggesting the presence of an inhibitor. A quantitative assay of the circulating FVIII inhibitor by the Bethesda method showed a level of 4.0 Bethesda units/mL. Patient was treated with steroids but had recurrence upon dose tapering. Rituximab was used as steroid sparing drug, which put him in remission.

Discussion

Acquired hemophilia is a rare but potentially life-threatening bleeding disorder caused by the development of autoantibodies (inhibitors) against plasma coagulation factors, most frequently factor VIII (hemophilia A). The incidence of acquired hemophilia A has been estimated to be 0.2-1.0 case per 1 million persons per year, but this may underestimate the true incidence of the disorder, given the difficulty in making the diagnosis. Acquired hemophilia A can be idiopathic, but also associated with pregnancy, medications, autoimmune disease and malignancy. Common presentations include hemorrhages into the skin, muscles, or soft tissues, but intra-articular bleeding episodes are uncommon. Laboratory study shows normal bleeding time, normal PT, and

normal platelet count. There is prolongation of aPTT that is not reversed on a correction study, reduced FVIII levels, and evidence of an FVIII inhibitor with Bethesda method (BU). Therapeutic options include treatment of the underlying disorder, discontinuation of an offending drug, and eradication of the inhibitor with immunosuppression. Steroid is considered a first line agent for immunosuppression. Rituximab may be considered in cases of resistance or intolerance to first line treatment. Patients with severe bleeding and inhibitor titers of 5 BU or higher should receive therapy with either recombinant factor VIIa or an activated prothrombin complex concentrate. Prognosis of patients with acquired hemophilia A depends on early identification of the disease and response to immunosuppression.

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Objectives

- We describe a case of an acquired FVIII inhibitor secondary to Myelodysplastic Syndrome (MDS). While nearly 20% of patients with MDS develop autoimmune disorders, we identified only two published cases of an acquired factor VIII inhibitor in association with MDS.

Case Report

- 73-year-old man presented with a 3-month history of pancytopenia. He had dyspnea on exertion, melena, and weight loss of 50 lbs in the last 10 months.
- PMH: COPD, tobacco abuse, and peripheral arterial disease
- Medications : Statin and aspirin.
- Physical Exam:
 - Pale, clammy gentleman
 - No palpable lymphadenopathy
 - Insignificant abdominal examination
- Vitals: T 98.6 °C
BP 135/164
HR 85
RR 18
SpO₂ 100% on RA

Diagnostic Workup

- | | | | |
|-----|-------------|----|--------------------------------------|
| 2.8 | 7.1
23.1 | 97 | Absolute reticulocyte count of 0.85. |
|-----|-------------|----|--------------------------------------|
- Colonoscopy, upper GI endoscopy, and capsule endoscopy were normal. Vitamin B12, folate, and autoimmune markers were all negative.
 - Coagulation studies showed normal Prothrombin time, prolonged activated Partial Thromboplastin Time (aPTT) of 46.7 seconds (Normal range: 25-35 s) which wasn't correctable on mixing with normal plasma. Factor VIII (FVIII) level was 5%, suggesting the presence of an inhibitor. A quantitative assay of the circulating FVIII inhibitor by the Bethesda method showed a level of 4.0 Bethesda units/mL.
 - Bone marrow aspirate showed a hypercellular marrow with 60 % cellularity with megakaryoblastoid changes which is consistent with MDS.
 - Patient was treated with steroids but had recurrence upon dose tapering. Rituximab was used as steroid sparing drug, which put him in remission.

Discussion

- Acquired hemophilia is a rare but potentially life-threatening bleeding disorder caused by the development of autoantibodies (inhibitors) against plasma coagulation factors, most frequently factor VIII (hemophilia A).
- The incidence of acquired hemophilia A has been estimated to be 0.2-1.0 case per 1 million persons per year, but this may underestimate the true incidence of the disorder, given the difficulty in making the diagnosis.
- Acquired hemophilia A can be idiopathic, but also associated with pregnancy, medications, autoimmune disease and malignancy. Common presentations include hemorrhages into the skin, muscles, or soft tissues.

- Laboratory study shows normal bleeding time, normal PT, and normal platelet count. There is prolongation of aPTT that is not reversed on a correction study, reduced FVIII levels, and evidence of an FVIII inhibitor with Bethesda method (BU).
- Therapeutic options include treatment of the underlying disorder, discontinuation of an offending drug, and eradication of the inhibitor with immunosuppression.
- Steroid is considered a first line agent for immunosuppression. Rituximab may be considered in cases of resistance or intolerance to first line treatment.
- Patients with severe bleeding and inhibitor titers of 5 BU or higher should receive therapy with either recombinant factor VIIa or an activated prothrombin complex concentrate.
- Prognosis of patients with acquired hemophilia A depends on early identification of the disease and response to immunosuppression.

“Mood disorder treatment makes you urinate”- A case of lithium induced nephrogenic diabetes insipidus

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Learning objective 1

Elevated serum lithium levels are a risk factor for Nephrogenic Diabetes Insipidus (NDI)

Learning objective 2

Treatment options for Lithium Induced Nephrogenic Diabetes Insipidus (LINDI)

Case

A 57-year-old female presents one month after dental surgery on antibiotics with stomatitis. She returned to the dentist who treated her with Magic mouthwash, nystatin, and fluconazole. The patient did not improve on medication and was having weight loss due to decreased oral intake, one protein drink/day. She was brought to the hospital and treated with IV fluids. She was admitted for AKI and elevated lithium levels. PMHx: includes CKD stage 2, and bipolar. PSHx: includes parathyroidectomy. Medications: Allopurinol, vitamin D, colchicine, fluconazole, folic acid, lithium, lorazepam, and paricalcitol. PE: temperature 98.6, HR 81, BP 125/62, RR 18, saturation 96% on RA. Emaciated appearing, anxious and intermittently confused, shallow lip ulcers. Labs: sodium 141, potassium 3.1, chloride 102, CO₂ 26, BUN 31, creatinine 2.3, glucose, 91, calcium 9.7, lithium 1.94 (normal 0.6-1.2 mmol/L), WBC 31.24, h/h 12.3/38.9, PLT 385000, u/a: leukocytes and bacteria. Imaging: CXR showed no findings. Labs the following day urine sodium- 23, urine osmolality- 167, and serum sodium- 160. Lithium was stopped. She was treated with fluid replacement, DDVAP, amiloride, and HCTZ.

Discussion

Lithium is used widely for the treatment of bipolar and other mood disorders. Great care must be used with lithium as it can have many side effects. One of the many side effects is NDI. When the levels of lithium rise, the molecules enter the principal cells of the collecting ducts in the kidneys via sodium transport channels on the luminal surface. Once lithium enters the principal cells it causes decreased expression of aquaporin-2 water channels (AQP2). Studies have suggested increased expression of cyclooxygenase-2 causes increased expression of prostaglandin-E₂ which increases apoptosis of the AQP2 channels. Others have shown distal tubular acidification defects or decreased production of cAMP lead to NDI. Regardless of the many proposed mechanisms known to cause NDI, treatment is necessary. NDI is the decreased ability of the kidneys to concentrate urine. This causes an increase in solute concentration within serum and stimulation of thirst, leading to polyuria and polydipsia. NDI can cause electrolyte imbalances which can be corrected. Most LINDI can be corrected with the following treatments and stopping lithium. Treatment should start with IV fluids to maintain a fluid balance in the body. Then additional treatment approaches such as a low solute and low protein diet, thiazide with/without potassium sparing diuretic, acetazolamide, NSAIDs, or exogenous ADH can be given. It is advised to use thiazides with a potassium sparing diuretics, such as amiloride, to treat lithium-induced NDI. Amiloride

decreases the uptake of lithium into the principal cells of the collecting duct. This case reminds physicians that patients on lithium therapy should have lithium levels checked when starting, changing dose, and with renal impairment to prevent complications such as NDI.

Resources

Bedford JJ, Weggery S, Ellis G, et al. Lithium-induced nephrogenic diabetes insipidus: renal effects of amiloride. *Clin J Am Soc Nephrol* 2008; 3:1324.

Behl T, Kotwani A, Kaur I, Goel H. Mechanisms of prolonged lithium therapy-induced nephrogenic diabetes insipidus. *Eur J Pharmacol*. 2015; 755:27-33.

Bichet, D. G. (2017, July 11). Treatment of nephrogenic diabetes insipidus. Retrieved February 17, 2018, from [https://www.uptodate.com/contents/treatment-of-nephrogenic-diabetes-insipidus?search=lithium nephrogenic diabetes insipidus&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2](https://www.uptodate.com/contents/treatment-of-nephrogenic-diabetes-insipidus?search=lithium+nephrogenic+diabetes+insipidus&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2)

Christensen BM, Zuber AM, Loffing J, et al. alphaENaC-mediated lithium absorption promotes nephrogenic diabetes insipidus. *J Am Soc Nephrol* 2011; 22:253.

de Groot T, Sinke AP, Kortenoeven ML, et al. Acetazolamide Attenuates Lithium-Induced Nephrogenic Diabetes Insipidus. *J Am Soc Nephrol* 2016; 27:2082.

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Objectives

1. Elevated serum lithium levels are a risk factor for Nephrogenic Diabetes Insipidus (NDI)
2. Treatment options for Lithium Induced Nephrogenic Diabetes Insipidus (LINDI)

Background

- Lithium is used widely for the treatment of bipolar and other mood disorders and can lead to NDI³

Case Presentation

- 57 yo Caucasian female
- Decreased PO intake with 25lb weight loss 2/2 stomatitis
 - PMH: CKD stage 2 and bipolar
 - PSH: parathyroidectomy
 - Vitals: T 98.6 °F
BP 125/62
HR 81
RR 18
SpO₂ 96% on RA

- Exam:
 - Emaciated appearing, anxious and intermittently confused
 - Shallow lip ulcers

- References**
- Wegary S, Ellis G, et al. Lithium-induced nephrogenic diabetes insipidus: renal effects of amiloride. Clin J Am Soc Nephrol 2008; 3:1324.
 - Behl T, Kotwani A, Kaur I, Goel H. Mechanisms of prolonged lithium therapy-induced nephrogenic diabetes insipidus. Eur J Pharmacol. 2015; 755:27-33.
 - Bichet D, G. (2017, July 11). Treatment of nephrogenic diabetes insipidus. Retrieved February 17, 2018, from https://www.uptodate.com/contents/treatment-of-nephrogenic-diabetes-insipidus?search=lithium&source=search_result&result_selected=true&rank=2&type=default&display=rank=2
 - Christensen BM, Zuhair AM, Loffing J, et al. alphaNaC-mediated lithium absorption promotes nephrogenic diabetes insipidus. J Am Soc Nephrol 2011; 22:253.
 - de Groot T, Sinke AP, Kortbeeren ML, et al. Lithium-induced alterations in the expression of epithelial sodium channel. Diabetes Insipidus. J Am Soc Nephrol 2016; 27:2082.

Initial Diagnostic Workup

31.24	12.3	385	141	102	31	91
	38.9		3.1	26	2.3	9.7

Lithium 1.94 (Range 0.6-1.2 mmol/L)

- Urinalysis: small leukocyte esterase, small bacteria
- Urine and blood cultures ordered
- Chest X-ray: normal
- 2 days Later**
 - Urine sodium 23 meq/L
 - Urine osmolality 167 mosm/kg
 - Serum sodium 162mmol/L

Hospital Course

- In the emergency department:
 - Given 2L of LR in the ED for renal failure
- Upon admission:
 - Lithium was stopped
 - Started on NS @ 100ml/hr
- Day 2:
 - Started on 1/2 NS @ 100ml/hr
 - Given 10mg of Geodon for sleep aid
- Day 3:
 - Switched to D5W @ 100ml/hr
- Started on DDAVP
 - NG Tube placed
 - Started on Ativan for agitation
 - Transferred to ICU
 - Remainder of hospitalization
 - Fluids continued
 - 1st time seizure
 - Started on amiloride (2/2/18), stopped 2/12/18
 - Started on HCTZ (2/8/18)
 - Discharged 2/16/18

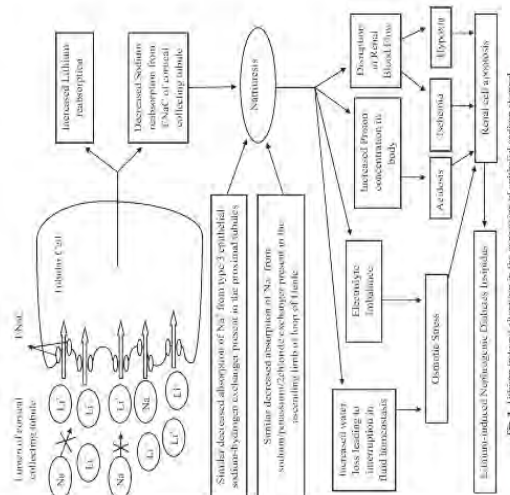


Fig. 1. Lithium induced alteration in the expression of epithelial sodium channel.

De Groot T, et al. 2016

Microscopic Polyangiitis induced Disseminated Intravascular Coagulation and Gastrointestinal Vasculitis

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Learning Objectives

1. Appreciate the complicated presentation of vasculitis when superimposed on Progressive Chronic Kidney Disease
2. Appreciate the extensive systemic nature of microscopic polyangiitis (MPA) and potential for rare complications
3. Recognize the diagnostic dilemma caused by similarity in vasculitis related manifestations and treatment induced adverse effects

Case Presentation

A 74-year-old male with history of Type 2 Diabetes Mellitus, Hypertension, Chronic Kidney Disease (CKD) Stage 3 and Coronary Artery Disease presented with hematochezia and acutely worsening renal function. Conservative management of renal failure for prerenal acute kidney injury (AKI) on Progressive CKD failed to improve renal function which prompted extensive work up including negative renal artery Doppler. Urgent renal biopsy, showed Rapidly Progressive Necrotizing Glomerulonephritis. Patient was initiated on dialysis and treated with plasmapheresis, Cyclophosphamide and high dose intravenous (iv) methyl prednisone. Confirmatory lab tests showed positive Myeloperoxidase and p-ANCA antibodies diagnosing him with Microscopic Polyangiitis. Colonoscopy showed multiple colonic polyps with high grade dysplasia. Patient was discharged on cyclophosphamide and steroids. Unfortunately, he presented back within a month with melena, profound anemia and thrombocytopenia. The cytopenias were ascribed to adverse effect of Cyclophosphamide which was discontinued. An upper GI endoscopy was performed showing extensive erosive gastritis and duodenitis which was attributed to steroid and was managed with argon plasma coagulation. Multiple angioectasias were also detected in the small bowel with video capsule endoscopy. Patient continued to have melena despite intervention and discontinuation of Cyclophosphamide failed to improve platelet count. Additional work up for thrombocytopenia indicated low grade Disseminated Intravascular Coagulation with elevated d-dimer, low fibrinogen, and abnormal coagulation parameters. This suggested diffuse systemic involvement of MPA with gastrointestinal vasculitis and autoimmune DIC. He was treated empirically with 5 days of high dose iv methyl prednisone without confirmatory GI biopsy due to high risk in the setting of thrombocytopenia. Treatment led to resolution of GI bleed and DIC indirectly indicating MPA and associated autoimmunity as the underlying cause of both.

Discussion

Microscopic Polyangiitis is a pauci-immune systemic small vessel vasculitis associated with the perinuclear antineutrophilic cytoplasmic antibody (p-ANCA). Most common manifestations of MPA are glomerulonephritis including RPGN, pulmonary involvement, and cutaneous leukocytoclastic vasculitis. Gastrointestinal involvement is less common and includes GI vasculitis causing non-specific abdominal pain to massive bleeding. Hematologic involvement is rarer still and can include Microangiopathic hemolytic anemia, Thrombotic thrombocytopenic purpura and DIC. Both are more prominent during

relapse phase and in general portend a worse prognosis unless aptly addressed. Medications involved in the treatment of vasculitis can cause side effects similar to these less known complications and hence might pose a diagnostic dilemma. Differentiation between the vasculitis induced clinical scenarios and potential confounders is of utmost importance in enabling appropriate treatment to improve morbidity and mortality.

*** This vignette was chosen for oral presentation on Research Day. Contact Rohini Ramamoorthy at rramamoorthy@uabmc.edu for a copy of the PowerPoint.**

Septic arthritis in immunosuppressed patient

Chad Martinez, UAB Huntsville Regional Medical Campus; Ali Hassoun, MD, Infectious Disease Specialist, Alabama Infectious Diseases Center, UAB Huntsville Regional Medical Campus

Learning Objectives

1. Emphasize the importance of a detailed history
2. Educate on the risk factors and management of *Pasteurella multocida* infection
3. Understand septic arthritis in immunocompromised patients can be caused by atypical organisms

Case Presentation

A 64-year-old male with a history of advanced rheumatoid arthritis and chronic steroid use was referred to our office with 2 days history of right lower extremity redness, swelling and pain with reduced mobility. The patient denied any fever, chills or myalgia. Past surgical history is significant for bilateral knee replacements. Denied recent travel. Owns a cat but denied any recent bite. Past infection history is significant for disseminated histoplasmosis, and right shoulder *Enterobacter* septic arthritis for which he is on suppressive trimethoprim/sulfamethoxazole. Physical exam revealed right lower extremity erythema from knee down, hot to touch, and significant right ankle swelling. The patient was given one dose of oritavancin and reported resolved erythema 7 days later with persistent right ankle edema and pain. Vitals remained stable with a temperature of 97.6 F and blood pressure of 116/69. Additional labs were drawn for further workup and were notable for a CRP of 1.5, an ESR of 39, and CBC with increased immature granulocytes (3.8). Incision and drainage were performed, and cultures showed beta-lactamase negative *Pasteurella multocida*. The patient was started on IV ampicillin/sulbactam and returned 2 weeks later reporting that the right ankle edema and arthralgia had resolved. IV antibiotics were continued for an additional 2 weeks.

Discussion

Pasteurella is a zoonotic infection caused by gram-negative coccobacilli. Although usually a common pathogen among animals, *Pasteurella* can cause a variety of disease among humans. *Pasteurella* is part of the normal upper respiratory flora of many mammals and is largely transmitted via cat and dog bites, scratches, and licks with *Pasteurella multocida* being the most common species. *Pasteurella* can be pathogenic even in previously healthy individuals but those who are immunosuppressed are at higher risk of infection with increased severity. Infection can manifest as cellulitis or uncommonly spread to deeper tissues causing septic arthritis, osteomyelitis, and meningitis. Respiratory infections can also occur in individuals with concomitant chronic pulmonary disease. Symptoms occur within 24 hours of exposure and severe complications should be considered in patients with known immunosuppression. Serious infections are also more highly associated with cat bites which tend to penetrate deeper.

Pasteurella multocida can be diagnosed by isolation in culture and is susceptible to variety of antibiotics. Amoxicillin-clavulanate is an appropriate empiric therapy. Penicillin can be used for soft tissue infections although a definitive treatment regimen should be based on cultures due to the likelihood of polymicrobial infections in patients with animal bites. Although beta-lactamase testing is not always warranted in soft tissue infections, it should be considered in deeper infections and especially with individuals with immunosuppression. Without beta-lactamase presence, septic arthritis and osteomyelitis can be treated with high dose penicillin G. With beta-lactamase production and coinfections, ampicillin-

sulbactam, piperacillin-tazobactam, ceftriaxone, and quinolones may be used. Four to six weeks of antibiotic treatment is recommended.

Objectives

1. Emphasize the importance of a detailed history
2. Educate on the risk factors and management of *Pasteurella multocida* infection
3. Understand septic arthritis in immunocompromised patients can be caused by atypical organisms

Case Presentation

64-year-old male with right lower extremity redness, swelling and pain with reduced mobility. Denied fever, chills or myalgia.

- PMH: Rheumatoid arthritis
- PSH: significant for bilateral knee replacements
- Travel H: denied recent travel
- Pet H: Owns one cat, denied recent bites
- Infectious H: (+) for disseminated histoplasmosis and right shoulder Enterobacter septic arthritis
- Meds: suppressive trimethoprim/sulfamethoxazole, chronic hydrocortisone use

Vitals: T 98.2 °F
BP 112/74
HR 72
RR 16
SpO₂ 100% on RA

Exam:

- (+) right lower extremity erythema from knee down
- significant right ankle edema, hot to touch, reduced mobility

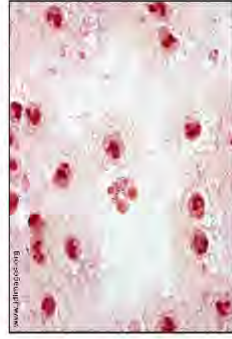
The patient was given one dose of orbitavancin and reported resolved erythema 7 days later with persistent right ankle edema and pain.

Diagnostic Workup

6.79	13.4	CMP within normal limits	CRP 1.5
39.9	442	Immature granulocytes 3.8	ESR 39

Vital signs remained stable

- Incision and drainage were performed
- Joint/synovial fluid culture and gram stain revealed many polymorphonuclear WBCs and 1+ *Pasteurella multocida*. beta-lactamase testing was negative



Gram stain of aspirate showing *Pasteurella multocida*



Culture growing *Pasteurella multocida*

Treatment Plan

- The patient was started on IV ampicillin/sulbactam
- Follow-up at 2 weeks, patient reported that the right ankle edema and arthralgia had resolved
- IV antibiotics were continued for an additional 2 weeks



Lower extremity cellulitis caused by *Pasteurella multocida*



Septic arthritis of left knee

Prevalence

- Reported incidence of septic arthritis by population^{1,2,3}
 - 4-10 per 100,000 in the general population
 - 30-100 per 100,000 in those with rheumatoid arthritis, immunosuppression, prosthetic joints, old age or other risk factors

Discussion

- *Pasteurella* is a zoonotic infection caused by a gram-negative coccobacilli; transmitted via cat and dog bites, scratches, and licks with *Pasteurella multocida* being the most common species.
- Can be pathogenic in previously healthy individuals commonly causing cellulitis
- Immunosuppressed patients are at higher risk of infection with increased severity
- Infection can uncommonly spread to deeper tissues causing septic arthritis, osteomyelitis, and meningitis
- Symptoms occur within 24 hours of exposure
- Cat bites are associated with serious infection because of their deep penetrance
- Amoxicillin-clavulanate is an appropriate empiric therapy
 - Antimicrobial regimens should be based on cultures due the likelihood of polymicrobial infections
- Beta-lactamase testing is not always warranted but consider in deep infections and/or individuals with immunosuppression
 - Beta-lactamase (-), treat with high dose Penicillin G.
 - Beta-lactamase (+) or coinfections, use ampicillin-sulbactam, piperacillin-sulbactam, ceftriaxone, or quinolones
- Treat for 4-6 weeks

References

1. Mathew CJ, Weston VC, Jones A, Field M, Coakley G. Bacterial septic arthritis in adults. *Lancet*. 2010 Mar;6:375(9717):846-55
2. Hecovitz DL, Kirzop E, Hecovitz S, Barilla-Labaica ML. Approach to septic arthritis. *Am Fam Physician*. 2011 Sep;15:84(6):653-60 full-text.
3. Mathew AJ, Revindran V. Infections and arthritis. *Best Pract Res Clin Rheumatol*. 2014 Dec;28(6):955-9

Knowledge that will change your world

***Streptococcus intermedius* as a Cause of Necrotizing Pneumonia and Empyema: A Case Report**

Mary Fok, MS3, UAB Huntsville Regional Medical Campus; Jesse Faulk, MD, PGY1, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Alan Baggett, Assistant Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning objectives

Assess the cause and clinical manifestations of necrotizing pneumonia

Case presentation

62-year-old Caucasian female with a 15 pack-year smoking history presented to the Emergency Department with a chief complaint of left-sided chest pain. She reported that one month ago she developed fevers, chills, rigors, and left-sided pleuritic chest pain that spontaneously resolved after a week. She then developed fever with a maximum temperature of 38.4°C, productive cough, and pleuritic chest pain three days prior to presentation. She denied any nausea, vomiting, or hemoptysis. She denied recent aspiration or dental work. She did admit to alcohol abuse, drinking 1 pint of vodka per day. She had no significant medical history. Vital signs on admission included: temperature of 39.4°C, pulse of 132, respiratory rate of 22, blood pressure of 106/75, and pulse oximetry of 95% on 2 liters nasal cannula. Physical exam revealed decreased expiratory breath sounds bilaterally with rhonchi and dullness to percussion in the left lower lobe. Laboratory studies revealed white blood cell count of $27.5 \times 10^3/\mu\text{L}$, hemoglobin of 12.1 g/dL, absolute neutrophil count of $26.5 \times 10^3/\mu\text{L}$, and C-reactive protein of 29.8 mg/dL. Chest x-ray showed left basilar airspace disease with a small left pleural effusion. CT angiogram revealed empyema with consolidation of the left lower lobe with areas of pulmonary necrosis. Patient had chest tube placed and pleural fluid showed WBC of 13,000/ μL , neutrophils of 98%, pH of 7.27, LDH of 2601, glucose less than 2, and protein of 4.1. Pleural fluid culture grew *Streptococcus intermedius*. Patient underwent video-assisted thoracoscopic surgery for decortication and completed a 4-week antibiotic course of Augmentin, resulting in resolution of symptoms.

Discussion

Necrotizing pneumonia is a serious and rare complication of bacterial lung infection. Necrotizing pneumonia is thought to be caused by particularly virulent bacteria that cause the associated pneumonia. *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Mycoplasma pneumoniae* are all reported causes of necrotizing pneumonia. Clinical manifestations are similar to uncomplicated pneumonia but are more severe with devastating complications, such as diffuse pulmonary inflammation, septic shock, and respiratory failure. *Streptococcus intermedius* is a gram-positive, catalase negative, facultative anaerobe that is part of the *Streptococcus anginosus* subgroup. These organisms are normally part of the oral cavity and gastrointestinal tract and are known to cause abscesses and systemic infections. *Streptococcus intermedius* as a cause of necrotizing pneumonia is rare and the cases reported are seen more frequently in predominantly male patients with comorbid conditions and history of smoking. In addition, these cases were complicated by pleural effusions with purulent formation. *Streptococcus intermedius*, despite being part of the normal flora, can in certain instances be the cause of severe disease, leading to necrotizing pneumonia and abscess formation. These can occur in both the immunocompromised and immunocompetent. Treatment requires surgical intervention in addition to antibiotic therapy, usually a beta-lactam antibiotic. Appropriate antibiotic use and early surgical treatment result in a lower mortality rate and shortened hospital stay.

Objectives

- Assess the cause and clinical manifestations of necrotizing pneumonia and empyema

Background

- Streptococcus intermedius* is a gram-positive, catalase negative, facultative anaerobe that is part of the *Streptococcus anginosus* subgroup
- Normally part of the oral cavity and GI tract and known to cause abscesses and systemic infections
- Necrotizing pneumonia is a rare and serious complication of bacterial lung infection and associated with high morbidity and mortality

Case Presentation

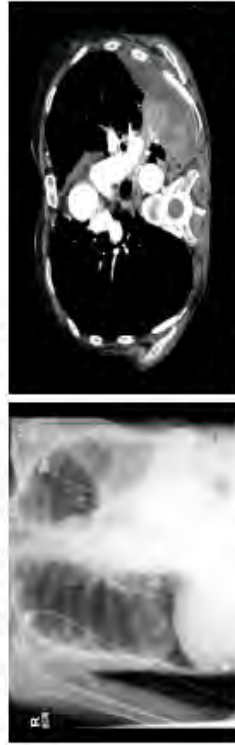
- 62 y.o. Caucasian female with a 15 pack-year smoking history
- Fevers, chills, and left-sided pleuritic chest pain that spontaneously resolved
- One month later, developed fever of 101.1°F, productive cough, and pleuritic chest pain
- PMH: non-contributory
- Vitals: T 102.9°F, BP 106/75, HR 132, RR 22, SpO₂ 95% on 2LNC
- Physical Exam:
 - Ill-appearing, thin female
 - Decreased expiratory breath sounds bilaterally with rhonchi
 - Dullness to percussion in the left lower lobe

Initial Diagnostic Workup

27.5 12.1 302
35

ANC 26.5 CRP 29.8
Lactic acid 3.6 ESR 60

- Chest X-ray: left basilar airspace disease with a small left pleural effusion
- CT angiogram chest: empyema with consolidation of the left lower lobe with areas of pulmonary necrosis



Left: CXR showing left basilar infiltrates and pleural effusion
Right: CTA showing left lower lobe empyema with consolidation

Hospital Course

- Upon admission: Vancomycin and Zosyn started for empiric treatment of pneumonia; Interventional Radiology consulted for drainage and fluid analysis
 - Pleural fluid to serum protein ratio: 0.73
 - Pleural fluid to serum LDH ratio: 13.5
 - WBC: 13,000 with 98% neutrophils
 - pH: 7.27
 - Glucose: <2
- Fluid culture: rare *Streptococcus intermedius* group
- Three days after admission: Patient feeling better
 - Chest X-Ray showed no significant change
 - Pulmonology consulted
 - tPA administered through chest tube
- Eight days after admission:
 - CT chest showed multiloculated left pleural effusion
 - Cardiothoracic surgery consulted
 - Video-assisted thoracoscopic surgery for decortication
- POD #7: chest tube removed
- Sixteen days after admission: Patient discharged home on PO Augmentin to complete a total 4-week antibiotic course

- 1 month follow-up:



CXR showed persistent left basilar pleural and parenchymal scarring

Discussion

- Necrotizing pneumonia is thought to be caused by particularly virulent bacteria that cause the associated pneumonia
- Clinical manifestations similar to but more severe than uncomplicated pneumonia with devastating complications, such as diffuse pulmonary inflammation, septic shock, and respiratory failure
- S. intermedius* is a rare cause, and reported cases are seen more frequently in predominantly male patients with comorbid conditions and history of smoking
- Appropriate antibiotic use, usually a beta-lactam, and early surgical treatment result in lower mortality rate and shortened hospital stay

References

- Harnoodi, F., Ali, I., Sabagh, H., and Kumar, S. *Streptococcus intermedius* causing necrotizing pneumonia in an immunocompetent female: a case report and literature review. *Case Rep Pulmonol.* 2016;7452161.
- Naguchi, S., Yalero, K., et al. The clinical features of respiratory infections caused by the *Streptococcus anginosus* group. *BMC Pulmonary Medicine.* 2015;15:133.

Idiopathic Orbital inflammatory Pseudo tumor in a patient with Systemic Lupus Erythematosus (SLE): A rare case

Soujanya Thummathati, MD, PGY2, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Abdur Raziq, MD, PGY3, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Usha Yendrapalli, MD, PGY1, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Parekha Yedla, Associate Professor, Department of Medicine, UAB Huntsville Regional Medical Campus

Learning Objective 1

Include orbital pseudo tumor in the differential diagnosis of orbital cellulitis

Learning Objective 2

The mainstay of treatment for orbital pseudo tumor is corticosteroids, not antibiotics

Case Description

We present a case of a 45-year-old Caucasian female who came in with acute onset of right eye swelling and redness. It initially started as mild irritation with blurred vision, progressing to swelling of both upper and lower eyelids and painful eye movements in less than 24 hours. She underwent an umbilical hernial repair a day prior to her symptom onset. She denied any recent trauma to her eye, systemic infection, or fever and denied use of contact lenses. Her past medical history includes SLE, anticardiolipin antibody syndrome with recurrent venous thromboembolism, on anticoagulation.

Physical exam was remarkable for erythematous, warm swollen upper and lower eyelids, mild conjunctival erythema with minimal chemosis and mild proptosis was noted. She did not have tenderness to palpation but had painful extra ocular movements. Visual acuity was decreased in the right eye. It was difficult to assess pupillary reflex in the right eye. There were no focal neurological deficits and her vital signs were within normal limits.

CT scan of the orbits with contrast showed asymmetric right orbital proptosis, inflammatory changes in the periorbital and intraconal fat, presumably cellulitis. No fluid collection was identified to suggest an abscess.

Patient was started on Vancomycin, Clindamycin and Ceftriaxone for a probable diagnosis of orbital cellulitis. Thirty-six hours later, she had worsening chemosis, erythema and reduced visual acuity. Ophthalmology was consulted and they recommended steroids if no response to antibiotics for a possible diagnosis of Idiopathic Orbital Inflammatory Syndrome/Orbital Pseudo tumor. Patient showed a dramatic improvement from steroids with resolution of almost all the eye findings except for minimal conjunctival erythema. She was discharged home on high dose oral Prednisone to be tapered over weeks with outpatient follow up with ophthalmology and a repeat CT of the orbits to check for resolution. She was doing well without any relapses eleven months later.

Discussion

IOIS or Orbital pseudo tumor is a benign non granulomatous inflammation of orbits and is a diagnosis of exclusion. Keratoconjunctivitis sicca is the most common ocular manifestation of SLE and unilateral exophthalmos secondary to orbital pseudo tumor is very rare and only few cases have been reported so far. Thyroid ophthalmopathy, infection, neoplasm and other systemic inflammatory disorders like lupus need to be excluded at presentation. High dose corticosteroids remain the mainstay of treatment. Longer duration of steroid therapy, tapered over weeks to months is needed to avoid relapses. Biopsy is usually indicated in patients who do not respond to steroids and in relapses to rule out other causes.



Idiopathic Orbital inflammatory Pseudo tumor in a patient with Systemic Lupus Erythematosus (SLE): A rare case



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Learning Objectives

1. Include orbital pseudo tumor in the differential diagnosis of orbital cellulitis
2. The mainstay of treatment for orbital pseudo tumor is corticosteroids, not antibiotics

Case Description

- 45year old Caucasian female presented with acute onset of right orbit swelling, redness and blurred vision, progressing to swelling of both upper and lower eyelids with associated painful eye movements in less than 24 hours
- She denied any use of contact lenses, recent trauma to her eye, systemic infection, or fever
- Her past medical history includes SLE, antinuclear antibody syndrome with recurrent venous thromboembolism, on anticoagulation
- Physical exam was remarkable for erythematous, warm swollen upper and lower eyelids, mild conjunctival erythema with minimal chemosis and proptosis. She did not have tenderness to palpation but had painful extra ocular movements. Visual acuity was decreased in the right eye. It was difficult to assess pupillary reflex in the right eye. There were no focal neurological deficits
- Her vital signs were within normal limits

Images

1. Before steroids: Ptosis, proptosis
2. Conjunctival chemosis
3. After steroids
4. CT orbits: Asymmetric right orbital proptosis. Inflammatory changes in the periorbital and intraconal fat, presumable cellulitis. No e/o abscess.



Hospital Course

- She was started on Vancomycin, Clindamycin and Ceftriaxone for a probable diagnosis of orbital cellulitis. She had worsening chemosis, erythema and reduced visual acuity 36 hours later
- Ophthalmology was consulted and they recommended steroids for a possible diagnosis of Idiopathic Orbital Inflammatory Syndrome (IOIS)/orbital pseudo tumor as there was no response to antibiotics
- Patient showed a dramatic response to steroids with resolution of almost all the eye findings except for minimal conjunctival erythema as shown in the pictures above
- She was discharged home on high dose oral Prednisone to be tapered over weeks
- She was doing well without any relapses eleven months later

Discussion

- IOIS or Orbital pseudo tumor is a benign non granulomatous inflammation of orbits that can mimic orbital cellulitis and is a diagnosis of exclusion^{1,3}
- In SLE patients, keratoconjunctivitis sicca is the most common ocular presentation and unilateral exophthalmos secondary to orbital pseudo tumor is very rare with only few cases reported so far²
- Thyroid ophthalmopathy, infection, neoplasm, trauma or foreign body, and other systemic inflammatory disorders like lupus and vasculitis need to be excluded at presentation^{2,3}
- CT or MRI of the orbits may show evidence of inflammation or enhancing tissue, but the etiology can not be determined by imaging
- High dose corticosteroids usually at a dose of 1-2mg/kg body weight tapered over eight to ten weeks is the mainstay of treatment. Clinical improvement with steroids has diagnostic significance as well⁴
- Biopsy is reserved to patients who do not respond to steroids and in cases of relapse to rule out other causes of orbital inflammation³
- Immunosuppressive therapy with antimetabolites like Methotrexate and Azathioprine are the treatment of choice in steroid dependent and refractory IOIS cases²

References

1. Szabo, B., Szabo, I., Orsian, D., Stéfaut, C. "Idiopathic Orbital Inflammatory Pseudotumor: Case Report and Review of Literature." *Form J Morphol Embryol* 2011; 52(3):927-930
2. Priya Y, Nithyanandam S, Reddy MS. Role of antimetabolites in recalcitrant idiopathic orbital inflammatory syndrome. *Oman Journal of Ophthalmology*, 2011;4(1):21-24. doi:10.4103/0974-620X.77658.
3. Mendenhall, W. M.; Lessner, A. M., *American Journal of clinical oncology* 2010; 33 (3), 304-306.
4. Chaudhry IA, Shamsi FA, Arat YO, Riley FC. Orbital Pseudotumor: Distinct Diagnostic Features and Management. *Middle East African Journal of Ophthalmology*, 2008;15(1):17-27. doi:10.4103/0974-9233.53370.

Superior Mesenteric Artery Syndrome: A Rare But Real Cause of Abdominal Pain

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Learning Objective

Developing a complete differential diagnosis for chronic abdominal pain.

Case Description

A 40-year-old Caucasian male with a history of chronic abdominal pain treated with narcotics and malnutrition presented with recurrent severe pain to the hospital. On review of the chart he had undergone multiple upper endoscopies showing only mild gastritis, an ultrasound showing no signs of acute or chronic cholecystitis, a normal HIDA scan, an elective cholecystectomy, multiple normal colonoscopies all without relief. Urine tox screens were repeatedly negative for cannabis. Infectious causes such as HIV and hepatitis had been excluded. He presented this time after an outpatient repeat upper endoscopy with nausea and vomiting and was found on CT to have a small bowel obstruction with a transition point over the third portion of the duodenum. This was confirmed by upper GI series. He was diagnosed with superior mesenteric artery (SMA) syndrome with an aortomesenteric angle of 15 degrees. After the obstruction resolved he was treated with a non-surgical approach of positioning in the left lateral position after meals to promote weight gain. This allowed for weight gain and resolution of his symptoms including complete cessation of narcotic use.

Discussion

Recurrent abdominal pain is an extremely common complaint in both the inpatient and outpatient setting and drug-seeking behavior is always a concern. Since the pain is frequently self-limiting, the underlying cause often goes undiagnosed. SMA syndrome has been shrouded in controversy in the literature due to its non-specific symptoms, its rarity, and the fact that some patients do not improve despite aggressive therapy. The etiology is believed to be compression of the third portion of the duodenum due to a reduced angle between the SMA and the aorta leading to compression, obstruction and non-specific symptoms as seen in our case. The reduced angle can be congenital, or acquired after either surgery or the loss of the mesenteric fat pad in patients with extreme weight loss for whatever reason. Treatment can be conservative initially as noted but a variety of surgical procedures exist including dividing the ligament of Treitz (Strong's procedure), gastrojejunostomy or duodenojejunostomy, each with their pros and cons. This case reminds physicians to maintain an open mind and to think through a full differential diagnosis when evaluating chronic abdominal pain patients since making the correct diagnosis can be life-changing. This patient has made a remarkable recovery with conservative measures and no longer seeks narcotics.

Introduction

- 40yo CM with a history of chronic abdominal pain (treated with narcotics) and malnutrition presented with recurrent severe symptoms to the hospital.
- Chart review included multiple upper endoscopies (mild gastritis), an ultrasound (no signs of acute or chronic cholecystitis), a normal HIDA scan, an elective cholecystectomy, and multiple normal colonoscopies.
- Urine tox screen was negative for cannabinoids.
- Infectious causes had been excluded.
- He presented within 24 hours of an outpatient repeat upper endoscopy with abdominal pain, nausea, and vomiting.
- CT revealed a small bowel obstruction with a transition point over the 3rd portion of the duodenum.
- This was confirmed by upper GI series.
- He was diagnosed with superior mesenteric artery (SMA) syndrome with an aortomesenteric angle of 14 degrees.
- After the obstruction resolved he was treated with a non-surgical approach of high calorie supplements with meals and positioning in the left lateral position after meals to promote weight gain.
- This allowed for weight gain and resolution of symptoms including complete cessation of narcotic use.

	Sept-06	May-07	Jun-17	Oct-17
Weight (kg)	51	50	52	60
Pain (0-10)	7	7	9	0



Figure 1: Upper GI series illustrating small bowel obstruction with transition point over 3rd portion of duodenum



Figure 2: Computed Tomography of the abdomen showing a small bowel obstruction with a transition point over the superior mesenteric artery in close proximity to the aorta



Figure 3: Computed Tomography illustrating the anatomy of the abdominal aorta, celiac trunk, and superior mesenteric artery. A normal aortomesenteric angle is 25 to 60 degrees. Superior mesenteric artery syndrome has a reduced angle of 6 to 15 degrees. The aortomesenteric angle in this case is 14 degrees.



Figure 4: Computed Tomography illustrating aortomesenteric distance. The normal aortomesenteric distance is 10 to 28mm. Superior mesenteric artery syndrome is defined as a distance of 2 to 8mm. This case demonstrates a distance of 4mm.

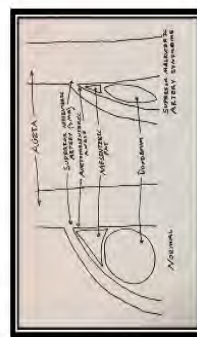


Figure 5: A sketch illustrating the relationship between the superior mesenteric artery and duodenum. By increasing the mesenteric fat the aortomesenteric angle will increase relieving the duodenal compression.

Discussion

- Recurrent abdominal pain is an extremely common complaint in both the inpatient and outpatient setting.
- Drug-seeking behavior is always a concern.
- Since the pain is frequently self-limiting, the underlying cause often goes undiagnosed.
- SMA syndrome has been shrouded in controversy in the literature due to its non-specific symptoms, its rarity, and the fact that some patients do not improve despite aggressive therapy.
- Etiology is believed to be compression of the 3rd portion of the duodenum due to a reduced angle between the SMA and the aorta.
- This leads to obstruction, and other symptoms, such as pain.
- Treatment is conservative initially, with a variety of surgical procedures available if needed including dividing the ligament of Treitz (Strong's procedure), gastrojejunostomy or duodenojejunostomy.
- This case reminds physicians to maintain an open mind and to think through a full differential diagnosis when evaluating chronic abdominal pain patients.
- This patient has made a remarkable recovery with conservative measures and no longer seeks narcotics.

References

- Johnson CM, Johnson TJ, Johnson EC. Superior mesenteric artery syndrome: a review of the literature. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.
- Zakaria V, Doshi L, Williams S. Superior mesenteric artery syndrome: a review of the literature. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.
- Stevens A, Cacioli L, Nasir SM, Chavan RAS, Al-Abed NM, Jafar FH, Sagarika S. Superior mesenteric artery syndrome: a review of the literature. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.
- Alarid MM, Costa-Almeida C, Lando JM, Martinez G. Increase body weight in SMA syndrome. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.
- Choi R, Lim J, A. A. Zorini E. et al. The effectiveness and rate of long-term medical therapy for SMA syndrome: a systematic review for a national Institutes of Health clinical research network. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.
- Maye R, Tsalikis J, Redman S, Quock T, Moayy C. Treating SMA syndrome with a non-surgical approach: a review of the literature. *Journal of Clinical Gastroenterology*. 2007;41(1):1-10.

Appendicitis caused by an atypical organism in an immunocompetent patient

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Learning Objectives

1. Appendicitis can be caused by atypical organisms
2. *Cryptosporidium* appendicitis clinical presentation in immunocompetent patients and treatment guidelines

Case Presentation

A 39-year-old Caucasian female with a history of hypothyroidism presented to the emergency department with a 1-week history of non-bloody diarrhea and increasing abdominal pain. The pain was localized to the right lower quadrant and worsened by touch and movement. She also reported relief with analgesics. She remained afebrile without nausea or vomiting. She denied any recent travel or sick contacts. She had a 5 pack-year smoking history and denied use of alcohol and illicit drugs. She is married with children, has 2 dogs and 1 cat, and works in chicken houses. Her past surgical history includes a hernia repair, cholecystectomy, left ACL repair, tonsillectomy, and adenoidectomy. On presentation, she was afebrile with a temperature of 97.1, and had a blood pressure was 146/84. Her heart rate and respiratory rate were 90 and 16, respectively. Physical exam revealed diffuse, bilateral lower quadrant tenderness with rebound but no guarding. Laboratory studies were insignificant with a WBC of $10.17 \times 10^3/\mu\text{L}$. A CT of abdomen and pelvis was found to have appendicolith and a dilated appendix up to 1.1 cm. Appendectomy was performed. Pathology of the appendix revealed focal acute inflammation involving mucosal surface with overlying infectious organisms consistent with *Cryptosporidium parvum*. Further testing was negative for HIV. She was started on nitazoxanide 500mg every 12 hours for 10 days, and her symptoms subsequently resolved.

Discussion

Appendicitis may present with atypical, subtle symptoms or with classic symptoms of anorexia, nausea, vomiting, and right lower quadrant abdominal pain. The abdominal pain may initially present as periumbilical pain that migrates to the right lower quadrant as the inflammation ensues. WBC $>10,000$ cells/ μL with a left shift is present in most patients, although a normal WBC count may be seen very early. Appendicitis caused by parasitic infestations is very rare, of which *Enterobius* spp. is the most commonly reported. *Cryptosporidium* is an intracellular protozoan parasite found to infect the gastrointestinal tract of mammals, reptiles, birds, and fish. This allows the parasite to shed through stool and contaminate soil, food, and both drinking and recreational water sources. It is considered the leading cause of waterborne disease in the United States causing diarrhea in both immunocompetent and immunocompromised patients, young and old. Diagnosis of *Cryptosporidium* may be made through microscopic examination of specimen with acid-fast staining, direct fluorescent antibody and/or enzyme immunoassays. Treatment is supportive care, as the infection is typically self-limiting. However, Nitazoxanide is an FDA-approved drug that may be used in for treatment of diarrhea in immunocompetent patients. While gastrointestinal manifestations are most common in both populations, appendicitis secondary to *Cryptosporidium* is exceedingly rare, especially in an immunocompetent host, with only a few cases previously reported.

Objectives

1. Appendicitis can be caused by atypical organisms
2. *Cryptosporidium* appendicitis clinical presentation in immunocompetent patients and treatment guidelines

Background

- Appendicitis symptoms may include anorexia, N/V, and RLQ abdominal pain
- Abdominal pain may initially present as periumbilical pain that migrates to the right lower quadrant as inflammation ensues
- WBC >10,000 cells/ μ L with a left shift is present in most patients

Case Presentation

- 39- yo Caucasian female presented to the Emergency Department
- PMH: Hypothyroidism
 - PSxH: Cholecystectomy, hernia repair, tonsillectomy, left ACL repair
 - SH: 5 pack-year smoking history; has 2 dogs and 1 cat; works in chicken houses
 - 1-week history of non-bloody diarrhea with increasing abdominal pain relieved by analgesics

Initial Workup

- Vitals:
 - T 97.1 °C
 - BP 146/84
 - HR 90
 - RR 16
 - SpO₂ 100% on R
- Physical Exam:
 - Diffuse, bilateral lower quadrant tenderness with rebound but no guarding
- Labs and Imaging:
 - WBC 10.17x10³/ μ L
 - CT abdomen and pelvis: found to have appendicolith and a dilated appendix up to 1.1 cm

Course

- Patient received Ivanz IV and surgery was consulted
- Patient underwent laparoscopic appendectomy with an uncomplicated postoperative course
- Pathology of the appendix revealed focal acute inflammation involving the mucosal surface with overlying infectious organisms consistent with *Cryptosporidium parvum*.



- Following the final pathology report, the patient was diagnosed with appendicitis secondary to an underlying *Cryptosporidium* infection and was referred to infectious disease.
- Infectious disease outpatient consult found patient to be immunocompetent via a negative HIV Test and normal IgG, IgM, IgA, CD4 and CD8 counts.
- Patient was prescribed Nitazoxanide 500 mg q 12 hours for 10 days and symptoms resolved.

Discussion

- Cryptosporidium* is an intracellular protozoan parasite infecting the gastrointestinal tract of mammals, reptiles, birds, and fish¹.
- Previous case studies involving *Cryptosporidium* infections of extra-intestinal sites have been well documented in immunocompromised patients, especially AIDS victims³.
- Appendicitis caused by parasitic infestations is very rare.
- Appendicitis secondary to *Cryptosporidium* is exceedingly rare, especially in an immunocompetent host.
- Treatment is supportive care, as the infection is typically self-limiting. However, Nitazoxanide is an FDA-approved drug².

References

1. DPDx - Laboratory Identification of Parasites of Public Health Concern. (2017, November 08). Retrieved March 21, 2018, from <https://www.cdc.gov/dpdx/cryptosporidiosis/>
2. Martin, R. F., M.D. (2017, July 12). Acute appendicitis in adults: Clinical manifestations and differential diagnosis (W. Weiser, Ed.). W. Chen. https://www.uptodate.com/contents/acute-appendicitis-in-adults-clinical-manifestations-and-differential-diagnosis?search=cryptosporidium&rank=1&hpid=hp%2Fsearch%2Fsearch%2Fcryptosporidium%2F150&usage_type=default&display=rank=1
3. Oberhuber, G., Lauer, E., Stollte, M., & Borchard, F. (1993). Immunity to *Cryptosporidium parvum* in a case report. Retrieved March 21, 2018, from <https://www.ncbi.nlm.nih.gov/pubmed/1771937>

Isolated persistent left superior vena cava

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Learning Objectives

1. Significance of a rare cardiac venous anomaly.
2. Types of imaging used to confirm the diagnosis.

Case Presentation

A 50-year-old Caucasian female with a past medical history significant for obesity, hypertension, and type-2 diabetes mellitus presented to clinic with complaints of shortness of breath associated with exertion. She denied orthopnea, paroxysmal nocturnal dyspnea, and palpitations. Physical exam was unremarkable, including her cardiac exam. EKG was significant for low voltage QRS complexes. Chest X-ray (CXR) was unremarkable with a normal cardiac silhouette and no pulmonary congestion. Transthoracic echocardiogram (TTE) showed high normal right ventricular systolic pressure consistent with minimal pulmonary hypertension, mild concentric left ventricular hypertrophy, left ventricular ejection fraction of 55-60%, sclerotic aortic valve without stenosis with a mean gradient of 12 mmHg. Due to costs, the patient refused pulmonary function tests and sleep study and preferred to go directly to a right heart catheterization, which was done to evaluate for pulmonary hypertension. During the procedure, the catheter advanced to the left subclavian vein instead of going inferiorly into the right atrium. Venogram demonstrated absence of superior vena cava in confluence of the right subclavian vein. Computed tomographic angiography (CTA) was done to identify congenital abnormalities of venous drainage. It showed a persistent left superior vena cava draining via the coronary sinus into the right atrium and absent right superior vena cava.

Discussion

Persistent left superior vena cava occurs in 0.3 to 0.5% of the general population. When associated with absent right superior vena cava, it is known as isolated persistent left superior vena cava (PLSVC). This is very rare and occurs in only 0.07-0.13% of the patients who have other cardiac malformations. Associated malformations include ASD, VSD, tetralogy of Fallot, Eisenmenger's syndrome, mitral atresia, and dextrocardia. In the majority of the cases, PLSVC is a benign condition when it drains into the right atrium via the coronary sinus. It can, however, rarely present with cyanosis as a result of right to left shunt when it drains into the left atrium. This occurs in approximately 10% of cases. It is usually discovered incidentally on imaging.

CXR may show focal widening of the mediastinum superior to the left side of the aortic knob. On transthoracic echocardiogram (TTE) a dilated coronary sinus should raise the suspicion for PLSVC. TTE with bubble study with injection of agitated saline from both the right and left arm veins helps in making the diagnosis by causing early opacification of the abnormally large coronary sinus before the right-sided chambers. Additional imaging that can confirm the diagnosis are venography, transesophageal echocardiogram, cardiac CT, and cardiac magnetic resonance imaging.

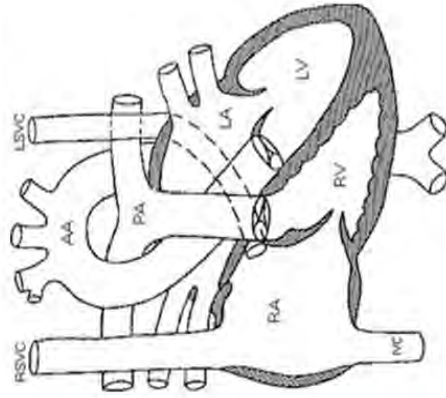
Clinical significance of PLSVC includes difficulty in advancing central venous catheters, pacemakers, or defibrillator leads, cardiac arrhythmias including atrial and ventricular fibrillation, and paradoxical systemic emboli when present in a patient with an atrial septal defect. Other complications as a consequence of catheter insertion include cardiac tamponade, shock, and even cardiac arrest.

Learning Objectives:

1. Significance of a rare cardiac venous anomaly.
2. Types of imaging used to confirm the diagnosis.

Case Presentation

- 50 year-old Caucasian Female,
- PMH:
 - obesity, HTN, and DM2
- CC: SOB associated with exertion. No orthopnea, PND, or palpitations.
- Physical exam: unremarkable, including her cardiac exam.
- EKG: low voltage QRS complexes.
- CXR: normal cardiac silhouette and no pulmonary congestion.
- TTE: high normal right ventricular systolic pressure, mild concentric LVH, LV EF of 55-60%, sclerotic aortic valve without stenosis with a mean gradient of 12 mmHg.
- Right heart cath: Done to evaluate for pulmonary hypertension. Catheter advanced to the left subclavian vein instead of going inferiorly into the right atrium.
- Venogram: absence of superior vena cava in confluence of the right subclavian vein.
- Cardiac CTA: persistent left superior vena cava draining via the coronary sinus into the right atrium and absent right superior vena cava.



Reference

Sheikh, Azeem S (05/2014). "Persistent left superior vena cava with absent right superior vena cava: review of the literature and clinical implications." . Echocardiography (Mount Kisco, N.Y.)

Discussion

- Persistent left superior vena cava: 0.3 to 0.5% % in general population.
- Isolated persistent left superior vena cava: 0.07-0.13 % of the patients who have other cardiac malformations.
- Associated malformations: ASD, VSD, Tetralogy of Fallot, Eisenmenger's syndrome, mitral atresia, and dextrocardia.
- Benign condition, in the majority, when it drains into the right atrium via the coronary sinus.
- Rarely present with cyanosis as a result of right to left shunt when it drains into the left atrium. approx. 10% of cases.
- usually discovered incidentally on imaging.
- CXR: focal widening of the mediastinum superior to the left side of the aortic knob.
- TTE: dilated coronary sinus
 - TTE with bubble study with injection of agitated saline from both the right and left arm veins: early opacification of the abnormally large coronary sinus before the right-sided chambers.
- Additional imaging to confirm the diagnosis: venography, TEE, cardiac CT, and cardiac MRI.
- Clinical significance:
 - Difficulty in advancing central venous catheters, pacemakers, or defibrillator leads,
 - Cardiac arrhythmias including atrial and ventricular fibrillation,
 - Paradoxical systemic emboli when associated with ASD.
 - Complications as a consequence of catheter insertion:
 - cardiac tamponade, shock, and even cardiac arrest.

Stroke more than just aspirin, echo and carotid: Adrenoleukodystrophy Mimicking Stroke

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Objective

Cerebral vascular accidents are a frequent cause of morbidity and mortality worldwide. Hypoperfusion, embolism, or thrombus formation are common causes of ischemic stroke. Often, patients present with multiple risk factors and classic symptoms suggestive of stroke. The objective of this report is to illustrate a rare cause and diagnostic work up of stroke in young female with no clear risk factors. We present a case of adrenoleukodystrophy, with initial symptomatology and image findings suggestive of an acute subcortical stroke.

Background

Adrenoleukodystrophy (ALD) is a rare X-linked disorder caused by mutations in the adenosine triphosphate (ATP)-binding cassette (ABC), subfamily D, member 1 gene (ABCD1) that encodes for a transport channel protein aiding movement of very long chain fatty acids (VLCFA) into the peroxisome. Defects result in accumulation and aggregation of VLCFA, leading to destruction of tissue. The central nervous system (CNS), testes, and adrenal cortex are commonly affected.

Case Presentation

We present a case of a 38-year-old female with history of previous stroke on antiplatelet agent, presents with acute onset left sided weakness and slurred speech along with numbness on left side. Systemic examination was unremarkable. Neurological examination showed dysarthria, left hemiparesis, hemisensory loss and mild ataxia on finger to nose test on left side.

Diagnostic Workup

Computed Tomography (CT) head did not show any abnormality. Magnetic Resonance Imaging (MRI) of brain showed acute infarct in the right subcortical area along with multiple T2 hyperintensities in periventricular area. Stroke diagnostic workup was negative including MR angiography of head and neck, echocardiography study, lipid panel and diabetic check-up. Patient had extensive stroke work up in past as well with no identifiable etiology. Extensive blood work up including hypercoagulable, autoimmune, inflammatory, metabolic, and infectious causes were ruled out including cerebrospinal fluid tests. Bilateral periventricular area hyperintensities can be seen in autoimmune condition like multiple sclerosis, which was ruled out later with clinical history and spinal fluid analysis. However, VLCFA were noted to be elevated. Ultimately, the diagnosis of adrenomyelopathy (Adrenoleukodystrophy phenotype) was confirmed with genetic testing.

Discussion

Dysarthria and hemiparesis is a common presentation of stroke and is seen daily in most stroke centers. Brain tumor, metabolic disorders, migraine, seizure, sepsis, syncope, psychiatric causes, and MS may all mimic an acute stroke. When evaluating a patient with symptoms and image findings suggestive of stroke

or MS, serum VLCFA may be of benefit to broaden the differential to include adrenoleukodystrophy. Typical cases of Adrenoleukodystrophy involve young males presenting with neurological symptoms and/or signs of adrenal failure. Findings may include behavioral changes, anopsia, dysarthria, paraparesis, sphincter disturbances, incoordination, and brainstem signs. Female carriers may remain asymptomatic or present later in life. Imaging reveals diffuse white matter disease that has poor correlation to disease severity, and can mimic multiple sclerosis or stroke acutely. The finding of elevated serum VLCFA is highly suggestive of ALD in male patients. Symptomatic females may have normal serum VLCFA, even with severe disease. Confirmatory genetic testing and adrenal function test should be done in all patients.

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Objectives

- Illustrate a rare cause of stroke in a young female with no clear risk factors.
- Identify key elements of the history that warrant further investigation.

Background

- Adrenoleukodystrophy (ALD) is a rare X-linked disorder caused by mutations in the adenosine triphosphate (ATP)-binding cassette (ABC), subfamily D, member 1 gene (ABCD1) that encodes for a transport channel protein aiding movement of very long chain fatty acids (VLCFA) into the peroxisome.
- Defects result in accumulation and aggregation of VLCFA, leading to destruction of tissue. The central nervous system (CNS), testes, and adrenal cortex are commonly affected.

Case Presentation

- 38-year-old female with history of previous stroke on antiplatelet agent, presents with acute onset left sided weakness and slurred speech along with numbness on left side.
- Systemic examination was unremarkable.
- Neurological examination showed dysarthria, left hemiparesis, hemisensory loss and mild ataxia on finger to nose test on left side.

Initial Diagnostic Workup

- Computed Tomography (CT) head did not show any abnormality.
- Magnetic Resonance Imaging (MRI) of brain showed acute infarct in the right subcortical area along with multiple T2 hyperintensities in periventricular area.
- Stroke diagnostic workup was negative including MR angiography of head and neck, echocardiography study, lipid panel and diabetic check up.



Hospital Course

- Bilateral periventricular area hyperintensities seen in autoimmune conditions like multiple sclerosis was ruled out later with clinical history and spinal fluid analysis.
- Extensive blood work up including hypercoagulable, autoimmune, inflammatory, metabolic, and infectious causes were ruled out including cerebrospinal fluid tests.
- However, VLCFA were noted to be elevated...
- Ultimately, the diagnosis of Adrenomyelopathy (Adrenoleukodystrophy phenotype) was confirmed with genetic testing.

References

- Engelen M, Barbier M, Dijkstra IM, et al. X-linked adrenoleukodystrophy in women: a cross-sectional cohort study. *Brain*. 2014; 137(Pt 3):693–706. [PubMed: 24430433]
- Ahmed RM, Murphy E, Davagnanam L, et al. A practical approach to diagnosing adult onset leukodystrophies. *J Neurol Neurosurg Psychiatry* 2014; 85: 770–781.

Discussion

- Dysarthria and hemiparesis is a common presentation of stroke and is seen daily in most stroke centers.
- Brain tumor, metabolic disorders, migraine, seizure, sepsis, syncope, psychiatric causes, and MS may all mimic an acute stroke.
- When evaluating a patient with symptoms and image findings suggestive of stroke or MS, serum VLCFA may be of benefit to broaden the differential to include adrenoleukodystrophy.
- Typical cases of Adrenoleukodystrophy involve young males presenting with neurological symptoms and/or signs of adrenal failure.
- Findings may include behavioral changes, anopsia, dysarthria, paraparesis, sphincter disturbances, incoordination, and brainstem signs.
- Female carriers may remain asymptomatic or present later in life.
- Imaging reveals diffuse white matter disease that has poor correlation to disease severity, and can mimic multiple sclerosis or stroke acutely.
- The finding of elevated serum VLCFA is highly suggestive of ALD in male patients. Symptomatic females may have normal serum VLCFA, even with severe disease. Confirmatory genetic testing and adrenal function test should be done in all patients.

Temporal Lobe Epilepsy Mimicking Migraine

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Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Objective

We present a rare case of temporal epilepsy, with initial history and symptomatology suggestive of migraine induced nausea.

Background

Temporal lobe epilepsy is an unprovoked, recurrent, focal seizure that may last several minutes. Generalization is not uncommon. Diagnosis is usually made at a young age. The etiology may unknown or secondary to trauma, stroke, infection, or structural abnormality. Awareness may not be impaired during events, and postictal states may be as short as seconds. Symptoms include amnesia, nausea, hallucinations, déjà vu, anxiety, and aura. As seizure intensity increases, staring spells, confusion, and aphasias may develop with increased postictal periods. Many of these symptoms may be confused for a migraine with nausea and aura.

Case Presentation

We present a case of a 20-year-old female who developed migraine like symptoms after being involved in a motor vehicle accident. Headaches were described as bitemporal, 9/10 in severity, with occasional radiation to her occipital area, throbbing in nature, associated symptoms included nausea, sensitivity to light and sound. She also complained of trouble focusing and described episodes of “brain fog”. She never had headaches or nausea in past, after recent MVA, her symptoms started coming on daily basis, some of them were debilitating. She tried multiple migraine medications including prophylactic and abortive, no improvement in her symptoms.

Diagnostic workup

Computed Tomography (CT) head without contrast did not show any intracranial hemorrhage. Magnetic resonance (MR) imaging and MR Angiography of her brain were unremarkable. Electroencephalogram (EEG) showed very few possible sharp waves. As her symptoms continue to get worse despite being on medications, patient was admitted, and continuous video EEG was performed. Patient was noted to have several episodes of severe nausea thought to be secondary to migraine along with “funny feeling” which were captured on video EEG study. During these events, EEG indicated bitemporal sharps and spike wave discharges. Patient was started on lamotrigine and her symptoms improved significantly.

Discussion

When a patient with migraine fails appropriate therapy, the investigator should attempt to elicit additional clues in the history that may be suggestive of seizure. Understand seizure symptoms including various aura will help to get correct and early diagnosis in patient with epilepsy. Localization of seizure focus also helps to decide the cause, and long term treatment plan. Nausea is a very common symptom

which could be associated with many conditions including migraine and GI tract issue but it could be an aura in patient with epilepsy.

Tim Anderson¹, Jitesh Kar²
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². Neurologist-Huntsville Hospital

Objectives

- Present a rare case of temporal epilepsy, with initial history and symptomatology suggestive of migraine induced nausea.
- Promote further investigation for disease etiology once initial treatment fails.

Background

- Temporal lobe epilepsy is an unprovoked, recurrent, focal seizure that may last minutes.
- Diagnosis is usually made at a young age.
- Etiology may be structural or secondary to trauma, stroke, infection.
- Symptoms include amnesia, nausea, hallucinations, déjà vu, anxiety, and aura.
- As seizure intensity increases, staring spells, confusion, and aphasia may develop.
- Many symptoms may be confused for a migraine with nausea and aura.

Case Presentation

- 20-year-old female who developed migraine like symptoms after being involved in a motor vehicle accident.
- Headaches were described as bitemporal, 9/10 in severity, with occasional radiation to her occipital area, throbbing in nature, associated symptoms included nausea, sensitivity to light and sound.
- She also complained of trouble focusing and "brain fog".

Initial Diagnostic Workup

- Started on multiple migraine medications including prophylactic and abortive with no improvement in her symptoms.
- Computed Tomography (CT) head without contrast did not show any intracranial hemorrhage.
- Magnetic resonance (MR) imaging and MR Angiography of her brain were unremarkable.
- Electroencephalogram (EEG) showed very few possible sharp waves.



Hospital Course

- As her symptoms continue to get worse despite being on medications, patient was admitted, and continuous video EEG was performed.
- Background: During the entire study, background was predominantly alpha rhythm in the frequency of 9-10 hertz over both hemispheres. There was no asymmetry over any hemisphere. Intermittent beta wave frequency noted in the frontal leads.
- Photoc stimulation was performed. The patient had intermittent temporal sharps noted.
- The patient had multiple push button events and intermittent bilateral temporal and some parietal discharges were noted.

Discussion

- When a patient with migraine fails appropriate therapy, the investigator should attempt to elicit additional clues in the history that may be suggestive of seizure.
- Understand seizure symptoms including various aura will help to get correct and early diagnosis in patient with epilepsy.
- Localization of seizure focus also helps to decide the cause, and long term treatment plan.
- Nausea is a very common symptom which could be associated with many conditions including migraine and GI tract issue but it could be an aura in patient with epilepsy.
- When a patient continues to fail treatment for migraine with no improvement, other etiologies such as seizure should be considered.

References

1. Devinsky O. Diagnosis and treatment of temporal lobe epilepsy. Rev Neurol Dis. 2004;1(1):2-9.
2. Englot DJ, Blumenfeld H. Consciousness and epilepsy: why are complex-partial seizures complex? Prog Brain Res. 2009;177:147-70

A Case Series: 2 cases of neuropsychiatric syndrome due to Anti-GAD Antibody: Limbic Encephalitis

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Learning Objectives

This case series aims to describe two patients with autoimmune limbic encephalitis presenting as memory loss and visual hallucinations.

Case Presentation

Limbic encephalitis is a rare autoimmune disease that can present with a myriad of neuropsychiatric symptoms including memory loss, agitation, mood changes, hallucinations, and seizures. Due to the wide array of symptoms that can occur in the setting of limbic encephalitis, it can be challenging to distinguish it from other neuro-cognitive or psychiatric disorders solely on the basis of history and physical examination.

We present two female patients with almost identical neuropsychiatric symptoms. Both patients had past medical histories of hypertension, diabetes mellitus, stroke, and depression and presented with multiple neuropsychiatric symptoms: short term memory loss, intermittent confusion, irritability, mood changes, and agitation, which were gradual in onset and progressively worsened over the course of 7 to 8 months. In both patients, the disease process progressed to include visual hallucinations and delusions. On physical examination, no focal neurological deficits were noted except a few episodes of myoclonus.

Both patients had memory testing and performed below normal. Metabolic lab workup did not show any lab abnormality. Their electroencephalography studies demonstrated intermittent sharp waves in the bilateral temporal area and intermittent myoclonus. Both patient's brain magnetic resonance imaging (MRI) showed bilateral temporal lobe hyperintensities on T2 FLAIR sequence. Cerebrospinal fluid tests on both patients showed elevated proteins and infectious work up was negative for everything, including herpes. Paraneoplastic panel was negative as well. Autoimmune encephalitis panel showed an elevated anti-glutamic acid decarboxylase (Anti-GAD) level on both patients. Patient's received 5 days of intravenous immunoglobulin and symptoms improved significantly. Patient A had repeat brain MRI which demonstrated significant improvement of the abnormality on the temporal lobe.

Discussion

Limbic encephalitis is important to consider in any case with neuropsychiatric symptoms or unexplained new onset temporal lobe epilepsy. Herpes virus encephalitis can have similar neuroimaging findings, but clinical course and absence of Anti-GAD antibody helps to rule out viral infection. Glutamic acid decarboxylase-Abs (GAD) are described in association with several neurologic conditions including stiff-person syndrome, cerebellar syndromes, refractory seizures, and more recently, with autoimmune limbic encephalitis (LE) (both paraneoplastic and nonparaneoplastic). Paraneoplastic LE with GAD-Ab has been described in several patients in association with small cell lung cancer and thymoma. Nonparaneoplastic LE related to GAD-Ab has been noted in 21 cases, 17 of whom manifested MR-FLAIR signal abnormalities

of the medial temporal lobe. Various case reports and case series report that immunotherapy with immunoglobulins and/or plasma exchange has helped such patients.

*** This vignette was chosen for oral presentation on Research Day. Contact Carolina Temple at cetemple@uab.edu for a copy of the PowerPoint.**

Esophageal Varices in a Polycythemia Vera Patient

Tarek Abdalla, MS3, UAB Huntsville Regional Medical Campus; Soujanya Thummathati, MD, PGY2, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Roger D. Smalligan, Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Learning Objective #1

Follow a non-classical case of polycythemia vera and explore esophageal varices in this patient and potential causes

Learning Objective #2

Discuss treatment of polycythemia vera

Case

We present a case of a 57-year-old man who was admitted with complaints of progressively worsening generalized weakness and one-week history of dark tarry stools and nausea. History notable for loss of appetite and 50-lb weight loss over the last year and denied any NSAID or anticoagulant use. Past medical history is significant for major depressive disorder, HTN, non-ischemic cardiomyopathy with recovered EF, IgA nephropathy, CKD stage 4, acute embolic stroke five months prior with negative hypercoagulable work up and no evidence of left atrial appendage thrombus. No major surgeries in the past. Social history only notable for previous 3 pack-year history before quitting 6 years ago. Family history was negative for cancer and hematologic disorders.

Physical exam was negative except positive stool guaiac.

Labs on admission were remarkable for leukocytosis (25.7k), persistent erythrocytosis (hemoglobin 19.1g/dL, hematocrit 61.4%), and elevated LDH and GGT (579U/L and 89U/L respectively). Alkaline phosphatase (186U/L) only abnormal level on hepatic function panel. CEA and AFP were normal. Further work up showed low erythropoietin level and positive blood JAK2 mutation.

Hepatomegaly and splenomegaly were seen on ultrasound accompanied by an accessory splenule; however, deep abdominal ultrasound was negative for hepatic/portal vein thrombosis.

EGD showed grade II esophageal varices in the lower third of the esophagus and erosive gastritis without active bleed. Varices successfully banded for eradication.

Bone marrow biopsy confirmed JAK2 positive Myeloproliferative neoplasm likely Polycythemia Vera (PV) and flow cytometry negative for any malignancy. He was started on aspirin and therapeutic phlebotomies with a hematology outpatient follow. Decision regarding Hydroxyurea to be decided later.

Discussion

Polycythemia vera (PV) is a chronic myeloproliferative disorder due to mutations in JAK2 V617F leading to erythrocytosis. Classic findings in PV include erythrocytosis, weakness and pruritis; however, hepatic involvement, especially in the absence of thrombosis, is not common. Portal hypertension (HTN) may

occur in a myeloproliferative process due to massively increased portal blood flow and decreased hepatic vascular compliance. The pressure backup caused by portal HTN leads to systemic consequences commonly seen in cirrhotic patients like splenomegaly and esophageal varices. In one previous study of 97 cases of PV, 7 patients had varices without cirrhosis. All 7 cases had evidence of thrombus in the portal vein. Our patient did not have portal vein thrombosis, hence our theory that increased portal blood flow coupled with increased viscosity may have led to the portal HTN. The melena most likely came from previously bleeding varices despite EGD report. Esophageal varices can be treated with pharmacologic therapy (beta blocker) or band ligation. Management of PV ranges from aspirin and phlebotomy (goal Hct <45) to use of hydroxyurea or even a kinase inhibitor like ruxolitinib (Jakafi). Patients >60 years old and/or a previous history of thrombotic events typically justify cytoreductive therapy with hydroxyurea. This case reminds physicians that liver complications can occur in patients with PV and they must be monitored appropriately.

Objectives

1. Follow a non-classical case of polycythemia vera (PV) and explore causes of esophageal varices.
2. Discuss treatment of PV.

Background

- PV
 - Subset of chronic myeloproliferative disorders (MPD)
 - Distinguished by erythrocytosis
 - Consequence of mutation in JAK2 V617F
 - Median age – 60 years
 - Findings include dizziness, weakness, and pruritis

Case Presentation

- 57 YO-WM presenting with generalized weakness, nausea and dark tarry stools x 1 week
- **Positives:** loss of appetite, 50-lb weight loss x 1 year
 - **Negatives:** No NSAID, anticoagulant or iron use
 - **PMH:** complex including HTN, Non ischemic cardiomyopathy w/ recovered EF, biopsy proven IgA nephropathy, CKD stage 4, acute embolic stroke (5 months prior)
 - **Social Hx:** 3-pack year tobacco history, denies alcohol and illicit drug use
 - **FH:** negative for cancer or hematologic disorders
 - **Vitals:** BP 145/80, otherwise unremarkable
 - **Exam:** Fecal occult blood+, otherwise unremarkable

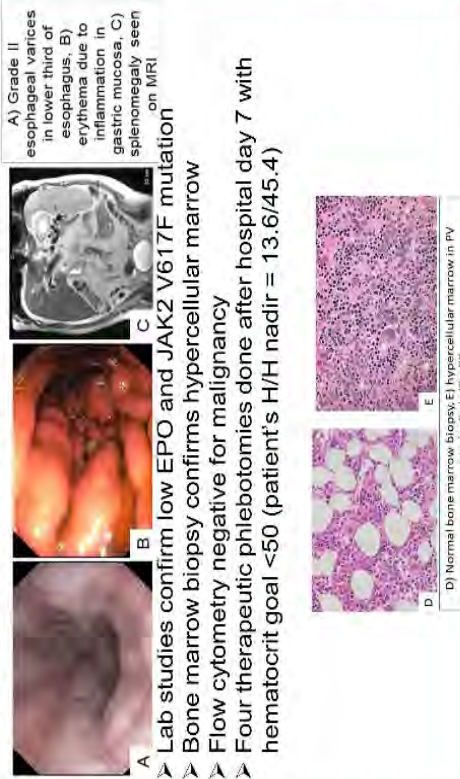
Admission Labs/Imaging

25.7	19.1	313	BUN – 46, Cr 3.4 (CMP nml otherwise)	ALP – 186
61.4			PTT – 40.6 / PT – 16.1	LDH – 579
			INR – 1.2	GGT – 89
				ESR – 1

➤ Chest X-ray: normal

Hospital Course

- Inpatient admission
 - IVF w/ NS brings repeat H/H down to 17.5/55.6, WBC – 24.17
 - Alpha-fetoprotein (AFP) and carcinoembryonic antigen (CEA) ordered and found to be normal
- Hospital day #1
 - JAK2 mutation and erythropoietin (EPO) levels studies sent via hematology-oncology consultation
 - No melena seen
- Hospital day #2
 - Upper GI endoscopy shows grade II esophageal varices in lower 1/3 of esophagus and erosive gastritis w/o active bleed
- Banding performed to eradicate varices
- Hospital day #3–4
 - Abdominal U/S remarkable for hepatosplenomegaly (liver 19.71cm, spleen 20cm) along with accessory splenule (2.3cm)
 - Deep abdominal U/S and MRI performed, negative for hepatic vein thrombosis or other possible cause of varices



Discussion

- Esophageal varices are typically a consequence of portal hypertension (PHTN)
- PHTN seen in MPDs due to massively increased portal blood flow and decreased hepatic vascular compliance¹
- Consequently leads to varices and splenomegaly
- In study of 97 patients w/ PV, 7 patients had varices w/o cirrhosis - all 7 had evidence of portal vein thrombus²
- This patient did not have evidence of a thrombus, thus it is theorized that increased portal blood flow coupled with increased viscosity may have led to these findings

Management

- Esophageal varices are treated pharmacologically with a $\beta 2$ blocker and procedurally via endoscopic band ligation, and/or by transjugular intrahepatic portosystemic shunt placement (TIPS)
- Initial management of PV includes aspirin and phlebotomy (goal Hct <45)
- Cyto-reductive therapy w/ hydroxyurea used when >60 years and/or past thrombotic event history
- Ruxolitinib (Jakafi) is a JAK2 inhibitor recently approved for PV

References

1. Torres AB, Godeau S, Ctein G, An H-C, Karagöz Y, Keleli B. Portal hypertension in myeloproliferative disorders. *Journal of Hematology*. 2013;2013:672781. doi:10.1155/2013/672781.
2. Warrilow RJ, Polonsky P, et al. Hepatic vascular disease and portal hypertension in polycythemia vera: a retrospective study of 145 patients. *Journal of Hematology*. 1990;12(3):1186-1174. doi:10.1002/jhm.1840120315.

Section II: Research Abstracts

Delays of the transfer for primary PCI in patients with ST-Elevation Myocardial Infarction

Zaid Al-Rufaye, MD, PGY3, Department of Internal Medicine, UAB Huntsville Regional Medical Campus, Huntsville, AL; Farrah Ibrahim, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; David Drenning, MD, FACC, The Heart Center, Huntsville Hospital, Huntsville, AL

Description

One proven treatment for improving the outcome of STEMI is a shorter first door-to-balloon time. In this study, we try to identify the areas with the most delays in inter-hospital transfer system for patients with ST-myocardial infarction for primary PCI.

Method

A retrospective chart review of 300 patients that were transferred from 14 non-PCI capable facilities to Huntsville Hospital during the period of January 2011 through October 2016. We looked at the times of the patient arrival at the transferring facility (D1), transfer system activation, heart alert (HA) after recognizing STEMI, the patient leaving the transferring facility (D1 exit), arrival at the catheterization laboratory (D2), and balloon time (B).

Results and Discussion

A total of 300 transfers and 14 transferring facilities are included in this study. D1 to B times range (from 62 to 248 minutes). D1 to B times within the goal of ≤ 90 minutes were identified in 106 patients (35.3%), with an average of 80.8 minutes and median of 83 minutes. Delays due to transit time were found in 36 patients (12%). Delays in D1 to B time > 90 minutes were identified in 158 patients (52.6%), excluding transit time (fixed distance) and D2 to B time (all included in the study < 30 minutes). Transportation arrangement was the reason for delay in 80 patients (50.6%), including delays in transport availability, transport crew efficiency, not following the protocol and operator not answering the phone. 53 patients (33.5%) were transported by air within average time of 36 minutes from HA to D1 exit. 202 patients (67.3%) were transported by ground with an average HA to D1 exit time of 20 minutes. Emergency Department (ED) delays were noted in 65 patients (41.1%), including delays in initial evaluation, obtaining EKG for patients with chief complaint of chest pain, failure to recognize STEMI, and delay in calling (HA) after recognizing the STEMI on EKG. Adverse events were detected in 15 patients (7.7%), including arrest or cardiogenic shock. Non-diagnostic initial EKG noted in 10 patients (6.3%).

Conclusions

The two major causes of delays in inter-hospital transfer system for primary PCI in patients with STEMI are related to the ED process in the transferring facility and the transport system. Outcome improvement for STEMI patients should focus on these areas. Further studies are needed to enforce these findings.

Description

One proven treatment for improving the outcome of STEMI is a shorter first door-to-balloon time. In this study, we try to identify the areas with the most delays in inter-hospital transfer system for patients with ST-myocardial infarction for primary PCI.

Background

A retrospective chart review of 300 patients that were transferred from 14 non-PCI capable facilities to Huntsville Hospital. Period of January 2011 through October 2016.

We looked at the times of the patient:

- 1- Arrival at the transferring facility (D1).
- 2- Transfer system activation, heart alert (HA) after recognizing STEMI.
- 3- Leaving the transferring facility (D1 exit).
- 4- Arrival at the catheterization laboratory (D2).
- 5- Balloon time (B).

Results

- A total of 300 transfers and 14 transferring facilities are included in this study. D1 to B times range (from 62 to 248 minutes).
- D1 to B times within the goal of ≤ 90 minutes were identified in 106 patients (35.3%), with an average of 80.8 minutes and median of 83 minutes.
- Delays in D1 to B time > 90 minutes were identified in 158 patients (52.6%), excluding transit time (fixed distance) and D2 to B time (all included in the study < 30 minutes).
- Transportation arrangement was the reason for delay in 80 patients (50.6%), including delays in transport availability, transport crew efficiency, not following the protocol and operator not answering the phone.
- 53 patients (33.5%) were transported by air within average time of 36 minutes from HA to D1 exit.
- 202 patients (67.3%) were transported by ground with an average HA to D1 exit time of 20 minutes.
- Emergency Department (ED) delays were noted in 65 patients (41.1%), including delays in initial evaluation, obtaining EKG for patients with chief complaint of chest pain, failure to recognize STEMI, and delay in calling (HA) after recognizing the STEMI on EKG.
- Adverse events were detected in 15 patients (7.7%), including arrest or cardiogenic shock.
- Non-diagnostic initial EKG noted in 10 patients (6.3%).

number of transfers versus delays per hospital



Discussion

- Current treatment guidelines emphasize the importance of rapid reperfusion in the treatment of patients with STEMI.
- Multiple factors play role in the variability of D1 to B times but in our study we excluded physical distance as it is fixed between the two facilities.
- Arranging for the transport appears to play a major role in the delays.
- Air transport definitely reduces transit time between the two facilities but surprisingly the average total transit time is longer with air vs ground transport.
- The other major factor is ED process with the most common cause is diagnostic dilemma and non diagnostic initial EKG.

conclusions

The two major causes of delays in inter-hospital transfer system for primary PCI in patients with STEMI are related to the ED process in the transferring facility and the transport system. Outcome improvement for STEMI patients should focus on these areas. Further studies are needed to enforce these findings.

Glycemic Control with Insulin Glargine in the Setting of Renal Impairment in Hospitalized Patients

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Description

Diabetic patients admitted to the hospital are at risk for developing hyperglycemia or hypoglycemia, both of which can lead to significant adverse outcomes. ADA and AACE guidelines recommend insulin (both short and long acting) as the primary treatment strategy for glucose control. Hypoglycemia has been observed more frequently in diabetic patients treated with insulin in the setting of chronic kidney disease (CKD). The purpose of this study is to assess frequency of hypoglycemia and glycemic control associated with receiving sliding scale insulin (SSI) only or in combination with long-acting insulin (LAI) in hospitalized patients with chronic kidney disease and hyperglycemia.

Methods

IRB approval was obtained for this retrospective analysis for patients >19 years old admitted to Huntsville Hospital between April 22, 2017 and July 19, 2017. Electronic medical records were reviewed for eligibility and exclusion criteria. Patients were identified by having orders for SSI during the specified timeframe. They were screened and included in the study if they had hyperglycemia as well as chronic kidney disease (stages 3, 4, or 5). Patients were divided into two groups: (1) those who received SSI alone and (2) those who received SSI plus LAI within 24 hours of admission. Demographic, laboratory data, and point of care blood glucose (BG) readings were utilized to assess glycemic control, frequency of hypoglycemic events, and length of stay. Continuous variables were evaluated by a two-sample t-test and categorical variables were evaluated by chi-squared analysis.

Results

Out of 50 patients that were included in this analysis, 33 (66%) received SSI alone and 17 (34%) received both SSI plus LAI. Patients in the SSI only group had better baseline glycemic control based on admission HbA1c data ($7.2 \pm 1.5\%$ vs $8.6 \pm 2.0\%$, $p=0.026$) and fewer patients were on insulin at home (30% vs 88%, $p<0.001$). Patients in the SSI group had greater glycemic control, defined as values between 70 to 180mg/dL, than the patients who received SSI plus LAI (62% vs 50%, $p<0.001$). The rate of hypoglycemia (BG <70mg/dL) was not significantly different between the SSI only group and SSI plus LAI group (5% vs 4%, respectively; $p=0.305$). Rates of hyperglycemia (BG >180mg/dL) were higher in the SSI plus LAI group (46% vs 32%, $p<0.001$). Rates of optimal glycemic control (BG 140-180mg/dL) were higher in the SSI only group (26% vs 19%, $p=0.002$). Finally, length of stay was similar between treatment strategies (8.0 ± 6.1 vs 6.6 ± 3.5 days, $p=0.294$).

Conclusion

Treatment with SSI only was associated with overall improved inpatient glycemic control; however, more frequent hypoglycemic episodes were observed in the SSI only group compared to the SSI plus LAI, though

this finding did not reach statistical significance. Patients in the SSI only group also had better baseline glycemic control. There were no differences in length of stay between the two groups.

Objective

Assess glycemic control associated with receiving sliding scale insulin (SSI) only or in combination with long-acting insulin (LAI) within 24 hours of admission in hospitalized patients with chronic kidney disease

Background

- ADA/AACE guidelines¹ recommend both short and long acting insulin as the primary treatment strategy for glucose control
- Diabetic patients admitted to the hospital are at risk for developing hyperglycemia or hypoglycemia, both of which are associated with adverse outcomes including death¹
- Decreased insulin requirements have been observed in insulin requiring diabetics in the setting of CKD²

Methods

- Retrospective analysis for patients >19 years old admitted to Huntsville Hospital between April 22nd, 2017 and July 19th, 2017
- Electronic medical records were reviewed for eligibility and exclusion criteria
- Patients were divided into 2 groups:
 - 1) SSI alone
 - 2) SSI plus LAI within 24 hours

Methods (cont.)

Inclusion Criteria	Exclusion Criteria
Age >19 years	Hypoglycemia at admission
Admitted between 4/22/17 – 7/19/17	DKA or HHS
Hyperglycemia	Insulin pump patients
CKD Stages 3, 4, 5	2 more doses of glucocorticoids during hospitalization

Variables Analyzed
Total daily insulin dose
Glycemic control
Frequency of hypoglycemic events
Length of Stay
Demographic data

- Continuous variables were evaluated by a two-sample t-test and categorical variables were evaluated by chi-squared analysis.

Results

Baseline Characteristics	SSI only within 24 hours of admission (n=33)	LAI + SSI within 24 hours of admission (n=17)	p-value
Age (years)	74.2	67.6	0.018
Male (%)	58	59	0.933
Weight (kg)	89.6	93.7	0.528
Home Insulin (%)	30	88	<0.001
Home LAI (%)	24	76	0.001
HbA1c (%)	7.2	8.6	0.026
LOS (days)	8.0	6.6	0.294
SCR on admission (mg/dL)	2.8	1.9	0.040
Baseline SCR (mg/dL)	2.4	1.6	0.014
CKD Stage			
Stage 3 CKD (%)	58	76	N/A
Stage 4 CKD (%)	27	24	N/A
Stage 5 CKD (%)	15	0	N/A
AKI on admission (%)	48	65	0.429
OAD during admission (%)	24	17	0.863

Results	SSI only (n=987 AC)	LAI + SSI (n=439 AC)	p-value
SAI during admission (IU)	43.1	86	0.019
SAI (IU/day)	6.2	14.5	0.009
Total insulin during admission (IU)	61.8	205	0.002
TDD Insulin (IU/day)	8.1	32.4	<0.001
BG 70-180 (%)	62	50	<0.001
BG 140-180 (%)	26	19	0.002
BG >180 (%)	32	46	<0.001
BG <70 (%)	5	4	0.305

AC=acuthefts, SSI=sliding scale insulin, LAI=long-acting insulin, SAI=short-acting insulin, TDD=total daily dose, BG=blood glucose

Discussion

- Treatment with SSI only within 24 hours of admission was associated with overall improved inpatient glycemic control
- Baseline glycemic control worse in LAI group (higher HbA1c and more insulin-experienced patients)
- Overall, more insulin given to LAI group than SSI group
 - Including SAI (mealtime and SSI) and LAI
- More frequent hypoglycemic episodes were observed in the SSI only group compared to the SSI plus LAI (did not reach statistical significance)
- No differences in length of stay between the two groups

Future Directions

- Additional data collection to increase number of patients in each group
- Matched groups based on baseline glycemic control and/or insulin requirements during admission

References

- The American Diabetes Association. Standards of medical care in diabetes — 2017. Diabetes Care 2017;40(1):S1-S135.
- Baldwin D, Zander J, Munoz C, et al. A randomized trial of two weight-based doses of insulin glargine and glulisine in hospitalized subjects with type 2 diabetes and renal insufficiency. Diabetes Care 2012;35:1970-1974.

Evaluation of Orthopaedic Trauma Fellowship Web Sites and an Assessment of 21 Content Domains

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Description

A program's web site can attract or deter fellowship applications. It can also impact applicants' final rank lists. Web-based information may allow applicants to apply more selectively, decreasing interview costs for themselves and programs. The accessibility and content of program web sites for several orthopaedic subspecialties have been analyzed for inadequacies. The goal of this study was to perform an analysis for the web sites of orthopaedic trauma fellowships.

Methods

A list of accredited orthopaedic trauma fellowships was obtained from the Orthopaedic Trauma Association (OTA) Fellowship Directory. Web site accessibility was determined by presence of a functional hyperlink in the directory and the web site's searchability using Google®. Web site content was evaluated based on 21 criteria.

Results

53 programs were identified, offering 84 positions. 27 had web sites accessible through the OTA fellowship directory via functioning links. 19 additional web sites were accessible using Google®. Seven programs lacked web sites entirely. Web site content varied between programs. Over half of the web sites lacked information for 13 of the 21 content criteria. A complete list of results can be located in Table 1.

Discussion

Inadequacies exist in the accessibility and content of OTA accredited Orthopaedic Trauma Fellowship web sites. We draw attention to 21 standard content areas pertinent to applicants that could be considered by the OTA and individual programs to include on their respective web sites. Standardization across web sites may allow for a more direct comparison between programs and improve the match process.

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Introduction

- Major source of information: Internet
- Online Information can influence to which programs applicants apply
- Some applicants value program's web site over opinions of mentors and family
- Accessible and comprehensive information may attract more fellowship applications
- Also may allow for decrease costs by applicant and program
- Survey: operative experience, fellow autonomy, program faculty are important
- Goal: Determine accessibility of orthopaedic trauma fellowship web sites and objectively evaluate their content

Methods

- Data collection and web searches performed on January 27, 2017
- Follow-up analysis performed August 2017
- Accessibility: Presence of direct hyperlink in OTA Fellowship Directory and systematized Google search: "program name" + "orthopaedic trauma fellowship"
- 21 Evaluated criteria established by program director and fellowship applicant

Results

Positions offered:

- 1: 60%
- 2: 23%
- 3: 11%
- 5: 4%
- Unreported: 2%



Table 1. Content Included on OTA Fellowship Directory and Program Specific Web Sites

	OTA n=53	Individual Pages n=46
Number of Programs % (n)		
Program Description	49.06% (26)	100.00% (46)
Research Opportunities	28.30% (15)	82.61% (38)
Description of Application Process	3.77% (2)	73.91% (34)
Attending Faculty	92.45% (49)	71.74% (33)
Case Descriptions	94.34% (50)	69.57% (32)
Coordinator Contact Info	98.11% (52)	67.39% (31)
Institutional Meetings	81.13% (43)	67.39% (31)
Research Requirements	13.21% (7)	63.04% (29)
Teaching Responsibilities	15.09% (8)	43.48% (20)
Out-Patient Clinic Expectations	7.55% (4)	43.48% (20)
Rotation Schedules	22.64% (12)	39.13% (18)
Previous Fellows	0% (0)	39.13% (18)
Fellow Salary	90.57% (48)	36.96% (17)
On-Call Expectations	71.70% (38)	34.78% (16)
Director Contact Info	90.57% (48)	32.61% (15)
National Meetings Sponsored	33.96% (18)	32.61% (15)
Current Fellows	0% (0)	32.61% (15)
Career Choice of Previous Fellows	0% (0)	28.26% (13)
Journal Clubs	20.75% (11)	23.91% (11)
Current and Previous Research	3.77% (2)	19.57% (9)
Medical School and Residency of Current Fellows	0% (0)	15.22% (7)

- No program contained all 21 data points
- Less than 1/2 of the criteria were present on over 1/2 of the web sites
- Follow-up analysis revealed no changes in content

Discussion

- Wide variation among accessibility and content of web sites
- Applicants spend upwards of \$5,000 and miss 11 days of residency training during interview
- >60% of residency PDs viewed resident absences as "extremely disruptive"
- Program web sites of equal or greater value than peer recommendations when forming a rank list
- Lacking a web site hinders applicants
- OTA "Tips for Applicants" advises applicants on aspects of programs they should learn
- Research opportunities on 83%
- Operative experience description lacking on 40%
- Program faculty names lacking on 30%
- AAOS Fellowship Directory only listed 39 programs (purchase required)
- Content was evaluated on presence not quality

References

- Niesen MC, Wong J, Ebrahmdadeh E, et al. Orthopedic surgery fellowships: the effects of interviewing and how residents establish a rank list. *Orthopedics*. 2015 Mar;38(3):175-9
- Meals C, Osterman M. The hand surgery fellowship application process: expectations, logistics, and costs. *The Journal of Hand Surgery*. 2015 Apr;40(4):783-9.
- Gladej LO, Pehler SF, Raley JA, et al. Is the orthopedic fellowship interview process broken? A survey of program directors and residents. *American journal of orthopaedics*. 2015;44(11):E444-53.

Knowledge that will change your world

Factors Correlated with Gastrointestinal Bleeding in Patients on Direct Oral Anticoagulants Compared to Warfarin

Hallie Knight, P4, Auburn University Harrison School Of Pharmacy; Jenna Lee, P4, Auburn University Harrison School Of Pharmacy; Amanda Holloway, P4, Auburn University Harrison School Of Pharmacy; Chris Squires, P4, Auburn University Harrison School Of Pharmacy; Taylor Steuber, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy; Haley Phillippe, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy

Background

Direct oral anticoagulants (DOACs) are becoming increasingly popular for prevention and treatment of thromboembolic events due to their predictable effect without the need for routine laboratory monitoring. Despite their ease of administration, fixed dosing, and high efficacy, they are also associated with risk of gastrointestinal (GI) bleeds that is comparable or higher than vitamin K antagonists (VKAs). The use of these agents may be complicated by several co-existing illnesses, age, and drug interactions. Numerous clinical risk prediction tools have been developed in an effort to identify patients considered to be at the highest risk for an anticoagulant-associated bleed; however, these risk prediction tools differ in how they were derived and how they identify individual risk factors. Additionally, most of these tools were developed in an era prior to DOAC utilization. The purpose of this study is to evaluate the factors correlated with GI bleeding events in patients taking DOACs compared to patients receiving traditional therapy with VKAs.

Methods

The study was approved by the institution's IRB for adult patients admitted to the hospital from January 2013 to July 2017 with a GI bleeding event as defined by the appropriate codes from the International Classification of Diseases (9th or 10th edition). Patients less than 19 years of age, pregnant patients, or patients not meeting the inclusion criteria were excluded. Demographic information, laboratory values, and history were collected and divided into categorical variables. Patients were categorized into two groups: those receiving a DOAC and those receiving a VKA. Correlational analyses were completed to identify associations between GI bleeding events in those taking a DOAC as opposed to those taking a VKA. Statistical analysis was performed using Minitab Statistical Software v18.0 (Quality Plaza, State College, PA).

Results

A total of 253 patients were included in the analysis (n=96 DOACs, n=157 VKAs). A weak to very weak, but statistically significant, correlation ($p < 0.05$) was identified between those taking DOACs and GI bleeding events compared to those on VKAs for patients with advanced age and history of chronic kidney disease. Very weak inverse correlations were found for those with improved renal function, history of alcohol use, and history of previous bleed.

Conclusion

DOACs have become a mainstay of treatment for prevention and treatment of thromboembolic events. However, the association between these factors and increased GI bleeding in DOAC-treated patients should prompt providers to consider patient-specific factors when selecting anticoagulant therapy.

* This vignette was chosen for oral presentation on Research Day. Contact Hallie Knight at mccrahl@auburn.edu for a copy of the PowerPoint. It was also previously presented as a poster at the American Society of Health-Systems Pharmacists Midyear Clinical Meeting in Orlando, Florida in December 2017.

Perceptions of an interprofessional debate activity as a method of literature evaluation

Taylor Steuber, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy; Haley Phillippe, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy; Bradley Wright, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy; Miranda Andrus, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy

Description

Interprofessional education and literature evaluation are emphasized in both medical and pharmacy education. Current literature studies support the idea of debates as an alternative to journal clubs in medical and pharmacy training. However, there are no reports of interprofessional literature evaluation in the medical and pharmacy literature. The purpose of this study is to assess how an interprofessional debate activity has been perceived by medical residents and pharmacy students.

Methods

Starting in August 2017, third year family medicine residents and fourth year pharmacy students participated in a monthly interprofessional debate activity, debating a controversial topic in the medical literature. After each debate, residents and students are administered a survey. One component of the survey gauges their perceptions of the impact the activity had on their literature analysis and teamwork skills. Participants are asked to provide their level of agreement on a Likert scale (1=strongly disagree through 5=strongly agree). Descriptive statistics were used to assess the results of this component of the post-survey.

Results

Twenty-eight participants (10 medical residents and 18 pharmacy students) have participated in the interprofessional debate activity. Of those, 26 have completed the post-survey (93% response rate). Overall, participants agreed or strongly agreed that the debate activity improved their literature evaluation, problem-solving, critical thinking, teamwork and communication skills. They also agreed that they preferred the debate style activity to a traditional journal club; however, there was a larger range of responses (range 1-5). Four participants strongly disagreed when asked if they preferred the debate style activity.

Discussion

The debate was well received as a method of literature evaluation by both the family medicine residents and pharmacy students. Participants reported positive perceptions of how the interprofessional debate activity impacted their skillset. Some participants may have not preferred the debate due to the more rigorous time commitment and preparation compared to a traditional journal club. Interprofessional debates are effective alternatives to journal clubs; however, continuous quality improvement measures will be employed to ensure a positive experience for all participants.

Background

- Interprofessional education and literature evaluation are emphasized in health education
- Debates can serve as alternatives to journal clubs¹⁻⁴

Purpose

- Assess how an interprofessional debate activity has been perceived by medical residents and pharmacy students

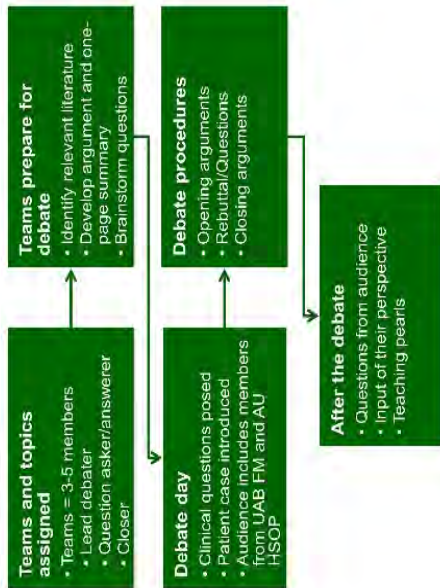
Methods

- Interprofessional debates started in August 2017
- PGY3 FM residents
- P4 pharmacy students
- Debate controversial topic in medical literature
- Post-survey administered after debate
- Literature analysis
- Teamwork skills
- Responses on a Likert scale (1=strongly disagree through 5=strongly agree)
- Descriptive statistics used for baseline characteristics and responses
- IRB-reviewed and exempt

Topics

- SGLT-2 vs. GLP-1
- Apixaban vs. warfarin
- Eplerenone vs. spironolactone
- Clopidogrel vs ticagrelor
- Bolus insulin vs GLP-1
- Statins in elderly for primary prevention

Debate Process



Results

- 28 participants (10 PGY3 residents, 18 P4 pharmacy students)
- 26 respondents (93% response rate)

Debate Perceptions Survey Item	Median (IQR)
1. The debate style activity improved my ability to analyze biostatistical tests and measures utilized within the study(ies).	4 (4,5)
2. The debate style activity improved my ability to apply the results of the study(ies) to patient care	5 (4,5)
3. The debate style activity improved my problem-solving and critical thinking skills	5 (4,5)
4. The debate style activity improved my communication skills	4 (4,5)
5. The debate style activity improved my interprofessional teamwork skills	5 (4,5)
6. The debate style activity increased my interest in the subject content area	5 (4,5)
7. Overall, I prefer the debate style activity compared to a traditional journal club style activity	4 (3,5)

Survey responses were ranked on a Likert scale from 1 (strongly disagree) to 5 (strongly agree)

Discussion

- Debate was well received by both parties
- Participants reported positive perceptions of working on interprofessional teams
- Also reported improved literature evaluation skills as a result of the process
- Some participants (n=4) disagree or strongly disagreed that they prefer the debate to a journal club
- Potentially due to more rigorous time commitment and preparation compared to a traditional journal club
- Debates provide an engaging platform and are effective alternatives to traditional journal clubs

Future Directions

- Quality improvement measure employed to enhance experience
- Involve PGY2 residents
- Additional discussion of literature evaluation and teaching after debate

References

1. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation." *Curr Pharm Teach Learn* 2017;9(3):427-432.
2. 2017;9(3):427-432.
3. Taylor Steuber, K. Wayne B. Steuber, et al. "The use of debate as an active learning tool in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
4. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
5. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
6. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
7. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
8. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
9. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.
10. Taylor Steuber, K. Wayne B. Steuber, et al. "Debate as an alternative method for medical literature evaluation: a case study in a college of pharmacy healthcare delivery course." *Curr Pharm Teach Learn* 2017;9(3):433-440.



Universal Hepatitis C Screening and Linkage to Care in a Large Urban Emergency Department

Larissa Mueller Pierce, MD, PGY1, UAB Huntsville Regional Medical Campus; Geetha Sanmugalingham, MSc., University of South Florida; Oluwatobi Ozoya, MD, University of South Florida; Jason Wilson, MA, MD, University of South Florida

Introduction

Performing demographic linkage to care analysis on Hepatitis C (HCV) RNA positive patients screening in an urban emergency department (ED) allows further insight into strategies to increase successful linkage. The United States Preventative Services Task Force recommends one-time HCV screening for baby boomers born between 1945-1965. However, many health care facilities have been hesitant to implement screening programs due to concerns around low linkage to care rates (Allison 2016).

Methods

Tampa General Hospital's emergency department is a large urban level one trauma center in Tampa, FL. From May 1, 2016 to November 30, 2017 we performed opt-out HCV antibody testing on 20,578 visitors to the ED from ages 18-71 who had no HCV test on record. Here we present percentages of linkage to care, defined as attendance at a visit with a physician (or a substance abuse counselor if warranted) for HCV RNA confirmatory polymerase chain reaction (PCR)-positive patients.

Results

Of the 20,578 tests performed, 1,342 were HCV antibody positive, yielding a seropositivity of 6.5%. Of these, 76.1% or 1,021 received an RNA PCR test and 592 were found to be RNA positive and have active disease. Of these, 255 or 43.1% were linked to care and 337 or 56.9% were not. A greater percentage of the baby boomer cohort was linked to care than non-cohort patients (49.6% of baby boomer cohort versus 37.8% non-cohort; $P=0.004$). More of the women than men were trending linked to care, but this did not prove statistically significant (48.2% of women linked versus 40.0% of men; $P=0.058$). Difference in linkage rates by race was not statistically significant ($P=0.10$). Insurance status highly correlated with successful linkage (52.5% of patients with insurance versus 25.6% without insurance; $P<0.001$) Type of insurance, public versus private, was not found to be statistically significant (54.7% vs 54.0%)

Conclusions

The highest correlation with successful linkage to care was insurance status, regardless of type. Patients in the baby boomer birth cohort were also more likely to be successfully linked, but were also more likely to have insurance so this may be a confounding factor. Instituting broad screening programs implemented in EDs where at-risk populations access the health care system allows for increased rates of identification and movement towards disease eradication. Examining demographic factors influencing linkage to care rates for our RNA positive population is a first step towards developing strategies to surmount barriers to care.

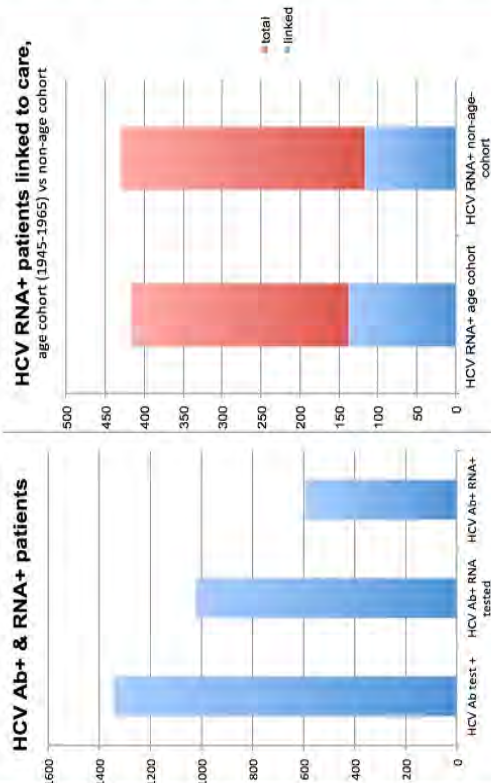
Introduction:

Performing demographic linkage to care analysis on Hepatitis C (HCV) RNA positive patients screening in an urban emergency department (ED) allows further insight into strategies to increase successful linkage. The United States Preventative Services Task Force recommends one-time HCV screening for baby boomers born between 1945-1965. However, many health care facilities have been hesitant to implement cohort screening programs due to concerns around low linkage to care rates (1,2,3). Universal HCV screening programs face additional linkage challenges.

Methods:

Tampa General Hospital's emergency department is a large urban level one trauma center in Tampa, FL. From May 1, 2016 to November 30, 2017 we performed opt-out HCV antibody testing on 20,578 visitors to the ED from ages 18-71 who had no prior HCV test on record. Here we present percentages of linkage to care, defined as attendance at a visit with a physician (or a substance abuse counselor if warranted) for HCV RNA confirmatory polymerase chain reaction (PCR)-positive patients.

20,578 HCV Ab screening tests, 5/1/16 – 11/30/17

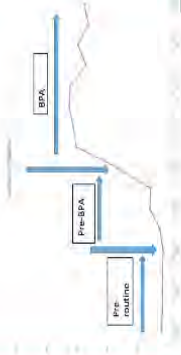


Results:

20,578 HCV antibody screening tests were performed on approximately 21% of visitors presenting to our ED during the study period who met our criteria and did not opt out of testing during an opportunity presented during registration. Of the screening HCV Ab tests performed, 1,342 were HCV antibody positive, yielding a seropositivity of 6.5%. Of these, 76.1% or 1,021 received an RNA PCR test and 592 were found to be RNA positive and have active disease. Of these, 255 or 43.1% were linked to care and 337 or 56.9% were not. A greater percentage of the baby boomer cohort was linked to care than non-cohort patients (49.6% of baby boomer cohort versus 37.8% non-cohort; $P=0.004$). More of women than men were linked to care, but this did not prove statistically significant (48.2% of women linked versus 40.0% of men; $P=0.058$). Difference in linkage rates by race was not statistically significant ($P=0.10$). Insurance status highly correlated with successful linkage (52.5% of patients with insurance versus 25.6% without insurance; $P<0.001$). Type of insurance, public versus private, was not found to be statistically significant (54.7% vs 54.0%).

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The highest correlation with successful linkage to care was insurance status, regardless of type. Patients in the baby boomer birth cohort were also more likely to be successfully linked, but were also more likely to have insurance so this may be a confounding factor. Instituting broad screening programs implemented in EDs where at-risk populations access the health care system allows for increased rates of identification and movement towards disease eradication. Examining demographic factors influencing linkage to care rates for our RNA positive population is a first step towards developing strategies to surmount barriers to care.



References

1. Hepatitis C virus infection in the 1945-1965 birth cohort (baby boomers) in a large urban ED. Allison, WE et al. Am J Emerg Med. 2016 Apr;34(4):697-701.
2. Unrecognized chronic hepatitis C virus infection among baby boomers in the emergency department. Galbraith JW et al. Hepatology. 2015 Mar;61(3):776-82.
3. Characterizing Failure to Establish Hepatitis C Care of Baby Boomers Diagnosed in the Emergency Department. Franco RA. Open Forum Infect Dis. 2016 Oct 4;3(4):211.

Reducing Unnecessary Daily Laboratory Testing through House Staff Education on High Value Care

Sasya Dronavalli, MD, PGY3, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Vishnu Kommineni, MD, PGY3, Department of Internal Medicine, UAB Huntsville Regional Medical Campus; Richard Ivey, MSSE, Huntsville Hospital, Huntsville, AL; Parekha Yedla, Associate Professor, Department of Internal Medicine, UAB Huntsville Regional Medical Campus

Aim

To evaluate and improve the house staff's practice of ordering routine lab tests and to incorporate the principles of high value, cost-effective care.

Methods

Electronic medical records of the patients admitted to Internal medicine service for one random month (Group 1) were reviewed and data were abstracted on demographics, length of stay (LOS), readmissions, laboratory tests, and lab-free days. Patients with LOS > 20 days were excluded. In patients with more than 2 days of lab tests, development of clinically relevant changes in the Hemoglobin, WBC, platelets, creatinine, and electrolytes over the course of the hospital stay was identified using preset criteria (*Table 1*).

House staff and faculty were given feedback using the results from group 1. They were also educated on the core principles of high value care as defined by ACP and Choosing Wisely initiative with a focus on reducing unnecessary cost burden and discomfort to patients. House staff were frequently reminded through text messages, emails, handouts, and didactic presentations to reinforce these concepts. Subsequently, data as outlined above were extracted for another month (Group 2) and both the groups were compared.

Results

Mean number of BMPs and CBCs performed per patient per day were 1.229 and 1.164 respectively in Group 1 (n=273) as compared to 1.079 and 0.933 in Group 2 (n=217). (*Table 2*) In Group 2, 43.78% of patients had lab-free days, which was significantly higher than Group 1 (31.5%).

Among patients with more than 2 days of lab tests, 53.5% in Group 1 (n=226) were noted to have clinically relevant changes in the BMP's whereas in Group 2 (n=183), it was 64.4%. Similarly, 47.7% of Group 1 (n=220) patients had clinically relevant changes in the CBC's compared to Group 2 (n=164) where 59.1% of them were deemed clinically appropriate. (*Table 3*)

Conclusions

A house staff led intervention utilizing education and data feedback was associated with significant reduction in daily lab testing rates.

Table 1.

Criteria for Clinically Relevant Changes in CBC and BMP	
CBC	BMP
WBC: Outside of normal limits Hemoglobin: drop of >1.5 or the need for blood transfusions during the hospitalization Platelets: <100,000/>500,000. A 50% drop was also considered abnormal.	-Sodium, Potassium: outside of normal limits -HCO ₃ : <21, >29 and / associated increased Anion Gap -Creatinine: >25% change from the lowest value in the first two days of admission

Table 2.

	Group1 (n=273)	Group 2 (n= 217)	P Value
Mean no. of BMPs/pt/day	1.229	1.079	p<0.0001
Mean no. of CBCs/pt/day	1.164	0.933	p<0.0001
Patients with lab-free days	31.5%	43.7%	p=0.0246

Table 3.

	Group 1	Group 2	P value
Percentage of patients with significant change in BMPs	121/226 = 53.5%	118/183 = 64.4%	p=0.025
Percentage of patients with significant change in CBCs	105/220 = 47.7%	97/164 = 59.1%	p=0.0264

Reducing Unnecessary Daily Laboratory Testing through House Staff Education on High Value Care

Sasya Dronavalli MD¹, Vishnu Kommineni MD¹, Richard Ivey MSSE², Parekha Yedla MD¹.

(1)UAB School of Medicine-Huntsville Internal Medicine Residency Program, Huntsville, AL.

(2)Huntsville Hospital, Huntsville, AL.

AIM

- To evaluate and improve House staff's practice of ordering routine laboratory tests by incorporating the principles of high value care.

METHODS

- Electronic medical records of the patients admitted to Internal medicine service for one random month (Group 1) were reviewed and data were extracted based on
 1. Demographics
 2. Length of stay (LOS)
 3. Readmissions
 4. Laboratory tests
 5. Lab-free days.

- Patients with LOS > 20 days were excluded.

- In patients with more than two days of lab tests, development of clinically relevant changes in the hemoglobin, white blood cells(WBC), platelets, creatinine and electrolytes over the course of the hospital stay was identified using preset criteria (Table 1).

- House staff and faculty were educated on the core principles of high value care as defined by ACP's Choosing Wisely Campaign with a focus on reducing unnecessary cost burden and discomfort to patients. They were given feedback using the results from group 1 during didactic presentation. House staff were frequently reminded through text messages, emails, handouts, and didactic presentations to reinforce these concepts.

- Subsequently, data as outlined above were extracted for another month (Group 2) and both the groups were compared.

Table 1

Criteria for Clinically Relevant Changes in CBC and BMP	
CBC	BMP
WBC: Outside of normal limits	Sodium, Potassium: outside of normal limits
Hemoglobin: drop of >1.5 or the need for blood transfusions during the hospitalization	HCO3: <21, >29 and / associated increased Anion Gap
Platelets: <100,000 / >500,000. A 50% drop was also considered abnormal.	Creatinine: >25% change from the lowest value in the first two days of admission

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RESULTS

- Mean number of BMPs per patient per day were 1.229 in Group 1 (n=273) as compared to 1.079 in Group 2 (n=217). (Table 2)
- Mean number of CBCs performed per patient per day were 1.164 in Group 1 (n=273) as compared to 0.933 in Group 2 (n=217). (Table 2)
- In Group 2, 43.78% of patients had lab-free days, which was significantly higher than Group 1 (31.5%).
- Among patients with more than 2 days of lab tests, (Table 3), 53.5% in Group 1 (n=226) were noted to have clinically relevant changes in the BMPs whereas in Group 2 (n=183), it was 64.4%.
- Similarly, 47.7% of Group 1 (n=220) patients had clinically relevant changes in the CBCs compared to Group 2 (n=164) where 59.1% of them were deemed clinically appropriate.

CONCLUSIONS

A house staff led intervention utilizing education and data feedback was associated with significant reduction in daily lab testing rates.

FUTURE OBJECTIVES

- To promote principles of High value care among other academic and non-academic services in Huntsville Hospital.
- To continue education of House staff to practice cost effective care in other areas such as radiology, microbiology.

Orthostatic Vitals for Dummies: OrthoStat App for recording orthostatic vitals based on current guidelines

Carolina Temple, MS3, UAB Huntsville Regional Medical Campus; Jitesh Kar, MD, Clinical Assistant Professor, Department of Neurology, UAB Huntsville Regional Medical Campus

Description

The financial burden for a diagnostic workup of dizziness and syncope is significant. Additionally, the steps involved to accurately measure orthostatic vitals is challenging to health care professionals (HCP) and is overwhelming for patients and their family members. This results in frequently inaccurate measurements. These inaccuracies are amplified by the fact that up until 2016 there was no agreed-upon guideline outlining the steps and interpretation. An accurate diagnosis of orthostatic hypotension depends on a consistent and well-established method. We have created an app that uses visual aids and timed voice commands to assist HCPs and patients in taking the steps to measure and record orthostatic vitals as outlined by the current consensus.

Methods

We prepared a survey of 18 multiple choice questions and distributed it among HCPs at Huntsville Hospital and medical students at UAB School of Medicine. The survey included questions about the setting in which they take orthostatic vitals, details about their training and experience, and includes a series of questions meant to assess their understanding and awareness of the current consensus. 124 responses were collected, the results were recorded in an excel spreadsheet and statistical analysis was performed. A subset of 20 of those that took the survey were introduced to our app, were taught how to use it, and were surveyed on their experience.

Results

Based on the results, only 6% of responders answered correctly on how to record orthostatic vitals based on the current guidelines. 5.7% of HCPs knew the correct sequence and time interval for recording orthostatic vitals. Only 14.6% of physicians could correctly interpret abnormal or positive result. 83.6% of HCPs reported that measuring orthostatic vitals is overwhelming. The top three challenges reported were that the process is time consuming, the time intervals are confusing, and concern that the patient would pass out. 88.5% of responders said that they would prefer to use an application that communicated with a blood pressure cuff that takes users through the steps of measuring orthostatic vitals with visual and voice command. Post-interventional analysis is currently ongoing, but preliminary data shows that 90% of users reported that having technology like app will help them to obtain the correct recording and interpretation of orthostatic vital measurement without any error.

Discussion



Many HCPs may not be updated with current guidelines for recording and interpreting orthostatic vitals. This causes inconsistencies in results and decreases the sensitivity of this test. The ability to correctly identify patients presenting to the ER or clinic as having orthostatic hypotension may help decrease the amount spent on working up other potential causes of dizziness and syncope. Not only can this be useful in a clinic setting, but could also be helpful at home for patients whose doctors ask them to keep a log of their blood pressure or orthostatic vital measurements. This app will not only help save time, but will also

help standardize the method of recording, interpreting results correctly, and providing clear and consistent results.

BACKGROUND

- Financial burden for diagnostic workup for dizziness and syncope is significant
- Steps involved to accurately measure orthostatic vitals (OV) is challenging to health care providers (HCP) & patients
- Accurate diagnosis depends on consistent, well-established methods
- We have created an app that uses visual aids and timed voice commands to assist HCP's and patients – guidelines based

CURRENT GUIDELINES

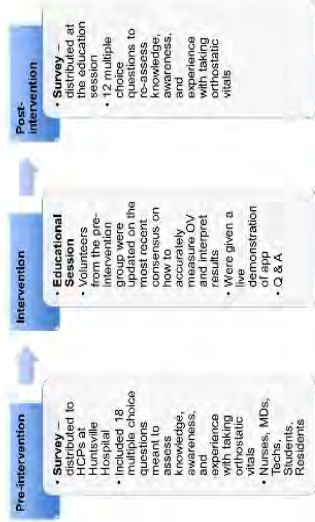
Position	Measure after
Lying/Supine* 	• 5 minutes
Standing 	• Immediately • 1 minute • 3 minutes

* Alternate: Seated position

Diagnostic Criteria

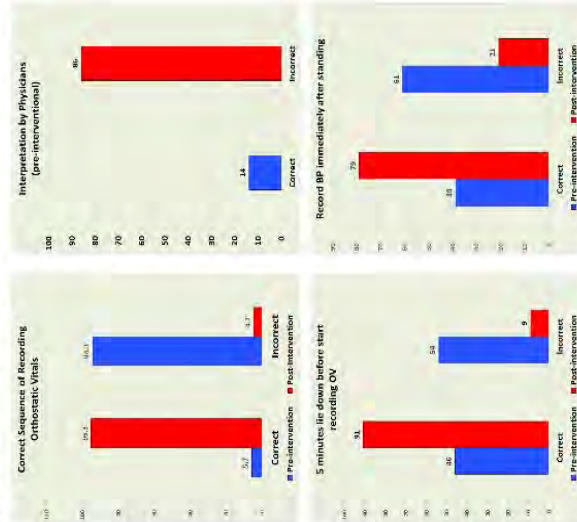
Systolic BP	Sustained reduction of at least 20 mmHg
Diastolic BP	Sustained reduction of at least 10 mmHg

METHODS



RESULTS

Figures: Pre-intervention data vs. Post-intervention data

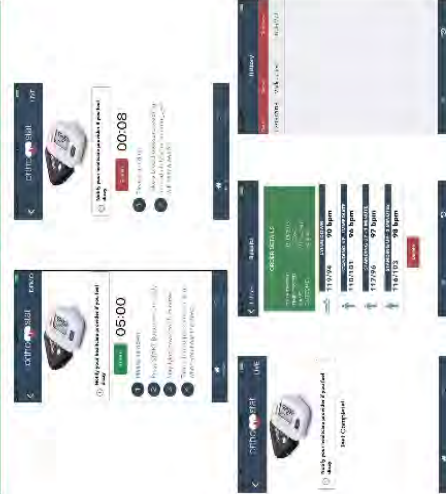


- 13.9% of all HCPs could interpret results
- 93% if participants included both supine and seated positions

DISCUSSION

- Top 3 Challenges with OV recordings:
 - Time consuming
 - Time intervals are confusing
 - Distracted while measuring OH
- Causes inconsistencies in results and decreases sensitivity of the test
- Correctly identifying patients presenting to ER or clinic with OH may help decrease healthcare dollars
- App aims to
 - Save time
 - Standardize method of recording
 - Interpret results
 - Provide clear and consistent results

ORTHOSTAT APP



REFERENCE

Gibbons CH, et al. Recommendations of a consensus panel for the screening, diagnosis, and treatment of neurogenic orthostatic hypotension and associated supine hypertension. J Neurol. 2017; 264:1567-1582

The Results of Teaching Healthcare Coaching Today, Benefits for Tomorrow

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Description

In 2015, 30.3 million Americans had diabetes. The Stanford Youth Diabetes Coaches Program (SYDCP) is an innovative program that has been developed to help residents and pharmacy students engage with the community by training local high school students from low-resource communities to become self-management coaches for their family members affected with diabetes. Community-based service-learning opportunities for family medicine residents can foster skills in community health assessment and promotion, an ACGME program requirement that can be difficult to effectively achieve.

Methods

To date there have been three cohort of student participants, two local high school settings and one after school enrichment program for students who are first generation, college bound. The methods include a pre survey, eight one hour sessions, and a post survey. Participating students were trained in coaching skills as well as basic health knowledge. After the class, each student coach then met with their diabetic family member weekly at home to complete their coaching assignments. When the students returned to class, they shared their experiences and challenges with the class and resident/pharmacy student facilitators. The surveys measured things such as positive attitude towards self by using a Worth Scale based on Rosenberg Self-Esteem Scale.

Results

After the 8 week intervention, participants reported an increase in diabetes and health knowledge, eating fruits, eating vegetables, the worth scale, and family belonging composite score. The participants reported a decreased in drinking soda pop, eating French fries, and there was no change in Resilience Composite Score.

Discussion

This program served to increase diabetes awareness and encourage student participants to adopt healthier behaviors. The program also taught strategies for coaching family members and other members of the community with diabetes. Student participants were eager to learn about the complications of diabetes including ways to prevent and treat them. They also learned about the importance of active listening, other communication skills, and basic nutrition. After the program, students demonstrated an increase in diabetes knowledge as well as confidence in coaching family members and/or friends with diabetes.

Description

In 2015, 30.3 million Americans had diabetes. The Stanford Youth Diabetes Coaches Program (SYDCP) is an innovative program that has been developed to help Family Medicine Residents and Pharmacy Students engage with the community by training local high school students from low-resource communities to become self-management coaches for their family members affected with diabetes. Community-based service-learning opportunities for Family Medicine Residents can foster skills in community health assessment and promotion, an ACGME program requirement that can be difficult to effectively achieve.

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Methods

When the students returned to class, they shared their experiences and challenges with the class and resident/pharmacy student facilitators. The surveys measured things such as positive attitude towards self by using a Worth Scale based on Rosenberg Self-Esteem Scale.

Discussion

This program served to increase diabetes awareness and encourage student participants to adopt healthier behaviors. To date there have been over 100 student participants in three cohorts, from two local high school settings and one after school enrichment program for students who are first generation, college bound. The program also taught strategies for coaching family members and other members of the community with diabetes. Student participants were eager to learn about the complications of diabetes including ways to prevent and treat them. They also learned about the importance of active listening, other communication skills, and basic nutrition. After the program, students demonstrated an increase in diabetes knowledge as well as confidence in coaching family members and/or friends with diabetes.

Table 1: Reported Change in Participant Knowledge

	No change	Increase	Decrease
Diabetes and Health Knowledge		X	
Health Behaviors			
• Drink soda pop			X
• Eat French fries			X
• Eat fruits		X	
• Eat vegetables		X	
Worth Scale(based on Rosenberg Self-Esteem Scale, includes questions about positive attitude toward self, etc)		X	
Resilience Composite Score (from California Healthy Kids Survey)	X		
Family Belonging Composite Score(from PROMIS)		X	

Results

After the 8 week intervention, participants reported an increase in diabetes and health knowledge, eating fruits, eating vegetables, the worth scale, and family belonging composite score. The participants reported a decrease in drinking soda pop, eating French fries, and there was no change in Resilience Composite Score.

References

- <http://www.diabetes.org/diabetes-basics/statistics/>
- Stanford University School of Medicine

Knowledge that will change your world

Checklist Protocol for Improving Diabetic Testing

Annie Herren, MS4, UAB Huntsville Regional Medical Campus; Chandler Stisher, MS3, UAB Huntsville Regional Medical Campus, David Bramm, Assistant Professor, Department of Family Medicine, UAB Huntsville Regional Medical Campus

Description

Our local free clinic provides care for the un- and under-insured of Huntsville, having to overcome obstacles including limited funding, rotating staff of volunteer physicians, and a patient population with poor health literacy. Our project attempts to provide a solution to management of diabetes in this clinic by using a simple checklist which can be placed into each patients' paper health record, giving all providers quick access to current results and necessary exams.

Methods

Charts at the Community Free Clinic were evaluated for presence of diabetes, then the checklist was pre-populated with one year of data and placed in the front of the chart. We documented rates of HbA1C testing that meet ADA guidelines both before and six months after implementation of the checklist, as well as LDL cholesterol, urinary albumin/creatinine ratio, presence of recent ophthalmologic exam, immunization status, and if the patient is on recommended medications (aspirin, ACE-I/ARB, and statin).

Results

During this study, we evaluated 239 visits to the clinic from 202 individual patients. Of these, 63% of visits had documented A1C within 100 days. We found that after the checklist was implemented, 48% of patients' rate of compliance with HbA1C testing stayed the same, 22% increased, and 25% decreased, showing that the checklist did not make a significant difference.

Discussion

We hoped to see significant improvements in compliance with HbA1C testing guidelines after implementing the checklist, but found instead that generally, most patients stayed the same as before the checklist. If they had not had HbA1C testing in 3 months before, they were likely to continue not being tested, and if they were up-to-date, they were likely to get tested within 3 months again. Reasons for this could include staff cooperation, patient noncompliance, and difficult changing clinic practices.

Despite this, we found evidence that physicians did make some changes to their ordering behavior after the checklist was implemented – many patients had new lab orders on the next visit, and several patients who had been severely out of compliance received new HbA1C tests.

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- Diabetes mellitus is a significant cause of death, disability, and poor quality of life for many Americans, and it can be very difficult for the majority of adults to maintain adequate glycemic control.²

- Hemoglobin A1C testing allows the patient and physician to see an approximate average of the blood sugar in the last 3 months, allowing them to see the effect of medications or lifestyle interventions quickly.
- Despite the benefit, few patients receive regular monitoring of HbA1C.¹ Electronic medical records, computerized decision support systems, and requirements of insurance companies can be used to increase rates of compliance with testing guidelines.
- Clinics for the homeless and uninsured often do not have such systems. We chose the Huntsville Community Free clinic for this project as limited funding, use of many volunteer physicians, and reliance on paper charting has led to fragmented care of chronic diseases such as diabetes mellitus.
- At the Community Free Clinic, lab tests as well as physician visits are free to the patient, allowing us to measure compliance without considering patients' ability to pay.

	Date			
Last visit	Weight			
	Glucose			
	Blood pressure			
	Smoking status			
	Tooth brush			
Lipids	HDL-C			
	LDL cholesterol			
Lab tests	Uricic Acidemia/ creatinin ratio			
	Erythrocytes			
	Proteinuria			
Inflammation	Protein			
	Insulin to B			
	Inflammation			
Recommended medications	Aspirin			
	ACE-inhibitor			
	Statins			

- The checklist was created after reviewing the 2017 guidelines determined by the American Diabetes Association.³
- We placed the checklist in 202 charts of diabetic patients and populated the charts with data from visits within the last year.
- We reviewed each visit for the information in the checklist. The populated charts were then photographed for data collection and later input into an Excel sheet.
- Staff were given information on utilizing the checklist and asked to fill it in with relevant information at each patient's visit.

- Six months later, we collected the charts and reviewed for new data. We additionally recorded whether any new labs had been ordered and whether the patient had come to the clinic for medication refills only. Photos were taken of the updated checklists and input into an Excel sheet.
- We then analyzed the data to determine the rates of compliance with guidelines before and after checklist implementation.

Results at Six Months



Response	Percentage
Same	50%
Increase	23%
Decrease	27%

- We did not find a difference in rates of compliance with HbA1C testing between the pre- and post-checklist periods
- Patients additionally may be unwilling to undergo more blood work, or physicians may/ not have time to address diabetes management at each visit.
- Despite no change in HbA1C ordering compliance, we believe that this project benefited many individual patients, as we observed many patients who had never received an HbA1C test had new orders placed.
- Limitations of the study included lack of staff participation, poor patient follow-up, and missing data.
- We hope in the future to continue to improve the checklist and learn how to utilize for management of chronic conditions in underserved populations.

1. Ali, M. K., Bullard, K. M., Scialoja, J. B., Cowie, C. C., Imperatore, G., & Goss, E. W. (2013). Achievement of goals in US diabetes care, 1999–2010. *New England Journal of Medicine*, 368(17), 1613–1624.
2. Linn, J., & Liang, Y. (2014). Diabetes management in the real world and the impact of adherence to guideline recommendations. *Current medical research and opinion*, 30(11), 2233–2240.
3. Warren, S. W., Gao, M. X., & Close, K. L. (2017). American Diabetes Association standards of medical care in diabetes 2017. *Journal of diabetes*, 9(4), 330–334.

Evaluating Physician Perceptions of Learning Based on Utilizing Clinical Pharmacy Services

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Purpose

Pharmacists and pharmacy students have been integrated into interprofessional teams with medical residents to promote optimal patient outcomes, teamwork, and facilitate learning. Specifically, pharmacists in the ambulatory care setting frequently care for patients directly in the clinic and manage medications as a part of the interprofessional team. Although interprofessional collaboration has previously been shown to be beneficial in improving patient outcomes, no prior study has evaluated the impact that medical residents perceive this collaboration has on their education. The purpose of this pilot survey is to evaluate the effect of pharmacist-physician collaboration within the clinic on medical resident learning.

Methods

This Institutional Review Board approved study includes a confidential and anonymous survey created to evaluate how medical residents perceive utilizing pharmacy services within the clinical setting improves patient care, their overall education, and their ability to work on an interprofessional team in the future. To measure this, seventeen questions, rated from strongly agree to strongly disagree, were designed. Demographics, including resident year and clinic setting, and pharmacy services utilized were collected as well. Various established surveys, including the Scale of Attitudes Toward Physician-Pharmacist Collaboration and Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education, were assessed and adapted to create a survey appropriate for this research topic. This pilot survey targeted medical residents within the University of Alabama-Birmingham (UAB) Family Medicine and Internal Medicine Clinics on the Huntsville Regional Medical Campus. The Qualtrics survey link was sent out via email to first, second, and third-year residents at the UAB-Huntsville Family Medicine and Internal Medicine Clinics in Huntsville, Alabama, which currently have clinical pharmacists providing services within the clinics. Data and results were collected and analyzed utilizing Qualtrics.

Results

Nineteen medical residents completed the survey with the majority of the respondents consisting of third-year medical residents (56 percent). Eighteen respondents (94 percent) felt that utilizing clinical pharmacy services improved patient care and made them more confident in their decisions about medications. All participants responded that utilizing clinical pharmacy services made them more effective members of an interprofessional team. Seventy-six percent of respondents indicated that clinical pharmacy services enhanced their knowledge in treating and managing chronic diseases. A large percentage of participants (94 percent) felt that working with pharmacists and/or pharmacy students was helpful to their educational experience and increased their desire to work closely with pharmacists in the future.

Discussion

Based on the results of this pilot survey, including pharmacists and pharmacy students as a part of interprofessional teams and utilizing clinical pharmacy services within the ambulatory clinic setting enhances medical residents' education and prepares residents to work as a part of the interprofessional team in the future. Medical residents also perceive this collaboration improves their confidence in making decisions about medications while enhancing their knowledge in treating and managing chronic diseases such as diabetes. Future studies will be needed to further evaluate the impact of clinical pharmacy services in the clinic setting on medical resident learning and to provide further support for further integrating pharmacists in the clinic setting and in collaboration with medical residents.

Background

- Pharmacists and pharmacy students have been integrated into interprofessional teams with medical residents to promote optimal patient outcomes, teamwork, and facilitate learning
- Although interprofessional collaboration has previously been shown to be beneficial in improving patient outcomes, no prior study has evaluated the impact that medical residents perceive this collaboration has on their education¹⁻³

Objective

The purpose of this pilot survey is to evaluate the effect of pharmacist-physician collaboration within the clinic on medical resident learning

Methods

- Various established surveys, including the Scale of Attitudes Toward Physician-Pharmacist Collaboration and Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education, were assessed and adapted to create a survey appropriate for this research topic¹⁻⁶
- Questions aimed to evaluate how medical residents perceive utilizing pharmacy services within the clinical setting improves patient care, overall education, and ability to work on an interprofessional team in the future
- Seventeen questions, rated from strongly agree to strongly disagree on a 5 point scale, were created
- The possible range of total scores is from 17 to 85, with a higher score indicating a more positive perception
- Additional questions including resident year, clinic setting, and pharmacy services utilized were also collected
- Anonymous surveys were distributed to all residents at the UAB-Huntsville Family Medicine and Internal Medicine Clinics as part of this IRB approved project
- Data and results were collected and analyzed utilizing Qualtrics

Mean Survey Responses Based on Resident Location

Question	Huntsville IM (n=10)	Huntsville FM (n=9)	Range (Median)
1. I have become more knowledgeable about medications and/or the management of medications from utilizing these pharmacy services.	4.3	4.5	3-5 (4)
2. I feel that using these clinical pharmacy services has improved my ability to make patient care decisions.	4.1	4.5	3-5 (4)
3. I am more confident in my decisions about medications when working with pharmacists and/or student pharmacists.	4.4	4.8	3-5 (5)
4. My patient's overall care improves when I utilize these clinical pharmacy services.	4.5	4.6	4-5 (5)
5. When I use these clinical pharmacy services, I feel that patients are more satisfied with their care.	4.0	4.0	3-5 (4)
6. Quality of care is improved when decisions are made by an interprofessional team.	4.6	4.9	4-5 (5)
7. Collaborating with pharmacists and/or student pharmacists by using these services makes me a more effective member of an interprofessional team.	4.3	4.9	4-5 (5)
8. Through my experience here at UAB-Huntsville, I am more confident in my ability to fulfill my role on an interprofessional team in the future.	4.5	4.8	4-5 (5)
9. I feel encouraged to become involved in interprofessional care at UAB-Huntsville.	4.2	4.5	4-5 (4)
10. Collaborating with clinical pharmacists and/or student pharmacists has enhanced my education during residency.	4.2	4.5	2-5 (4)
11. I feel that my knowledge in treating and managing diabetic patients by medication and/or lifestyle changes has been enhanced by working closely with pharmacists and/or student pharmacists in clinic.	4.3	4.0	2-5 (4)
12. I feel that my knowledge in treating and managing hypertensive patients by medication and/or lifestyle changes has been enhanced by working closely with pharmacists and/or student pharmacists in clinic.	3.9	3.8	2-5 (4)
13. I feel that my knowledge in treating and managing smoking cessation patients by medication and/or lifestyle changes has been enhanced by working closely with pharmacists and/or student pharmacists in clinic.	3.5	3.5	2-5 (3)
14. I feel that my knowledge in treating and managing chronic diseases has been enhanced by working closely with pharmacists in clinic.	3.8	4.4	2-5 (4)
15. I find working directly with pharmacists and/or student pharmacists in clinic to be helpful to my educational experience as a resident.	4.0	4.6	2-5 (4)
16. My desire to work closely with pharmacists in the future on patient care has increased after my experiences working with pharmacists and/or student pharmacists during residency.	4.3	4.6	3-5 (4)
17. As a way to improve patient care and outcomes, health insurances should reimburse for pharmacy services.	4.2	4.5	4-5 (4)
Total Scores (Out of possible 85)	71.1	75.3	65-85 (70)

Key: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree
*All results reported as mean values

Results

- A total of nineteen medical residents completed the pilot survey (31% response rate)
- The total survey score for IM was 71.1 (range: 65-78) and for FM was 75.3 (range: 65-85)

Level of Training*	n (%)
1 st year resident	7 (37%)
2 nd year resident	1 (5%)
3 rd year resident	10 (53%)
*One survey with no response	1 (5%)

Conclusion

- This survey can be used to identify the impact of medical resident collaboration with clinic pharmacists in the clinic setting
- Medical residents' education is enhanced by including pharmacists and pharmacy students as a part of interprofessional teams and utilizing clinical pharmacy services within the ambulatory clinic setting
- Medical residents also perceive this collaboration improves their confidence in making decisions about medications while enhancing knowledge in treating and managing chronic diseases such as diabetes
- Future studies will be needed to further evaluate the impact of clinical pharmacy services in the clinic setting on medical resident learning and to provide further support for further integrating pharmacists in the clinic setting and in collaboration with medical residents

References

1. Burke DS, Zarate JA, MacLaughlin AA, Samueldin M, Young RB. Perceptions of Physician-Pharmacist Interprofessional Clinical Education (SPICE) Instrument. Am J Pharm Educ. 2013 Nov;77(11):2013.
2. Lo MC, Freeman M, Linsang MC. Effect of a Multidisciplinary-Physician-Pharmacist Collaboration on Resident Attitudes and Patient Outcomes. Acad Med. 2013 Mar;78(3):449-456.
3. Mohammadi H, Hight J, Spangor G, Gerold A, Isenberg J. The Impact of a Multidisciplinary-Physician-Pharmacist Collaboration on Resident Attitudes and Patient Outcomes. Acad Med. 2013 Mar;78(3):449-456.
4. Manter C, Berger S, Reeves S. The Readiness for Interprofessional Education and Practice (RIPE) Scale: a validated scale for the interprofessional field. Interprof Educ. 2016;29(4):285-91.
5. Van Winkle LI, Fjortoft N, Hight J. The Interdisciplinary Education Perception Scale (IEPS): an alternative remodeled subscale structure and its reliability. J Interprof Care. 2007;22(1):1-10.
6. Van Winkle LI, Fjortoft N, Hight J. Validation of an Instrument to Measure Perceptions of Interprofessional Education. J Pharm Educ. 2011 Nov;75(9):178.

A Retrospective Case-Control Study on the Effects of Pharmacist Intervention on Cardiovascular Outcomes in an Ambulatory Setting

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Description

In this retrospective case-control study, we identify the impact of physician and pharmacist collaboration on cardiovascular outcomes in diabetic patients at our UAB-Huntsville Internal Medicine Clinic. We specifically look at outcomes regarding HbA1c, systolic (SBP) and diastolic blood pressures (DBP), total cholesterol, LDL, HDL, triglycerides, and appropriate use of aspirin, statins, and metformin in diabetic patients.

Methods

- IRB approved retrospective, case-control study of all diabetes patients in the IM clinic from July 2013 to March 2015.
- Inclusion Criteria: Age 18-65, Baseline A1c >6.5%.
- Exclusion criteria: No baseline or follow-up A1c in the chart, referral to endocrine specialist.
- Cases included patients referred to and seen by the pharmacist in at least 1 pharmacotherapy clinic visit.
- Controls included age-matched patients seen by the primary care physician as part of usual care.
- Data collected include baseline HbA1c, SBP, DBP, LDL, HDL, total cholesterol, triglycerides, and percentage of patients appropriately on aspirin, statins, and metformin given the most recent USPSTF guidelines. In our cases, we collected data at the initial clinical pharmacist visit as well as the follow-up visit. For our control group, we collected data that ranged from the same time period as our cases. Follow-up A1c after pharmacy visit or most recent A1c in control group and number of visits to the pharmacotherapy clinic.

Results

- Baseline A1c was higher in the cases (9.4%; range 6.8% - 16.6%) than the control group (8.1%; range 6.5% - 15.6%).
- More patients were controlled at A1c goals at baseline in the control group (17 vs. 2).
- The mean decrease in A1c was higher (1.2% vs. 0.7%) in patients referred to the pharmacist.
- The absolute increase in patients at goal at follow-up was higher in patients referred to the pharmacist (9 vs. 5).
- The median number of visits to the pharmacist was 1 with a range of (1-8).
- There was no significant difference in SBP or DBP.
- The intervention group had a reduction of LDL about 13 points, while the control group had a reduction of only 3 points.
- Post-intervention HDL and total cholesterol were similar in both groups.
- Control group had lower post-intervention triglyceride level of 35 points.
- In the intervention group, 9% more patients appropriate on a statin and about 8% more patients on aspirin.
- One surprise was that our control group had roughly a 17% more of their patients on metformin

than the intervention group.

Discussion

Physician and pharmacist collaboration within the Internal Medicine clinic resulted in greater decreases in A1c and a greater increase in patients achieving A1c goals than usual care within the clinic during this time. Our results also show that collaboration may play an important role in improving cardiovascular outcomes in diabetic patients. Although this is a retrospective study with a small sample size, our findings are consistent with other studies in circulation that show a benefit in cardiovascular outcomes when patients are seen by a pharmacist in collaboration with a physician in an ambulatory setting.

Background

- Diabetes mellitus affects 29.1 million people, over 9.3% of the United States (US) population¹
- Diabetes is the 7th leading cause of death in the U.S.¹
- Cardiovascular disease is the #1 cause of death among people with diabetes¹
- Guidelines recommend treating patients to a goal Hemoglobin A1c of <7% for most patients, as well as providing recommendations for the prevention of cardiovascular disease²
- Studies have shown that pharmacist and physician collaboration on diabetes management can reduce A1c levels further than usual care³

Objective

- Identify the impact of physician and pharmacist collaboration on diabetic and cardiovascular outcomes in patients with type 2 diabetes

Methods

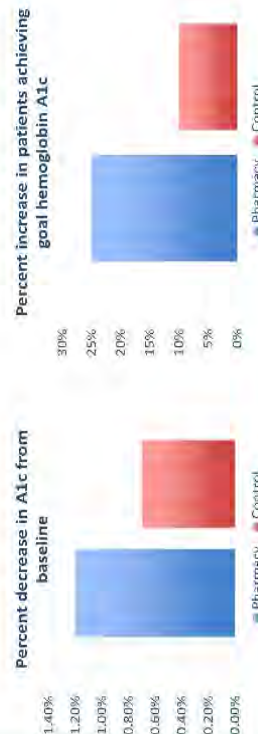
- IRB approved retrospective case-control study of diabetes patients in the IM clinic
- Inclusion Criteria: Age 18-65, Baseline A1c >6.5%
- Exclusion criteria: No baseline or follow-up A1c in the chart (excluded from A1c analysis), referral to endocrine specialist
- The pharmacy group included patients referred to and seen by the pharmacist in at least 1 pharmacotherapy clinic visit (intervention)
- Controls included age matched patients only seen by the primary care physician as part of usual care
- Data collected include baseline HbA1c, SBP, DBP, LDL, HDL, total cholesterol, triglycerides, and percentage of patients on aspirin, statins, and metformin
- For cases, data was included from the initial clinical pharmacist visit as well as the follow-up visit
- For the control group, data collected from the same time period as cases

Pharmacist Intervention

- Pharmacotherapy services, including collaborative drug therapy management (CDTM) services for diabetes, hypertension, and tobacco cessation are performed upon referral to the clinical pharmacist in the clinic
- Patients are scheduled a separate appointment with the clinical pharmacist
- Pharmacotherapy services performed for diabetes management include:
 - Medication reconciliation
 - Assessment of subjective and objective findings including lab reports
 - Comprehensive disease state education including complications and therapeutic goals
 - Lifestyle modification education including diabetic diet counseling
 - CDTM including initiation, modification or discontinuation of drug therapy
 - Insulin titration and administration counseling
 - Medication counseling including goals of therapy and adverse effects
 - Glucometer and self-monitoring counseling
 - Follow-up as needed
- All drug therapy recommendations are discussed with clinic physicians

Results

- Baseline A1c was higher in the pharmacy group (9.4%; range 6.8% - 16.6%) than the control group (8.1%; range 6.5% - 15.6%)
- More patients were controlled at A1c goals at baseline in the control group (17 vs 2)
- The mean decrease in A1c was higher (1.2% vs 0.7%) in patients referred to the pharmacist
- The absolute increase in patients at goal at follow-up was higher in patients referred to the pharmacist (9 vs 5)
- The median number of visits to the pharmacist was 1 with a range of (1-8)
- No significant differences were noted in systolic or diastolic blood pressure from baseline
- The pharmacy group had a reduction of LDL of almost 13 points while the control group had a reduction of only 3 points
- Post-intervention HDL and total cholesterol levels were similar in both groups
- Average triglyceride levels were lower in the control group by 35 points
- Statins were utilized in 83% of patients in the pharmacy group and 74% of patients in the control group
- Aspirin was utilized in 57% of patients in the pharmacy group and 49% of patients in the control group
- Metformin was utilized in 66% of patients in the control group and 49% of patients in the pharmacy group



Limitations

- Retrospective chart review
- Small sample size due to incomplete A1c data with many patients not having follow-up A1c levels available
- Higher baseline A1c levels and fewer patients controlled at baseline in the pharmacy group than controls
- Generalized A1c goals (oversimplified) were utilized and individualized goals may differ from patient to patient resulting in different outcomes
- Patients seen by the clinical pharmacist may be more motivated but also more difficult to control and have more comorbidities
- More time allotted for each patient appointment with the pharmacist, but also more focused on DM control

Conclusions

- Pharmacist and physician collaboration within the Internal Medicine clinic resulted in greater decreases in A1c and a greater increase in patients achieving A1c goals than usual care within the clinic during this time
- These results show that pharmacist-physician collaboration may play an important role in improving outcomes in diabetes patients
- These results are consistent with other studies which show a benefit of pharmacist and physician collaboration in the ambulatory setting
- Further studies are needed to further evaluate the clinical impact of collaboration on cardiovascular outcomes in patients with DM

References

- Centers for Disease Control and Prevention. National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014. Atlanta, GA: U.S. Department of Health and Human Services; 2014.
- American Diabetes Association. Glycemic targets. Sec. 5. In Standards of Medical Care in Diabetes 2016. Diabetes Care 2016;39(Suppl. 1):S38-S46.
- Brady R, J. Anderson SL, et al. A retrospective cohort analysis of the clinical effectiveness of a physician-pharmacist collaborative drug therapy management diabetes clinic. Pharmacotherapy. 2002;22:1294-1300.

Knowledge that will change your world

Evaluation of commercialized fecal microbiota transplant (cFMT) therapy for the treatment of recurrent *Clostridium difficile* infections

Jenna Lee, P4, Auburn University Harrison School of Pharmacy; Ali Hassoun, MD, Infectious Disease Specialist, Alabama Infectious Diseases Center, UAB Huntsville Regional Medical Campus; Brian Boyett, PharmD, Huntsville Hospital; Jonathan Edwards, PharmD, BCPS-AQ ID, BCGP, Huntsville Hospital; Taylor Steuber, Assistant Clinical Professor of Pharmacy Practice, Auburn University Harrison School Of Pharmacy

Background

Clostridium difficile infection (CDI) is a bacterial infection that typically occurs after the use of broad-spectrum antibiotics in older adults that reside in in long-term care facilities or hospitals. As more broad-spectrum antimicrobials have been developed and resistance has increased, CDI infections have become increasingly common causing a major economic and clinical burden. Recurrent CDI is common despite appropriate antibiotic treatment. FMT has been shown to reduce recurrent infections with a success rate higher than multiple courses of antibiotics. The purpose of this study is to evaluate the clinical and economic impact of cFMT in a large community hospital.

Methods

The study was approved by the institution's IRB for adult patients with multiple episodes of recurrent CDI despite antibiotic therapy. Patients with severe-complicated infection were excluded. cFMT was administered via colonoscopy or capsules in study approved patients. Each patient was evaluated 8 weeks post-transplant to assess for sustained clinical response and adverse events. The economic impact of cFMT was evaluated using historical data from EHR including: CDI rate, CDI readmission rate, rate of CDI-associated death, cost of CDI admissions, and rate of use of each antimicrobial regimen.

Results

There were a total of 40 patients enrolled (23 patients received solution/colonoscopy vs. 17 patients received capsule). Mean age was 66 years (68 yr in colonoscopy group vs 63 yr in the capsule group), female 60% (57% in colonoscopy group vs 59% in the capsule group), average recurrent episode was 3.4 (3.7 in colonoscopy group vs 3 in the capsule group), average CDI severity score was 1.37 (1.65 in colonoscopy group vs 1.06 in the capsule group). Total success rate was 80% (32/40) (78% (18/23) via colonoscopy vs 82% (14/17) via capsule). One patient experienced an adverse event from capsule with nausea and vomiting, which resolved without sequelae. There did not seem to be a correlation between cFMT donor and success rate. The cost of cFMT was \$635 for capsules and \$485 for solution, which was far less than recurrent CDI associated cost.

Conclusion

cFMT is a viable alternative to traditional FMT and was both clinically and economically beneficial in patients with recurrent CDI in a community hospital. Further studies are needed to confirm the above findings.



Evaluation of commercialized fecal microbiota transplant (cFMT) therapy for the treatment of recurrent *Clostridium difficile* infections

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Background

- Huntsville Hospital**
 - 941-bed tertiary care community hospital
 - Admissions per year: 44,000
 - Infectious Disease Specialists: 10
 - Gastroenterologists: 9
- Clostridium difficile* Infections (CDI)**
 - *Clostridium difficile* (*C. difficile*) is a Gram-positive, anaerobic, spore-forming bacteria prevalent in soil
 - *C. difficile* colitis results from a disturbance of the normal bacterial flora of the colon; colonization by *C. difficile*, and the release of toxins that cause mucosal inflammation and damage
 - CDI is most strongly associated with the use of systemic antibiotics
 - The Centers for Disease Control and Prevention (CDC) estimate over 450,000 CDI cases occur each year in the United States¹
- Fecal Microbiota Transplant (FMT)**
 - The transplantation of fecal bacteria from a healthy individual into a recipient in order to replenish the normal flora of the colon
 - Clinical trials have demonstrated FMT to be over 80% effective as a last-line treatment for recurrent CDI²
 - Traditionally, FMT required the physician to find a suitable donor, usually a close relative of the patient, and prepare the stool for transplantation via colonoscopy or nasogastric tube
 - Challenges such as procurement, processing, storage, and resistance among healthcare personnel have made traditional FMT difficult for hospitals to adopt and implement
 - Commercialized FMT (cFMT) products are now available as an alternative to traditional FMT by providing ready-to-use oral and rectal formulations

Objective

The objective of this study is to evaluate the effectiveness and economic impact of cFMT in patients with recurrent *C. difficile* infections in a large community hospital.

Methods

The study population included all adult patients presenting with recurrent *C. difficile* that were treated with cFMT from 4/1/16 until 8/1/17 in the hospital or at the hospital-owned outpatient center. Patients were identified and enrolled by IRB approved infectious disease and gastroenterology physicians after experiencing at least three treatment failures with antimicrobial therapy. Patients with a CDI severity score³ of 3 were excluded from the trial. cFMT was administered rectally via colonoscopy or orally via capsules. Each patient was evaluated at eight weeks post-transplant to identify if the patient suffered any adverse events and to determine if the patient experienced a sustained clinical cure. Clinical cure was defined as the absence of *C. difficile* associated diarrhea. The economic impact of cFMT was evaluated using historical data collected from the electronic medical record including: CDI rate, CDI readmission rate, rate of CDI-associated death, cost of CDI admissions, and rate of use of each antimicrobial regimen.

FMT Patient Characteristics

Characteristic	Colonoscopy (n=22)	Capsules (n=17)
Age - Yr (range)	63 (23-83)	63 (23-88)
Male sex - no (%)	10 (45)	7 (41)
Recurrent Episodes no.	3 / 14.1	3 / 17.6
CDI severity score ³	1.7 ± 0.3	1.1 ± 0.3

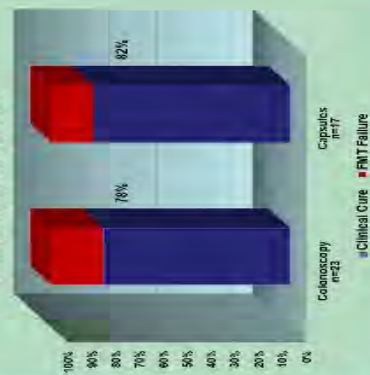
CDI severity score = 1 (mild), 2 (moderate), 3 (severe), 4 (fatal or life-threatening).

Incidence of CDI

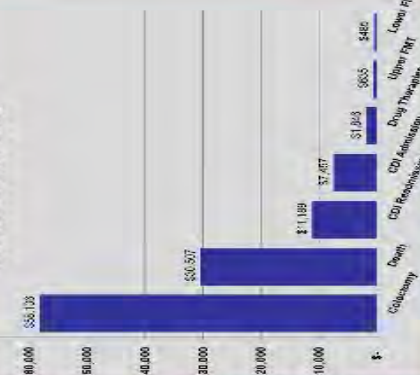
	No. of Patients	Total Admissions	Rate
Inpatient CDI Diagnosis			
Huntsville Hospital	334	44,104	0.75%
Nationally ⁴	333,600	35,063,420	0.95%
Admissions with Primary Diagnosis of CDI⁵			
Huntsville Hospital	94	44,104	0.21%
Nationally ⁴	112,000	35,063,420	0.32%
CDI Admissions Resulting in Death			
Huntsville Hospital	3	94	3.19%
Nationally ⁴	4,062	112,000	3.6%

⁴ CDC National Healthcare Data

Clinical Outcome of FMT



CDI-Associated Costs



Results

- The incidence of *C. difficile* at Huntsville Hospital is less than the national average
- 78% (18/23) of patients who received cFMT via lower administration (colonoscopy) experienced sustained clinical cure
- 82% (14/17) of patients who received cFMT via upper administration (capsule) experienced sustained clinical cure
- One patient experienced an adverse event of nausea and vomiting, which resolved without sequelae
- 2 of the patients that experienced treatment failure received cFMT from the same donor
- The total drug cost of therapies preceding cFMT averaged \$1,846 per patient, due to recurrent episodes
- The cost of all other CDI-associated outcomes far exceeds the cost of cFMT which was demonstrated to be 80% effective in curing *C. difficile* without any further recurrences or readmissions

Conclusions

cFMT was found to have an average success rate of 80% in patients that have previously failed at least three courses of antimicrobial therapy. Although these patients had lower baseline severity scores, cFMT via capsule demonstrated a higher success rate and can be performed in outpatient clinics. With costs of CDI admissions ranging from \$7,000 to nearly \$60,000, (depending on the outcome of the admission), the ability of cFMT to terminate the cycle of CDI will provide the health system with significant cost-avoidance each year. cFMT proved to be a viable alternative to the burdensome process of traditional FMT and should continue to be used for patients with recurrent CDI that have experienced multiple antimicrobial treatment failures.

References

1. Lessa FC, Mh Y, Bernstein M, et al. Burden of *Clostridium difficile* Infection in the United States. *N Engl J Med*. 2015;373(1):17-26.
2. Bournon EA, Broussard EK, Sweeney CM. Fecal microbiota transplantation: current clinical efficacy and future prospects. *Can J Gastroenterol*. 2015;29(5):351-359.
3. Liorio H, (Social & Scientific Systems), Gould C, (CDC), and Eliezer A. (AARQ). *Clostridium difficile* Infection (CDI) in Hospital Stays 2009-2012. Statistical Analysis. #124, January 2012. Agency for Healthcare Research and Quality, Rockville, MD.

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