



Annual Research Day 2018

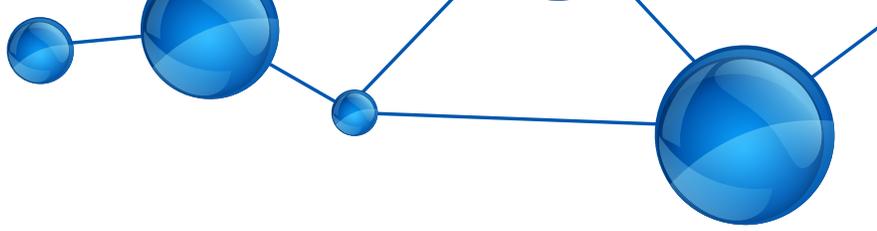
St. Elizabeth's Medical Center

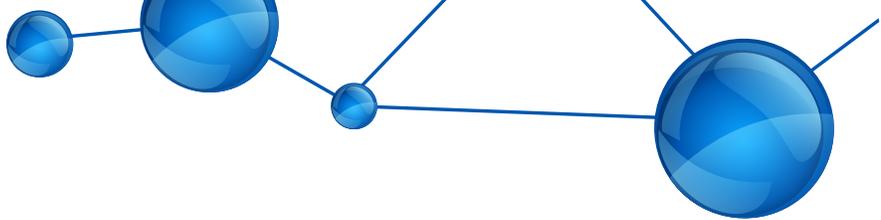
A STEWARD FAMILY HOSPITAL



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Welcome Message

Dear Friends and Colleagues:

On behalf of the Planning Committee, I would like to welcome you to the Steward St. Elizabeth's Annual Research Day, an event celebrating the academic mission of our medical center and the research efforts of our residents and fellows. We and the Accreditation Council for Graduate Medical Education consider research to be an important element of graduate medical education, and this event celebrates the efforts of our trainees who have been active in these endeavors. Research enables us to improve our care of patients and advance our medical knowledge and in this annual event, we judge the products of our trainees' efforts for their quality, methodology, significance, and originality. We applaud these efforts which are often pursued on top of and in addition to the full clinical responsibilities of our residents and fellows and are sympathetic to their friends and families who were deprived of their time in the preparation, and execution of the research. We firmly believe that research is vital in carrying out the mission of an academic medical center and can result in tremendous advances in medicine. To that end, we are honored to host and welcome our keynote speaker, Dr. Ann McKee, whose dynamic leadership and research in Neurology and Neuropathology are summarized elsewhere in this booklet.

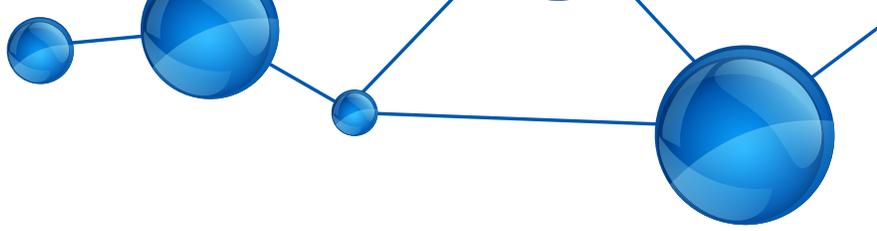
This year, the planning committee received a total of 67 abstract submissions in the categories of original investigation, quality improvement projects, and case reports. Highlights of these abstracts and a selection of the finest are displayed on poster boards in the auditorium today. Our Honorable Mention submissions have ribbons attached to the poster boards and the highest rated efforts will be presented orally in our program and receive awards.

I would very much like to thank our judges who reviewed and ranked the submissions and selected those that they felt were of the highest merit and worthy of oral presentation and honorable mention. I also would like to thank the planning committee, and in particular the efforts of Dr. Irene Gonsalvez and Dr. Natasha Bolotinsky our Psychiatry Residents for their efforts in organizing this event. Thanks also for the generous support of the SEMC GME Office, Medical Executive Committee, and Hospital Administration, without whom today's event would not be possible. We very much hope that you will enjoy this showcase of our residents' and fellows' research efforts and that it will stimulate additional research efforts within our medical center and the Steward Health Care System. Ultimately it's all about providing the best possible care to our patients, and we believe that research is an integral part of this effort. We hope that you will enjoy today's program and thank you for your participation.

Sincerely,



Norman I. Zarsky, MD
Chair, Annual Research Day Planning Committee



Program

March 29, 2018

7:00 - 7:30 a.m. **Continental Breakfast**

7:30 - 7:40 a.m. **Welcome & Introduction**

Norman I. Zarsky, MD
Chair, Research Day Planning Committee

7:40 - 8:10 a.m. **Keynote Speaker**

Ann C. McKee, MD
“Observation, Curiosity and an Open Mind”

8:10 - 9:25 a.m. **Oral Presentations**

1st Place Original Investigation: Maythawee Bintvihok, MD
Impact of Dexmedetomidine for the Treatment of Alcohol Withdrawal Syndrome upon ICU Length of Stay

2nd Place Original Investigation: Michael Schlewet, MD
Nasal Airflow Changes After Nasal and Sinus Surgery in Children with Sleep Disordered Breathing

3rd Place Original Investigation: Robert Ball, MD
The Impact of Using Pure Hypochlorous Acid for Intracavitary Irrigation and Lavage

1st Place Quality Improvement Project: Faris Alhalwan, PharmD
Nudge in the Right Direction: Pharmacists Optimizing Antimicrobial Stewardship by Improving Audit and Feedback in an Intensive Care Unit at a Community Teaching Hospital

1st Place Case Report: Hari Krishnan Nair, MD
A Rare Case of Rectal Hepatoid Adenocarcinoma in a Patient with Ulcerative Colitis

9:25 - 9:40 a.m. **Presentation of Awards**

9:40 - 10:40 a.m. **Poster Displays with Author Present**

Judges Panel

Original Investigation and Quality Improvement Report

Denise Daudelin, RN, MPH

Tufts CTSI, Tufts Medical Center



Ms. Daudelin, Assistant Professor of Medicine, Public Health and Community Medicine and Director, Research Process Improvement, Tufts CTSI, is a Research Scientist with experience in conducting quality improvement (QI) learning collaboratives and using QI methods to improve research processes. An Investigator and Project Director for several quality improvement demonstration

projects, she has worked with hospitals, emergency medical service agencies, primary care practices and researchers to develop measures of healthcare quality and achieve improvements in healthcare delivery and research. Before joining the Center for Cardiovascular Health Services Research, Ms. Daudelin was Director of Outcomes Analysis and Quality Improvement at Tufts Medical Center, where she developed and implemented operational QI and patient safety programs, co-developed QI and Resource Utilization software, and worked with clinicians to evaluate incidences and causes of medical errors. She recently conducted a quality improvement learning collaborative with 18 health care organizations in conjunction with the MA Department of Public Health.

Daniel E. Weiner, MD, MS

Tufts CTSI, Tufts Medical Center



Dr. Weiner is a Lead Navigator at Tufts CTSI, a nephrologist at Tufts Medical Center and Associate Professor of Medicine at Tufts University School of Medicine. He is a graduate of Tufts University (LA98) and Tufts University School of Medicine (M98), before completing a masters degree program in clinical care research at the Sackler School of Graduate Biomedical Sciences (S04). His research interests focus on the intersection of cardiovascular

disease and kidney disease. In addition, Dr. Weiner is the chair of the curriculum committee at Tufts University School of Medicine and is a member of the Residency Selection Committee at Tufts Medical Center.

Cheryl London, DVM, PhD

Cummings School of Veterinary Medicine,
Tufts University, and Molecular Oncology Research
Institute, Tufts Medical Center



Dr. London, is a Research Professor at Cummings School of Veterinary Medicine at Tufts University and the Molecular Oncology Research Institute at Tufts Medical Center. She has an active laboratory research program centered on comparative and translational oncology and is involved in the training of graduate students and postdoctoral fellows. Dr. London is also an Associate Faculty Professor at the Ohio State University College of Veterinary

Medicine (OSU CVM) where she remains Director of the Clinical Trials Office at the CVM and Director of Translational Therapeutics at the Center for Clinical and Translational Sciences, OSU College of Medicine. Prior to her time at OSU, she was an Assistant Professor in the Department of Surgical and Radiological Sciences at the University of California, Davis. Dr. London earned her DVM at Cummings School, completed her Residency in Medical Oncology at the University of Wisconsin-Madison and received her PhD in Immunology at Harvard University, where she was also a postdoctoral fellow in the Department of Pathology.

Judges Panel

Case Reports

Stanley Cheren, MD

Department of Psychiatry



Dr. Cheren is a Psychiatrist at St. Elizabeth's Medical Center, specialized in Consult and Liaison. He graduated from Tufts University School of Medicine and completed his residency in psychiatry at Boston University, where he later became the Head of the Department of Psychosomatic Medicine.

After extensive experience in inpatient and outpatient psychiatry, including 10

years of clinical research in disorders of the central nervous system at Bournewood Hospital, he is now Director of the educational curriculum in the Department of Psychiatry at St. Elizabeth's Medical Center.

Mihaela C. Blendea, MD, PhD

Division of Endocrinology, Department of Medicine

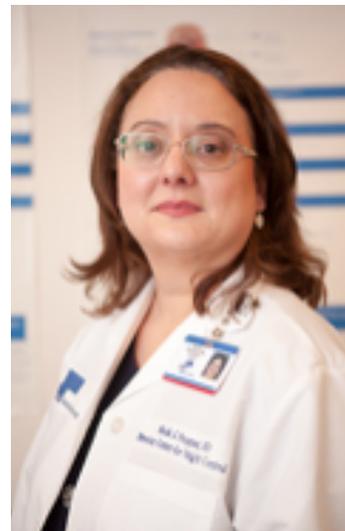


Dr. Blendea is an endocrinologist at St. Elizabeth's Medical Center. She received both her Doctor of Medicine and Doctor of Philosophy degrees from the University of Medicine and Pharmacy "Iuliu Hatieganu" Cluj-Napoca, Romania. After completing a fellowship in Endocrinology at the same institution, she practiced for 8 years before coming to the US. She completed an internship and residency in Internal Medicine at

Bridgeport Hospital, a Yale University School of Medicine affiliate. After her medical residency, she completed a second fellowship in Endocrinology, Diabetes and Metabolism at the University of Massachusetts. She serves as Core Faculty for the St. Elizabeth's Internal Medicine Residency Program and is an Assistant Professor of Medicine at Tufts University School of Medicine.

Nicole Pecquex, MD

Division of Bariatric Surgery, Department of Surgery



Dr. Pecquex is a general surgeon, specializing in bariatric surgery. She graduated from Tufts University School of Medicine in 1998. She completed her surgical residency at St Elizabeth's Medical Center, followed by a fellowships in Advanced Laparoscopic and Bariatric Surgery at the University Of Massachusetts Memorial Medical Center. She currently serves as Director of the Steward Center for Weight Control at St. Elizabeth's Medical Center. She is an Assistant

Professor of Surgery at Tufts University School of Medicine.

Keynote Speaker



Ann C. McKee, MD

Dr. McKee is the Director of Boston University's Chronic Traumatic Encephalopathy (CTE) Center, Associate Director of Boston University's Alzheimer's Disease Center, and Professor of Neurology and Pathology at Boston University. In addition, she is the Director of Neuropathology for the New England Veterans Administration Medical Centers (VISN-1), and Neuropathologist for the National PTSD Brain Bank. Dr. McKee is the Director of several successful brain banks focused on Alzheimer's Disease, aging (Framingham Heart Study (FHS)), amyotrophic lateral sclerosis (ALS), and CTE and traumatic brain injury (TBI). The CTE and TBI brain tissue repositories, the VA-BU-CLF and Chronic Effects of Neurotrauma Consortium (CENC) brain banks, are devoted to understanding the long-term effects of trauma and stress; they are the largest such resource in the world, with over 500 clinically and pathologically well-characterized cases.

She completed her undergraduate studies at the University of Wisconsin and received her medical degree from the Case Western Reserve School of Medicine. Dr. McKee then went on to complete her residency training in neurology at Cleveland Metropolitan General Hospital and fellowship training in neuropathology at Massachusetts General Hospital. She was Assistant Professor of Neuropathology at Harvard Medical School from 1991-94, when she became Associate Professor of Neurology and Pathology at Boston University School of Medicine. In 2011, she was promoted to Professor of Neurology and Pathology.

Work from Dr. McKee's laboratory over the past decade has been the major driver in CTE research and was instrumental in changing public awareness of the long-term effects of mild repetitive brain trauma, including concussion, subconcussion and blast injury. She proposed the preliminary criteria (McKee criteria) to neuropathologically diagnose CTE, which were subsequently confirmed by a NINDS consensus panel of expert neuropathologists; she defined the pathological staging scheme for CTE and reported the largest clinicopathological case series to date on CTE. Dr. McKee also helped to define microvascular injury and the neuropathology of aging through her work with the FHS and AD Center. As a board-certified neurologist and neuropathologist, Dr. McKee is specifically interested in the neuroanatomical substrate of neuropsychological symptoms. She has written widely on many neurodegenerative diseases including CTE, AD, ALS, FTLN, Lewy body disease, Parkinson's Disease, progressive supranuclear palsy, multiple system atrophy, and corticobasal degeneration.

Original Investigation

Original Investigation 1st Place



Impact of Dexmedetomidine for the Treatment of Alcohol Withdrawal Syndrome upon ICU Length of Stay

Maythawee Bintvihok¹; Ekaterina Yavarovich¹; Justin McCarty²; Peter LaCamera³

¹SEMC-Department of Medicine; ²SEMC- Department of Surgery; ³SEMC-Division of Pulmonary, Critical Care, and Sleep Medicine, Department of Medicine

Maythawee Bintvihok, MD

Background: Alcohol withdrawal syndrome (AWS) is a commonly treated condition in medical ICUs associated with high resource utilization. Dexmedetomidine is often used as an adjunct to benzodiazepines however, guidelines for its use are lacking. Dexmedetomidine must be administered in an ICU setting due to its known cardiovascular side effects. For these reasons, we evaluated the impact that dexmedetomidine use in AWS has upon ICU length of stay (LOS).

Study Design: We performed a multi-institutional retrospective cohort study of patients admitted to the ICU with the primary diagnosis of AWS from 2012-2017.

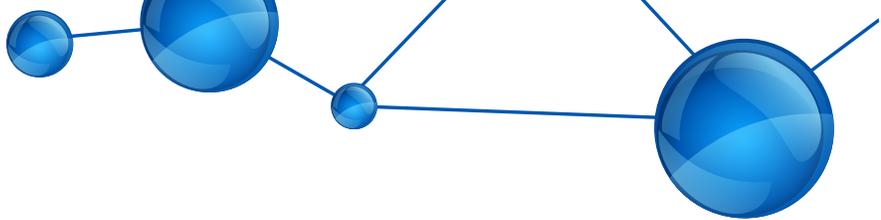
Setting and Participants: We compared ICU and hospital LOS between those treated with benzodiazepines alone versus a combination of benzodiazepines and dexmedetomidine for AWS.

Methods: Negative binomial regression, with generalized estimating equations to account for clustering of patients within hospitals, was performed to test whether dexmedetomidine use was associated with ICU and hospital LOS, after adjustment for CIWA at ICU admission. The ICU LOS model also adjusted for the time between hospital admission and ICU admission.

Results: 611 subjects were included across 9 institutions. Patients treated with dexmedetomidine in addition to benzodiazepines had higher CIWA scores at the time of ICU admission and spent longer on the medical wards prior to ICU admission. The dexmedetomidine group also had longer unadjusted ICU and hospital LOS ($p < 0.0001$ for both). After covariate adjustment, the dexmedetomidine group had a longer ICU LOS (relative mean to the benzodiazepines alone group: 2.34, 95% confidence interval (CI): 2.07-2.65, $p < 0.01$) and greater total hospital LOS (relative mean to the benzodiazepines alone: 1.59, 95% CI 1.32-1.92, $p = 0.03$). Discharge CIWA did not differ significantly between the two groups.

Conclusion: The use of dexmedetomidine for the treatment of AWS appears to be associated with increased ICU and hospital LOS compared to the use of benzodiazepines alone. This remained true after adjusting for CIWA scores at the time of ICU admission and the duration of time patients spent on the medical wards prior to ICU admission. These results provide preliminary evidence that dexmedetomidine use is associated with increased resource utilization and further studies are warranted to determine how best to incorporate dexmedetomidine into AWS treatment protocols.

Limitations: Retrospective study



Original Investigation

Original Investigation 2nd Place



Nasal Airflow Changes after Nasal and Sinus Surgery in Children with Sleep Disordered Breathing

Michael Schlewet¹; Peter Catalano¹

¹SEMC-Division of Otolaryngology, Department of Surgery

Michael Schlewet, MD

Background: The pathophysiology of sleep disordered breathing (SDB) and obstructive sleep apnea in adults has been extensively studied and treatment options well characterized. However, the same cannot be said regarding these conditions in children, with adenotonsillectomy being the primary treatment studied. Unfortunately, several authors report that adenotonsillectomy failed to cure a significant number of children who suffer from SDB. In this study we evaluate the nasal airflow changes that occur after nasal and sinus surgery in children with SDB.

Study Design: This prospective pilot study is designed to evaluate the nasal airflow changes and SDB related symptoms changes in children with SDB following minimally invasive nasal and sinus surgery

Setting and Participants: Children with SDB and nasal obstruction who were seen in ENT clinic and underwent minimally invasive nasal and sinus surgery.

Methods: 14 children who demonstrated nasal obstruction as determined by history, physical exam, and 3D sinus CT-scan, and did not have adeno-tonsillar hypertrophy, were included. No palatal expansion had yet been performed. CT imaging used to calculate nasal airway volumes was performed at baseline and 4-6 months post-nasal and sinus surgery. A SDB symptoms questionnaire was also obtained at baseline and 6 months post-operatively, and data was analyzed and compared using paired t-test.

Results: 14 patients aged 5-14 years (M 57%; F 43%) were enrolled in this study. All patients demonstrated significant increase in nasal airway volume after surgery ($p < 0.0001$), and improvement in all aspects of the SDB symptoms questionnaire at 6-months post operatively. There was no surgical morbidity.

Conclusion: Minimally invasive nasal and sinus surgery in children with SDB and nasal obstruction can produce significant improvement in nasal airflow and reduce disease related symptoms. This pilot study shows the importance of restoring nasal breathing as a primary goal in correcting SDB in children.

Limitations: The pre and post-op parent questionnaire was not a validated QoL instrument. Computational fluid dynamics (CFD) simulation software was not available for this study.

Original Investigation

Original Investigation 3rd Place



The Impact of Using Pure Hypochlorous Acid for Intracavitary Irrigation and Lavage

Robert L. Ball^{1,2,3}; Juan Sebastian Vazquez^{2,3}; Martin C. Robson⁴; Lauren T. Moffatt²; Jeffrey W. Shupp^{2,3}
¹SEMC- Department of Surgery; ² Firefighters' Burn and Surgical Research Laboratory, MedStar Health Research Institute, Washington, DC; ³ The Burn Center, Department of Surgery, MedStar Washington Hospital Center, Washington, DC; ⁴ Department of Surgery, University of South Florida, Tampa, FL.

Robert Ball, MD

Background: Surgical site infections (SSI) continue to be one of the most significant burdens on the healthcare system, occurring 500,000 times annually in the US at a cost of \$10 billion. Although irrigation is logical to reduce the bacterial load, no specific irrigation solution has been universally effective. Pure hypochlorous acid (HOCl) has a rapid in vitro bacterial kill rate against most pathogens responsible for SSI, is non-cytotoxic and is pH neutral to skin and wound cells. This study was designed to determine if there are deleterious effects of pure hypochlorous acid on internal organs using a rat model of laparotomy, laminectomy, or thoracotomy.

Study Design: Experimental animal model

Setting and Participants: Conducted at burn surgery research laboratory at MedStar Washington Hospital Center. Male Sprague-Dawley rats were used.

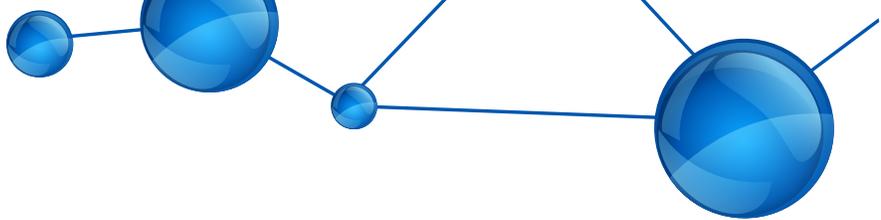
Methods: Animals underwent laparotomy, laminectomy, or thoracotomy. The intracavitary space was lavaged with either HOCl or normal saline and the irrigant left in place for two minutes, in the laparotomy and thoracotomy group, and then aspirated. In the laminectomy group the irrigant was left in place for 5 seconds and then aspirated. The procedures were also completed using Dakin's solution (NaOCl) as a comparator given its known

cytotoxicity. On days 2 and 5, necropsies of all animals were performed and relevant organs and blood samples obtained. Histology (H&E staining) was used to examine biopsies of the collected organs for signs of inflammation, blood vessel integrity, and necrosis. Immunohistochemistry with staining for caspase-3 was also used to identify apoptotic cells.

Results: There were no significant changes in the tissues between animals irrigated/lavaged with HOCl and saline (laparotomy: bowel, spleen, liver; laminectomy: spinal cord, nerve roots; thoracotomy: lungs, pleura). Intact organ-specific architecture was observed in both groups. In comparison, rats treated with Dakin's solution demonstrated significant capsular fibrosis and hemorrhage. Furthermore, significant apoptosis was noted within the bowel mesentery of the Dakin's group when stained for caspase-3.

Conclusion: HOCl is safe for surgical irrigation of intraperitoneal, intrathecal, and intrathoracic spaces. Further studies should be performed to demonstrate the efficacy of HOCl in an infected field.

Limitations: The study was limited by a small sample size of 6 rats for each group.



Quality Improvement Report

Best Quality Improvement Report



Nudge in the Right Direction: Pharmacists Optimizing Antimicrobial Stewardship by Improving Audit and Feedback in an Intensive Care Unit at a Community Teaching Hospital

Faris Alhalwan¹, Salwa Elarabi¹, Jorge Fleisher²

¹SEMC- Department of Pharmacy; ²SEMC-Division of Infectious Diseases, Department of Medicine

Faris I Alhalwan, PharmD

Background: The antimicrobial stewardship program (ASP) at our institution incorporates all core elements recommended by guidelines, including prospective audit and feedback (PAF). Full adherence to the implemented strategies and best practices are considered a challenge. Improvement of the existing audit and feedback with the recognition of appropriate practices may increase the likelihood of adherence and maximize the effectiveness of ASP.

QI Plan: The study consisted of a retrospective and a prospective phase. All intensive care unit (ICU) patients that received antimicrobials for the treatment of pneumonia, bacteremia and intra-abdominal infections over a period of two months (30-day period each phase) were included. Prospectively, pharmacy resident distributed institutional pocket guideline recommendations at the initiation of empiric therapy for the three selected diseases. The recommendation limited the utilization of empiric anti-pseudomonal and MRSA coverage, incorporating guidelines and the ICU antibiogram. Data collected included demographics, indication, antimicrobials, dosing, laboratory and microbiology result. Measured outcomes included; rate of appropriate antibiotics, duration of therapy, hospital readmission

within 30-day, and length of hospital stay. Peer comparison will be conducted later by rating ICU physicians anonymously based on appropriate prescribing of antimicrobials.

Results: The percentage of appropriate antimicrobial in the retrospective group (n=31) was 42% compare to 64% in the prospective group (n=28). The antimicrobial appropriateness increased in bacteremia (60% to 100%) and pneumonia treatments (40% to 65%), while there was a reduction by 8% in the intra-abdominal infection (33% to 25%). Duration of therapy, antimicrobial doses and hospital readmission within 30-day were reduced in the prospective group across all three indications. There was no difference between the two groups in length of hospital stay.

Conclusion: The involvement of pharmacists in the existing audit and feedback increased the appropriate antimicrobial utilization by 22%. Improvement of PAF and continuous monitoring of empiric antimicrobial therapy led to a reduction in antimicrobial doses, duration of therapy and hospital readmission within 30-day.

Case Report

Best Case Report



A Rare Case of Rectal Hepatoid Adenocarcinoma in a Patient with Ulcerative Colitis

Krishnan Nair, Hari¹; Agrawal, Archana²; Ricklan, David³; Kozyreva, Olga²

¹SEMC-Department of Medicine; ²SEMC- Division of Hematology and Oncology, Department of Medicine;

³SEMC-Department of Pathology

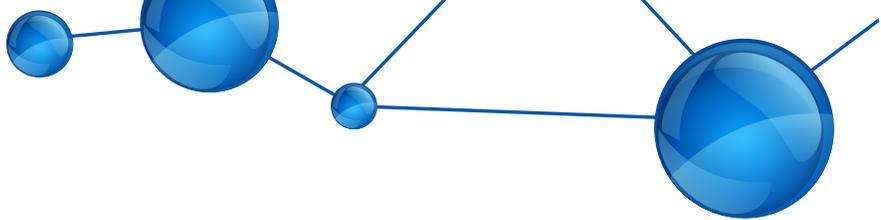
Hari Krishnan Nair, MD

Introduction: Hepatoid adenocarcinoma (HAC) is a rare subtype of aggressive extra-hepatic malignancy that is characterized by morphologic, histopathologic and immunohistochemical features similar to hepatocellular carcinoma. We report the case of a hepatoid adenocarcinoma (HAC) of the rectum in a 38-year-old male with longstanding ulcerative colitis.

Description of Case: A 38-year-old male with longstanding ulcerative colitis on treatment, presented with rectal bleeding and tenesmus, underwent a colonoscopy showing necrotic rectal mucosa. CT abdomen and pelvis incidentally revealed a large hypodense heterogenous mass in the right hepatic lobe measuring 10 x 8 x 8 cm, porta-hepatic lymphadenopathy, portal vein thrombosis, and an 11-cm mass in the rectosigmoid colon and multiple enlarged perirectal lymph nodes. Rectal biopsy showed predominant necrosis. Immunohistochemical staining of rectal tissue was negative for CK 7 and focally positive for CK 20 and CDX-2, and liver immunohistochemistry was positive focally for HepPar, AFP, Sall-4 and CK20, consistent with hepatoid adenocarcinoma. Genomic profiling revealed genomic alterations TP53 E171fs*10, with K-RAS wild-type tumor. He was started on palliative FOLFOX therapy for his stage IV metastatic

rectal cancer, completing 10 cycles of FOLFOX. Total proctocolectomy with end-ileostomy placement was done, and biopsy revealed diffuse moderate-to-severe chronic active ulcerative colitis, high grade dysplasia of descending colon, small focus of residual low-grade invasive adenocarcinoma in the anorectal region with negative margins and lymph nodes. With treatment, his serum AFP levels dropped from 15592 ng/mL upon diagnosis to 2.8 ng/mL over the course of 7 months.

Discussion: HAC is characterized by morphological similarities to hepatocellular carcinoma, typically exhibiting extensive lymphovascular invasion and poor prognosis. There is an association between inflammatory bowel disease and HAC, possibly with inflammation playing a role in the pathogenesis. This is the first reported case of metastatic HAC of the rectum with tumor genomic profile. Serum AFP levels can be an indicator of HAC in the absence of hepatic lesion. With limited experience due to its rarity, there is no standardized treatment regimen. Surgical resection followed by organ-specific chemotherapy with FOLFOX or FOLFIRI is the treatment of choice, though outcomes vary significantly.



Honorable Mention

Original Investigation



Use of Bortezomib-Containing Regimens in the Frontline Treatment of Patients with Plasmablastic Lymphoma: A multicenter Retrospective Analysis

Guerrero-Garcia, Thomas^{1,2}; Castillo, Jorge²

¹SEMC-Division of Hematology and Oncology, Department of Medicine; ²Dana-Farber Cancer Institute

Thomas Guerrero-Garcia, MD

Background: Plasmablastic lymphoma (PBL) is a rare and aggressive CD20-negative lymphoma. Based on this, we decided to evaluate the potential therapeutic value of frontline bortezomib-containing regimens in patients with PBL.

Study Design: International retrospective multicenter study

Setting and Participants: Pathological diagnosis of PBL who received therapy with bortezomib-containing regimens in the frontline setting.

Methods: Clinical (i.e. age, sex, HIV infection, stage, ECOG performance status, LDH level and CD 4 count) and pathological characteristics (i.e. expression of CD20, CD38, CD138, ki67, EBER, HHV8, ALK, and MYC rearrangement) were gathered. Kaplan-Meier overall (OS) curves were estimated.

Results: Nineteen patients with a diagnosis of PBL and treated with bortezomib-containing regimens as frontline were included in our analysis. The median age at diagnosis was 51 years (range 31-77 years). With regard to treatment, 10 patients (53%) received bortezomib-EPOCH, 2 patients (11%) received bortezomib-CHOP, 2 patients (11%) received VCD, 2 patients (11%) received VAD, 2 patients (11%) received VD, and 1 patient (5%) received alternating VCD and VAD. Complete

response was seen in 11 patients (58%), partial response in 3 (16%) and no response in 5 (26%). Only 2 patients received ASCT in first remission. Eleven patients (58%) experienced relapsed disease, including one of the patients who achieved CR and underwent ASCT. Salvage therapy was provided to only 4 patients and included daratumumab-ICE, rituximab-ICE, DHAP and etoposide-cyclophosphamide and prednisone. With a median follow-up of 33 months, the median OS was not reached. The 3-year OS rate was 59% (95% CI 33-78%; see Figure). When evaluating the 12 patients who received bortezomib + CHOP or EPOCH, the CR rate was 75%, the relapse rate was 25%, and the 3-year OS rate was 64% (95% CI 30-85%). The most common adverse events (Grade 3 or higher) included infections, febrile neutropenia, neuropathy and thrombocytopenia.

Conclusion: Bortezomib-containing regimens are feasible and effective as frontline treatment in patients with PBL. Our results suggest a high response rate as well as 3-year OS rate of approximately 60%, in contrast with the previously reported median OS time of 12-18 months. Prospective studies are needed to confirm the therapeutic role of frontline bortezomib-containing regimens in PBL.

Limitations: Retrospective study. Small number of patients.

Honorable Mention

Original Investigation



Direct Electro-anatomical Visualization of the His Pacing Lead Allows Navigation to Predetermined His Capture Sites

Ioannis Koulouridis¹; Wylie JV¹, Orlov MV¹

¹SEMC-Division of Cardiovascular Medicine, Cardiac Electrophysiology Section, Department of Medicine

Ioannis Koulouridis, MD

Background: His bundle (HB) pacing (HBP) remains technically challenging and is currently guided by EGM mapping and fluoroscopy. We describe a new technique for HBP directly guided by electro-anatomical mapping (EAM).

Study Design: Prospective cohort study.

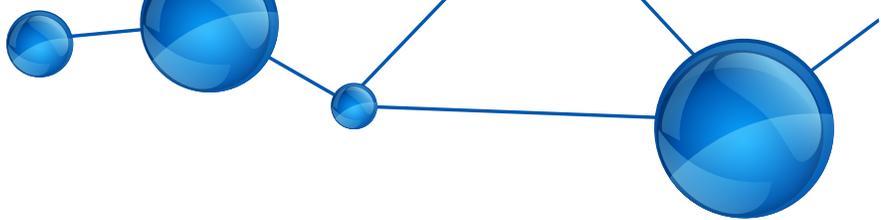
Setting and Participants: Fourteen consecutive patients (75±13 years, 9 males) with pacing and CRT indications were included.

Methods: The interatrial septum was mapped with a quadripolar catheter. HB EGMs, selective/nonselective HB capture sites were identified and tagged with EAM. Standard bipolar pacing leads were connected directly to EAM, navigated to tagged target sites and deployed after confirming capture.

Results: EAM target sites for HBP were identified in all pts. Reproducible navigation of the pacing lead to predetermined HBP locations guided by EAM was achieved in all pts (Fig). Lead was successfully deployed at target site in 12 pts (no HB capture in 1 pt, high threshold after sheath split in 1 pt). During follow up of 53±36 days there were no complications. Chronic pacing threshold elevation required discontinuation of pacing in 1 pt. Procedure, fluoroscopy and EAM times were 139±42, 9.4±3.5, and 16±13.3 min respectively. HBP threshold at implant was 2.54±1.59 V at 0.9±0.5 ms. Paced QRS was 16±32 ms narrower than baseline.

Conclusion: Direct guidance of HBP by EAM allows reproducible navigation to predetermined HB capture sites with likely reduction in fluoroscopy and improved operator confidence.

Limitations: Retrospective analysis of a small case series. Absence of a control group. Given the absence of randomization, no conclusions on causality of our outcomes can be made.



Honorable Mention

Quality Improvement Report



Compliance with Antimicrobial Dosing Guidelines in Patients Receiving Continuous Renal Replacement Therapy

Flint Spitler¹; Claire McManus¹
¹SEMC-Department of Pharmacy

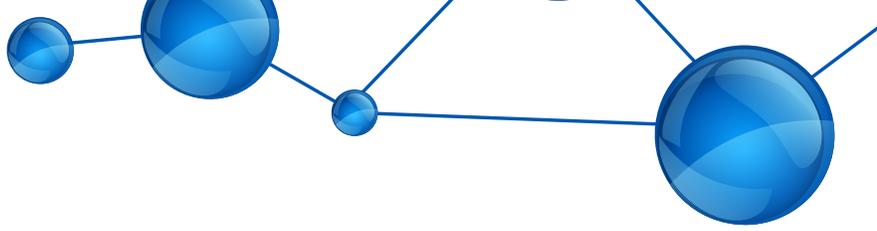
Flint Spitler, PharmD

Background: Critically ill patients with acute kidney injury frequently require continuous renal replacement therapy (CRRT) as supportive treatment. Antimicrobials are frequently prescribed for serious infections in patients receiving CRRT and doses must be adjusted for altered drug clearance. Published literature of pharmacokinetic studies provides limited guidelines for antimicrobial dosing in patients on continuous renal replacement therapy.

QI Plan: This study was submitted to the Institutional Review Board for approval. This single-center, retrospective, observational cohort study was performed using electronic medical records of adult patients receiving antimicrobials who received CRRT for at least 24 hours. Antimicrobial orders were verified by clinical pharmacists. The primary endpoints were defined as compliance of the initial antimicrobial dosage with preselected antimicrobial dosing guidelines, and the time required to reach compliance. Secondary outcomes included compliance with guidelines for subsequent dosage adjustments applied during transition to intermittent hemodialysis (IHD). Dosage guidelines were defined as the dosing ranges recommended by clinical drug database information and adopted reputable sources.

Results: Of the antimicrobial courses meeting inclusion criteria (n=48), compliance of initial antimicrobial dose with reference dosing guidelines was 77%. For time to reach compliance, 88% reached compliance in ≤ 24 hours. For the antimicrobial courses with initial dosage noncompliance, lack of loading dose was the most frequent cause for noncompliance (35%). Of the antimicrobial courses continued in patients transitioned from CRRT to IHD, 63% were compliant with reference ranges.

Conclusion: This study was a retrospective review to identify areas for quality improvement in antimicrobial dosing in patients receiving CRRT. Our study indicated that compliance of initial antimicrobial dosage with reference dosage guidelines was high, but areas for improvement exist (including loading doses and antibiotic dose adjustments when transitioned to IHD). This data can be used by clinical pharmacists to implement targeted interventions for optimal antimicrobial dosing across transitions in CRRT.



Honorable Mention

Quality Improvement Report



Evaluating the Quality and Safety of a Standardized Argatroban Order Set for Patients with Heparin-induced Thrombocytopenia in a Community Teaching Hospital

Omar Jamjoom¹; Mirembe Reed¹; Diala Nicolas¹; Claire McManus¹

¹SEMC-Department of Pharmacy

Omar Jamjoom, PharmD

Background: Prior to September 2016, no standardized argatroban protocol was utilized at our institution. Prescribers used a variety of references to guide argatroban therapy in heparin-induced thrombocytopenia. Incidents related to delays in therapy and inappropriate dosing and monitoring were reported during this period. As a consequence, pharmacy initiated the development and implementation of an order set to standardize dosing and monitoring.

QI Plan: The study followed a before-and-after design, and received Institutional Review Board approval for a quality improvement study. The before group included all patients with argatroban orders from January to August 2016, prior to order-set implementation. The after group included all patients receiving argatroban orders after implementation, from January to August 2017. The primary outcome was appropriate dosing and monitoring, which included guideline-appropriate dosing, number of orders started at prescribed dose, number of orders assigned aPTT goal and monitoring frequency, number of out-of-range aPTT and number of dosage adjustments missed. Secondary outcomes included adverse events and hospital length of stay.

Results: A total of 22 patients with argatroban orders in the specified period were identified and included in the study. Ten patients were included in the before group and twelve patients were included in the after group. Baseline characteristics were mostly similar; there were differences between groups in the number of post-cardiac surgery patients and the number of patients with heart failure. Implementation of the argatroban order-set led to a 30% improvement in the number of patients prescribed a guideline appropriate dose, a 10% improvement in the number of orders assigned a target aPTT and a 20% improvement in the number of orders assigned aPTT monitoring frequency. The number of out-of-range aPTT was lower in the post-order set group, while the number of missed dosage adjustments decreased from 35.5% of out-of-range aPTTs to 13.2% after order-set implementation.

Conclusion: Implementation of an argatroban order-set led to improvements in guideline-adherent dosing, the number of orders prescribed a target aPTT, and nursing dose adjustments.

Honorable Mention

Case Report



Multimodality Imaging of Anomalous Right Coronary Artery with Interarterial Course Found during a Non ST Elevation Myocardial Infarction

Maythawee Bintvihok¹; Joe Aoun¹; Mohammad Almeqdadi¹; Maxwell Afari²; Ashley Davidoff³; Lana Tsao²
¹SEMC-Department of Medicine; ²SEMC-Division of Cardiovascular Medicine, Department of Medicine; ³SEMC- Department of Radiology

Maythawee Bintvihok, MD

Introduction: An anomalous origin of the coronary artery from the contralateral sinus is a rare phenomenon, occurring in less than 1% of patients undergoing cardiac catheterization. It is the second most common cause of sudden cardiac death (SCD) in young athletes. We present a case of a patient with anomalous right coronary artery (ARCA) who presented with acute myocardial infarction.

Description of Case: A 63 year-old gentleman with a significant family history of premature coronary artery disease presented with exertional chest pain. Vital signs were notable for blood pressure of 164/57, heart rate of 67 beats-per-minute, and oxygen saturation of 97% at ambient air. Cardiopulmonary examination was unremarkable. Electrocardiogram showed sinus rhythm with no significant ST-T changes. However, troponin t peaked at 0.04 ng/mL (Normal \leq 0.03). He was diagnosed with acute myocardial infarction and underwent percutaneous coronary intervention of the left anterior descending artery with a drug eluting stent. During coronary angiography, the right coronary artery (RCA) was noted to arise from the left coronary cusp. Cardiac computerized tomography (CT) confirmed an anomalous origin of the RCA from the left coronary cusp with an interarterial course between the aorta and the main pulmo-

nary artery. The patient was discharged with the plan for an aortocoronary bypass if he presents with recurrent ischemia.

Discussion: Interarterial course of ARCA is associated with myocardial infarction and risk of SCD. The proposed mechanisms of SCD in ARCA include; acute angulation at the ostium of RCA and the left coronary sinus, mechanical compression by the aorta and pulmonary artery during strenuous activity, a slit-like RCA orifice, and intramural stenosis. ARCA may be found during diagnostic procedures performed for symptoms that are related to other conditions. Coronary angiography can visualize the anomalous origin; however, it is invasive and only provided limited information of coronary course. Cardiac CT has excellent spatial resolution and helps to determine the course of ARCA. As shown in this case, multimodality imaging such as CT and coronary angiography are important in making the diagnosis. Surgical management is usually reserved for young symptomatic patients, include coronary reimplantation, unroofing of the intramural segment, and aortocoronary bypass.

Honorable Mention

Case Report



Inhaled Racemic Epinephrine as a Trigger for Takotsubo Cardiomyopathy

Mostafa Ghanim¹; Mansour Almnajam¹; Sarthak Khare¹; Maxwell Eyrarn Afari²; Mohamed Khan²

¹SEMC-Department of Medicine; ²SEMC- Division of Cardiovascular Medicine, Department of Medicine

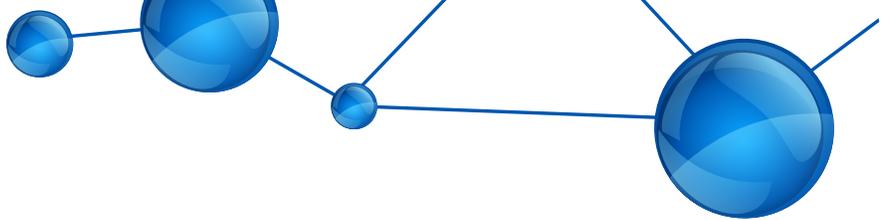
Mostafa Ghanim, MD

Introduction: Takotsubo cardiomyopathy (TC) is a syndrome characterized by systolic dysfunction, precipitated by acute emotional or physical stress, without angiographic evidence of coronary artery disease (CAD). Takotsubo caused by exogenous administration of epinephrine has been previously reported. It was believed that inhaled racemic epinephrine was better tolerated and less likely to provoke side effects when compared to levo(l)-epinephrine, however we describe a case of TC predisposed by inhaled racemic epinephrine.

Description of Case: A 70-year-old female with history of hypertension, and seizure presented with angioedema secondary to angiotensin- converting-enzyme inhibitor (ACE-i) use. On examination she was vitally stable. She had marked edema of the tongue without evidence of airway compromise; cardiopulmonary exam was within normal limits. She was promptly treated with famotidine, diphenhydramine, dexamethasone and racemic epinephrine. After 24-hours, she complained of chest pain and her electrocardiogram revealed new ST-segment elevation in the anterior leads. Cardiac enzymes peaked at 0.71 (normal value <0.03). Emergent coronary angiography did not reveal any significant CAD. Ventriculography showed apical ballooning

consistent with TC which was confirmed on echocardiography (with ejection fraction of 30%). She was discharged after 2 days on her goal directed CHF therapy including metoprolol succinate, spironolactone, hydralazine and nitrates. In 6 months follow up, her echocardiogram showed significant improvement in LV function to 55%.

Discussion: Exogenous administration of epinephrine is known to cause TC. Most of the reported cases were triggered by intramuscular or intravenous l-epinephrine. Inhaled racemic epinephrine was believed to be better tolerated and less likely to provoke side effects when compared to l-epinephrine, however in our case we believe that inhaled racemic epinephrine predisposed to Takotsubo cardiomyopathy. The proposed mechanism is through direct toxicity and or microvascular dysfunction due to catecholamine, leading to a hibernating myocardium. Supportive care and standard pharmacological therapy for cardiomyopathy is the cornerstone of management. Inhaled racemic epinephrine should be used with caution and with minimal effective dose especially in patients with predisposing risk factors such as postmenopausal women with psychiatric or neurologic disease.



Original Investigations

Validation and Comparison of Resting Gradient to Fractional Flow Reserve for Assessment of Coronary Artery Stenosis: A Real World Study

Joe Aoun¹; Saba Lahsaei²; Caroline Zahm¹

¹SEMC-Department of Internal Medicine; ²SEMC-Division of Cardiology, Department of Internal Medicine

Background: The visual interpretation of an angiographic stenosis may not always reflect the physiological significance of a lesion. Fractional Flow Reserve (FFR) is a reliable index to assess the significance of a lesion during hyperemia; however it carries a risk of misinterpretation and some adverse events due to adenosine use. This study sought to evaluate the accuracy of the resting distal coronary artery pressure to aortic pressure ratio (Pd/Pa) compared to hyperemic FFR therefore trying to bypass the need for adenosine.

Purpose: Retrospective cohort study.

Participants We reviewed electronic medical records at Steward hospitals to identify patients who underwent coronary stenting after utilization of FFR. Demographic characteristics, medical history and procedural data, including complications, were obtained.

Methods: We conducted a retrospective, multicenter study of 700 patients who underwent a pressure recording during coronary angiography using Pd/Pa and FFR measurements. Receiver operator characteristic (ROC) curve was constructed. Pd/Pa sensitivity, specificity, positive predictive value, negative predic-

tive value and accuracy test were calculated. The most accurate Pd/Pa cutoff predicting a FFR cutoff of 0.8 was determined.

Findings: The retrospective analysis of 700 procedures resulted in enrolling 449 pressure wire studies. By ROC analysis, the optimal cut-point for Pd/Pa was 0.93 to predict an FFR of ≤ 0.80 with an overall diagnostic accuracy of 78.84%. The sensitivity of this Pd/Pa cutoff was 85.06 %, specificity of 75.59 %, positive predictive value of 64.53% and a negative predictive value of 90.65%.

Conclusion: There was an overall accuracy of about 80% for predicting non-hyperemic index (FFR <0.80) using a cutoff of Pd/Pa ≤ 0.93 . The use of Pd/Pa can be considered in certain clinical scenarios where adenosine is contraindicated or other challenges are faced; with the knowledge that hyperemia might be necessary if there is any high clinical suspicion as it still remains the reference standard for diagnostic certainty.

Limitations: This is a retrospective study. On the other hand, although all operators used a similar technique to measure the FFR, we cannot exclude minor technical differences.

Survival trends in stage 1a and 1b non-small cell lung cancer (NSCLC) after surgery, a US population based study

Janak Adhikari¹; Ajit Thota¹; Hassan Ghazizadeh¹; James P Morgan¹

¹Carney Hospital- Department of Internal Medicine

Background: We conducted this study to evaluate the survival patterns among patients in stage 1a and 1b NSCLC who underwent surgery.

Study Design: Retrospective cohort

Setting and Participants: Adult patients (age ≥ 50 years) with stages 1a and 1b were selected from the Surveillance, Epidemiology, and End Results (SEER) database

Methods: Adult patients (age ≥ 50 years) diagnosed with stages 1a and 1b were selected from the Surveillance, Epidemiology, and End Results (SEER) database. Several cohorts categorized by race (Caucasians & African-Americans (AA)), gender & age (50-65, >65 years) were compared to see survival differences in patients during 2005-2014.

Results: There was an increased in 2 and 4 year relative survival in females as compared to males (2 year: 92.5 ± 0.5 vs 86.8 ± 0.6 , $Z=8.15$ and 4 year: 83.5 ± 0.8 vs 73.2 ± 1.0 , $Z=9.65$). There was also significant increase in RS for younger

as compared to older patients (2 year: 91.4 ± 0.6 vs 89.1 ± 0.5 , $Z = 3.63$ and 4 year: 79.4 ± 1.1 vs 78.3 ± 0.8 , $Z = 2.59$). The ethnic differences were also different early on with increased relative survival in African Americans as compared to whites with no difference at 4 years (2 year: 92.2 ± 1.1 vs 89.6 ± 0.4 , $Z = 2.37$ and 4 year: 80.6 ± 2.1 vs 78.5 ± 0.7 , $Z = 1.85$). There was also significant increase in RS for Stage 1a as compared to 1b tumors (2 year: 92.1 ± 0.4 vs 86.2 ± 0.7 , $Z = 7.54$ and 4 year: 82.6 ± 0.8 vs 72.4 ± 1.1 , $Z = 8.79$)

Conclusion: Our study shows that there is significant survival in African American population compared to whites initially after surgery for early lung cancer. A similar age and gender difference in survival is also seen with survival favoring the younger population and females.

Limitations: SEER data does not have individual patient information including a patient's risk factor, family history of other cancers, socioeconomic status, comorbidities and exposure to carcinogens.

Original Investigations



Feasibility of Robotic-Assisted Transabdominal Preperitoneal (rTAPP) Ventral Hernia Repair

George Orthopoulos¹; Omar Yusef Kudsi¹

¹SEMC-Department of Surgery

Background: Published results from mesh placement in the preperitoneal space between the posterior fascia and peritoneum for ventral hernia repair are limited.

Study Design: Retrospective review and descriptive analysis of consecutive and prospectively collected data regarding rTAPP ventral hernia repair

Setting and Participants: All patients who underwent rTAPP ventral hernia repair conducted by a single surgeon between 2014 and 2016.

Methods: All patients who underwent rTAPP ventral hernia were evaluated for the following: hernia defect dimension, mesh type/size, surgeon ability to close fascial defect, conversion rate, perioperative outcomes, complications (utilizing the Clavien-Dindo system) and length of stay. Demographics were also collected. 4-week, 3-months and 1-year post procedure follow up evaluation was recorded

Results: Fifty-four consecutive rTAPP ventral hernia repairs were performed, and all but two cases were elective. Indications

were: 41 primary ventral, 5 incisional, 3 lumbar, 2 spigelian, 1 recurrent incisional, 1 combined flank and inguinal, and 1 combined primary ventral and inguinal. The mean operative time was 73 minutes (range 25-217 minutes). The average hernia defect was 9.7 cm²; whereas the average size of synthetic mesh was 178 cm². Forty-six cases were completed through an rTAPP approach, and 8 were via partial rTAPP due to multiple peritoneal defects. Estimated blood loss was 5-10 mL. Forty-nine patients were treated on an outpatient basis. Two complications occurred: symptomatic seroma requiring aspiration in the office and rectus sheath hematoma requiring hospital readmission and blood transfusion.

Conclusion: Our study results support the safe and effective placement of mesh in the preperitoneal space via the use of robotic technology, and they represent the largest single-surgeon series of robotic-assisted TAPP ventral hernia repair. Large, multicenter prospective trials could further elucidate the potential benefits and the long-term outcomes from this approach.

Limitations: Single center, single surgeon, retrospective study



Can They Stop the Bleed? Evaluation of Tourniquet Application by Laypersons with Reported Training

McCarty, Justin¹; Chaudhary, Muhammad²; Herrera-Escobar, Juan Pablo²; Lipsitz, Stuart²; Haider, Adil²; Goralnick, Eric²; Caterson, Edward³

¹SEMC-Department of Surgery; ²Brigham and Women's Hospital- Center for Surgery and Public Health; Internal Medicine; ³ Brigham and Women's Hospital- Division of General Internal Medicine; ⁴ Brigham and Women's Hospital Department of Emergency Medicine; ⁵ Brigham and Women's Hospital- Department of Plastic and Reconstructive Surgery.

Background: Uncontrolled hemorrhage is the leading cause of preventable death in trauma. With increasing scope of mass casualty incidents (MCI), national initiatives have begun to train and empower laypersons to act as immediate responders and perform hemorrhage control (HC). A central tenet of these is application of tourniquets. This study assessed laypersons', who self-reported prior training, ability to control hemorrhage with a tourniquet.

Study Design: Subset analysis of prospective randomized study

Setting and Participants: Gillette Stadium, Boston, MA operational team employees.

Methods: Participants who self-reported: 1) No prior First- Aid (FA) training, 2) FA training or 2) FA + HC training were included and presented an emergency scenario requiring tourniquet application on a mannequin. Correct application was assessed by time to application, tightness, and anatomical location. We obtained demographic data including type of prior training and surveyed participants likelihood to assist in a MCI and comfort level in controlling hemorrhage. Univariate analysis of the effect of different amounts of training to no training was analyzed using chi-square and in a Logistic regression model accounting for age group, gender, education level, and likelihood to help and

comfort level was then performed. Univariate analysis of self-efficacy questions was performed using Wilcoxon rank-sum tests.

Results: 317 participants were included in the analysis. Self-reported prior training had a significant effect on successful application of a tourniquet: 14.4% of those reporting no prior first aid training, 25.2% with FA alone [OR 2.14(95%CI 1.09-4.24)], and 35.8% with FA+HC successfully applied a tourniquet [OR 3.40(95%CI 1.53-7.53)]. Likelihood to assist and comfort level controlling bleeding of participants with prior FA+HC was significantly higher than those without prior training ($p < 0.05$), even among those who could not correctly apply a tourniquet. In the adjusted model, reporting being very likely to assist or very comfortable controlling hemorrhage was not associated with correct application.

Conclusion: Self-reported prior FA+HC training, while associated with increased rate of correct tourniquet application, still results in only a third of individuals correctly performing the skill. As work continues to identify the most effective method to enable laypersons to be effective immediate responders, these findings highlight the importance of high-quality hemorrhage control training with proven long-term retention.

Limitations: single-site, post-hoc analysis, simulation



Original Investigations

Bone targeted therapy and skeletal related events in the era of modern therapies for castration resistant prostate cancer with bone metastases

Li Zhang¹; Christopher Sweeney²

¹SEMC-Division of Hematology and Oncology, Department of Medicine; ²SEMC- Dana-Farber Cancer Institute

Background: Bone metastases in castration resistant prostate cancer (CRPC) are associated with serious morbidity and costs. The optimal timing of initiation and duration of bone targeted therapy (BTT) Zoledronic acid and Denosumab is unknown in the current era with four classes of therapy for CRPC prolonging overall survival (OS).

Design: A retrospective cohort study

Setting and Participants: Patients who have received Abiraterone and/or Enzalutamide for CRPC from 2007 to 2017 in a high- volume center.

Methods: Patients (pts) were identified via a single-institution's clinical database. The database and electronic medical record review was used for data collection, including pts' characteristics and pattern of BTT uses. Kaplan Meier method and Cox proportional hazards model assessed association of BTT use with time to first SRE and OS, respectively.

Results: 197 pts were identified, and 79 (40%) had ≥ 4 bone metastases (BM) and median follow-up was 4.7 (95%CI: 4.2-5.9) years. More pts with ≥ 4 BM received BTT with first line therapy (49% vs 32% - p-int < 0.01). Pts with ≥ 4 BM, receiving BTT with first line therapy for CRPC had a 19% reduced risk of developing SRE - HR 0.81 (95% CI: 0.45-1.45). Pts with < 4 BM did not have a lower HR when starting BTT with first line CRPC therapy. No OS difference was noted in pts who received BTT with first line therapy or not, regardless of the volume of bone metastases.

Conclusion: Our cohort suggested that in the modern era, with more effective and greater number of CRPC therapies, pts with ≥ 4 BM still benefit from starting BTT with first line CRPC therapy.

Limitations: This is a retrospective study, further analysis and validation of the result is warranted.

Medical Resident Levels of Burnout Based on Maslach Burnout Inventory

Manasa Mullapudi¹; Taufiq Zaman¹; Bertrand Jabe¹; Claudia Nader¹

¹SEMC- Department of Medicine

Background: Physician burnout is prevalent and residents in particular are susceptible to emotional stress leading to burnout. Maslach Burnout Inventory, an instrument measuring burnout, assesses Emotional Exhaustion, Depersonalization and Personal Achievement.

Study Design: The MBI was completed by internal medicine residents with questions regarding age, gender, post graduate year training level, and medical education. Health and Wellness conferences were implemented with 6-month pre- and post-MBI. Results were analyzed using chi square test.

Setting and Participants: This study included 41 out of 54 internal medicine residents at a tertiary care medical center.

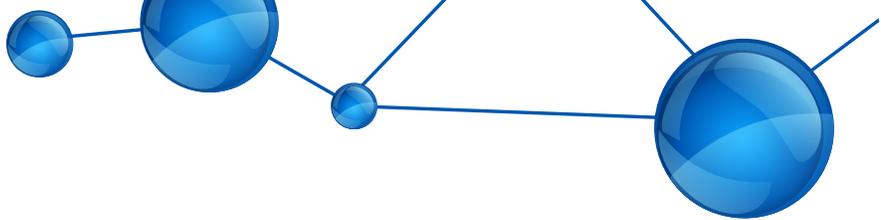
Methods: Internal medicine residents anonymously completed MBI surveys. Intervention included monthly health and wellness conferences and activities. MBI and demographic variable surveys done at 6 month intervals.

Results: A total of 41 residents completed both surveys. With respect to Emotional Exhaustion, majority of residents had a low level of burnout (78.0%). With respect to Depersonalization and Personal Achievement, more than 60% of the residents had at least moderate levels of burnout, with 26.8% and 24.4% expe-

riencing high levels, respectively. Burnout in terms of Personal Achievement showed statistical significance when stratified by PGY level. While the majority of PGY1 respondents had high levels of burnout (43.8%) and the majority of PGY2 respondents had moderate levels of burnout (63.6%), the majority of PGY3 respondents had low levels of burnout (64.3%) (P=0.006). There was no statistical significance in the various measures according to gender or graduate medical school status. there was a trend towards statistical significance with regards to age as residents 30 years and younger had higher levels of burnout in reference to Depersonalization when compared to those older than 30 (75.7% vs. 37.5%, P=0.059).

Conclusion: This study emphasizes that residents experience high levels of burnout. Most importantly, residents are most vulnerable to moderate-to-high levels of burnout during earlier years of training. Younger physicians may be more susceptible to burnout. This conclusion suggests that residents need to be trained to build resiliency skills during initial years of training to reduce the stressful demands of residency

Limitations: The limitations of this study include a sample taken from one cohort of residents at a single center residency program.



Original Investigations

In Vivo Imaging and Monitoring of Islet Graft Survival after Transplant

Thomas Pomposelli¹; Scott Johnson¹

¹SEMC-Department of Surgery

Background: Utilizing a novel technology in a non-human primate model to improve clinical outcomes following Pancreatic Islet Cell Transplant as a potential curative therapy for Diabetes Mellitus (DM1).

Study Design: Preparation and transplant of composite islet-kidney grafts into diabetic, nephrectomized recipients, followed by blood glucose and creatinine measurements and MRI.

Setting and Participants: The work was carried out at the CCTI at Columbia University Medical Center, utilizing non-human primates.

Methods: Pancreatic islet cells were harvested and cultured with a siRNA-iron oxide probe that targeted Caspase-3 to minimize apoptosis. A composite islet-kidney was then prepared in the donor via injection of the cells underneath the kidney capsule. After two months, this graft was then transplanted into a diabetic recipient baboon.

Results: After undergoing partial pancreatectomy, the islet cells were cultured with conjugated siRNA-iron oxide. The cells were infused back underneath the capsule of the kidney in the donor, and allowed to vascularize. The donor animal was confirmed

to maintain normoglycemia despite partial pancreatectomy. The recipient baboon underwent STZ infusion, and successful induction of diabetes was confirmed with the animal requiring >11 units of insulin per day. After a period of several months, the islet-kidney graft containing approximately 4,800 IEQ/recipient's body weight (kg) was transplanted into the recipient and both native kidneys nephrectomized without technical difficulty. The recipient animal maintained consistent fasting blood glucose levels < 150 with minimal insulin requirements and normal creatinine at long term follow up (>100 days) The islet cells were able to be followed non-invasively via MRI due to the iron oxide signaling on T2 weighted imaging.

Conclusion: Our lab's previous data demonstrated >8,000 IEQ/kg was required to regulate blood glucose levels, especially in the 30 day induction period in non-human primate islet-kidney models. However, our preliminary data from this study utilizing the new siRNA strategy demonstrate that half the amount of islet cells (4,800 IEQ/kg) maintained BG levels <150 with a minimal insulin requirement.

Limitations: Although additional cases are required, data from this study suggests that our new siRNA strategy may minimize loss of islets during preparation of islet-kidney grafts in donors.

First Experience with Ingevity and Fineline leads for His Bundle Pacing: Acute Success and Mid-term Follow up.

Erez, Aharon¹; Orlov, Michael¹

¹SEMC-Division of Cardiovascular Medicine, Cardiac Electrophysiology Section, Department of Medicine

Background: There is limited data on the feasibility and durability of stylet-driven leads deployment for His Bundle Pacing (HBP).

Study Design: Case Reports and Series

Setting and Participants: 17 patients (10 males, age 77±12 years) eligible for bi-ventricular pacing according to current indications

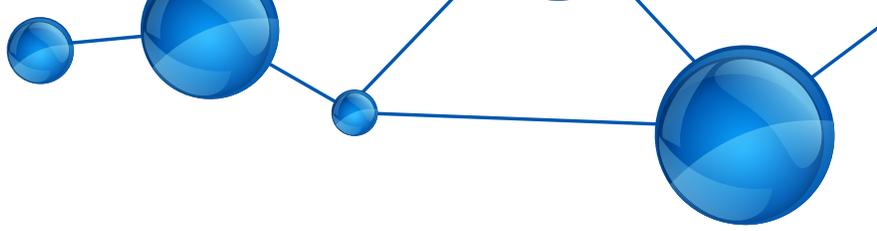
Methods: Between April and October 2017 HBP was attempted in 17 pts (10 males, age 77±12 years) via left sided access using a BSCI Straight extended hook right (EH STR) CS sheath and ING/FLN leads with custom shaped stylets.

Results: HBP was acutely successful in 15/17 pts. Procedure and fluoroscopy times were 2.4±0.7 hrs and 11±5 min re-

spectively. Acute HBP threshold was 2.4±1.5V at 1.0±0.5ms with impedance of 543±156 Ohms and energy thresholds of 17.8±22.4. HBP was deactivated (high threshold) in 1 pts, 2 pts died in follow up of unrelated causes. Follow up data at 2±2 months was available in 11 pts. HBP threshold was 2.5±1.3V at 1.2±0.3ms and energy thresholds of 25.8± 17.6(Fig). There was a trend toward lower impedance, procedure and fluoroscopy times with the fixed screw lead (FLN).

Conclusion: 1. Implantation of ING and FLN leads for HBP using non-specialized tools is feasible. 2. Acute procedural characteristics and HBP threshold are comparable to published experience. 3. Mid-term stability is comparable to other leads. Lead characteristics (fixation mechanism, steroid content) may contribute to long-term outcome and merit further investigation.

Limitations: small series, not comparative to other methods



Original Investigations

Impact of COPD Maintenance Inhaler Costs upon the Need for Acute Care

Frederic Celestin¹; Fahad Farooq², Peter LaCamera¹

¹SEMC-Division of Pulmonary, Critical Care, and Sleep Medicine, Department of Medicine; ²SEMC-Department of Medicine

Background: Cost can affect patients' access and adherence to inhalers. The financial burden imposed upon patients with COPD as well as extent to which costs influence compliance have not been explored.

Study Design: Observational multi-center prospective cohort study to evaluate the effect of inhaler costs upon exacerbations and compliance in a COPD population.

Setting and Participants: Subjects were recruited during hospitalization and participants are COPD patients

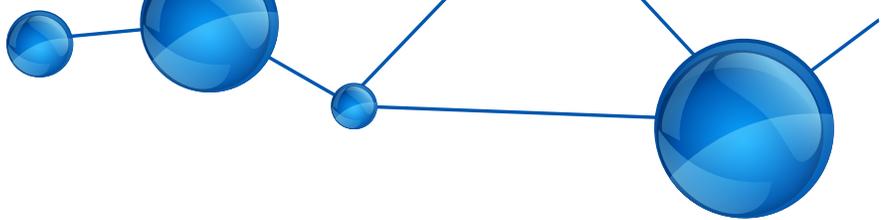
Methods: Information was gathered via direct patient contact, medical records and pharmacies. Patients' actual chronic inhaler expenditures (AE) and expected costs (EC) based on patients' active COPD inhaler regimens were acquired from pharmacies. The association between occurrence of COPD-related acute care and AE:EC ratio was examined.

Results: Among 21 subjects for whom 6 month data is available, 11 were not re-hospitalized nor visited an emergency room for COPD exacerbation. These subjects had an average AE of \$144.29 and EC of \$416.83 with an AE:EC ratio of 0.63. On average, this group was prescribed 2.18 daily maintenance

inhalers. These 11 subjects had a median income of \$50,000-99,999. 10 subjects were either re-hospitalized or visited an emergency room within 6 months of discharge. Their monthly average AE of \$140.76 and EC of \$369.39 with an AE:EC ratio of 0.55. On average, this group was prescribed 2.43 daily maintenance inhalers. These 10 subjects had a median income of \$20,000-49,999. Three subjects died during the observation period, one transitioned to home hospice and another one was found not to have COPD.

Conclusion: High costs can interfere with the routine use these inhalers. Those that required acute care after a COPD related admission were prescribed more inhalers at lower costs and demonstrated worse compliance than those not requiring acute care. They were also older, more likely males of lower income and active smokers. COPD regimens require tailoring based on disease severity and costs.

Limitations: This project was limited by a small power, relatively short cohort following period, lack of access to re-hospitalization and ER visit documentation outside Steward network, and subject recall.



Original Investigations

Treatment Dilemmas: Managing Antipsychotic Medication Risks in Elderly with Major Neurocognitive Disorder, Stroke and Psychosis

Tatyana Zharkova^{1,2}; Helen H. Kyomen^{1,3,4}

¹SEMC-Department of Psychiatry; ²Tufts University School of Medicine; ³Boston University; ⁴Harvard Medical School

Background: Age is a risk factor for both major neurocognitive disorder [MNCD] and stroke. For elderly who develop psychosis overlying MNCD and stroke, safety and quality of life concerns may mandate intervention with antipsychotic [AP] medication. How can a clinician manage the risks associated with treating elderly patients with MNCD, stroke and psychosis?

Study Design: Case series, systematic literature review.

Setting and Participants: We report on three patients with MNCD who presented to a geropsychiatric unit with psychosis and were found to have a recent stroke.

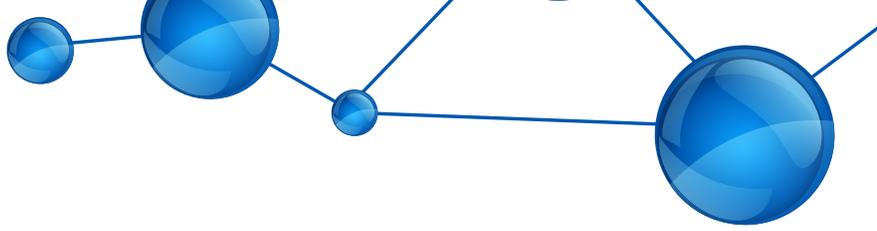
Methods: Detailed review of three clinical cases and systematic literature review.

Results: Weighing the risks vs. benefits of treating with APs while considering the safety of the patient are important benchmarks that guide the use of APs. Patients with severe psychosis may be prioritized for treatment with APs if immediate patient safety is a concern and the benefits exceed the associated risks. Determining alternatives to APs start with careful evaluation and providing interventions for co-occurring physical, medical or psychosocial conditions that may trigger the behavioral distur-

bance. A number of non-pharmacological interventions can be used. Other options include the use of other psychotropic drugs. An important caveat is that each patient must be evaluated individually, and the risk: benefit ratio for each individual must be considered at first evaluation and throughout the course of treatment. General guidelines include: 1) Start with low doses of APs and increase the dose gradually. 2) Monitor the body mass index of patients. 3) Maintain blood pressure at or below 140/90 mm Hg. 4) Consider using low doses of aspirin as an antiplatelet treatment. 5) Consider using statins to keep the LDL level below 70 mg/dl. 6) Keep the HA1c level below 7.0%. 7) Make heart-healthy lifestyle changes and engage in modest exercise.

Conclusion: Presented here are three cases illustrating the treatment dilemmas associated with the use of AP medication in elderly patients with MNCD, stroke and psychosis. Through their evaluation and treatment, it is possible to start to learn how to prioritize indications for the use of AP medication, identify and implement appropriate alternatives to the use of AP medication, manage the neurologic and cardiovascular stroke risks associated with AP medication use, and manage AP medication related metabolic syndrome which can increase stroke risk.

Limitations: Not applicable



Original Investigations

ACT Correlates Poorly with Anti Factor Xa Assay in Patients on Factor Xa Inhibitors Undergoing AF Ablation

Wajih A. Syed¹; John V. Wylie¹; Michael V. Orlov¹

¹SEMC-Division of Cardiovascular Medicine, Cardiac Electrophysiology Section, Department of Medicine

Background: Heparin infusion is used during AF ablation to prevent embolic complications. It has been observed that patients on Novel Oral Anti-Coagulants (NOACs) require higher doses of intra-procedural heparin and take longer to reach therapeutic Activated Clotting Time (ACT) compared to warfarin.

Study Design: We performed a prospective analysis of patients undergoing AF ablation. The cohort was divided into Rivaroxaban group and Apixaban group based on the type of anticoagulation.

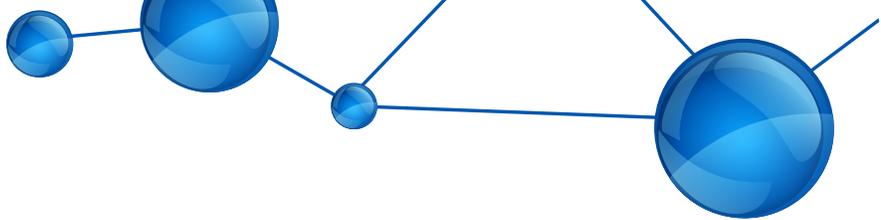
Setting and Participants: All adults with paroxysmal or persistent atrial fibrillation who had been on therapeutic anticoagulation for at least 4 weeks prior to AF ablation were enrolled.

Methods: Participant of each group had been on therapeutic anticoagulation with the last dose less than 24 hours prior to procedure. ACT and Anti Factor Xa (Anti-Xa) testing was performed at baseline and intra-operatively and total dose of heparin calculated. Pearson Coefficient was used to assess the correlation between ACT and Anti-Xa.

Results: A total of 16 patients were included in the study; 8 patients in each group. In the rivaroxaban and in apixaban group, the mean baseline ACT was 175 and 149 sec ($p=0.014$) and the mean Anti-Xa level was 1.1 and 0.42 ($p=NS$) respectively. The average time to achieve therapeutic ACT was 31 min and 40 min ($p=NS$) and total heparin dosage was 12477 U and 11448 U ($p=NS$) in the rivaroxaban group and apixaban group respectively. Nine out of 16 patients had therapeutic Anti-Xa levels at baseline despite sub-therapeutic ACT. After heparin bolus, all patients in both groups achieved therapeutic anticoagulation based on Anti-Xa level. Five patients (4 patients on apixaban, 1 – rivaroxaban) remained sub-therapeutic based on ACT and received additional heparin infusion. At baseline, there was positive correlation between ACT and Anti-Xa ($R = 0.45$) in both groups but correlation became poor after heparin infusion.

Conclusion: We observed poor correlation between ACT and Anti-Xa levels in patients undergoing AF ablation after heparin administration. Sub-therapeutic ACT may poorly reflect true anticoagulation status with heparin.

Limitations: Our study is limited by the total number of patients enrolled. It is unable to provide the mechanism of heparin resistance in patients taking NOACs.



Original Investigations

Using surgical complications to assess capacity in a resource poor setting: development of an infection surveillance program at a trauma hospital in Northwestern Cambodia.

¹Garland, Naomi; ¹Anthony McCluney

¹SEMC-Department of Surgery

Background: As Cambodia develops basic surgical services, the scope of procedures performed often advances without concurrent assurance of perioperative quality and capacity. In this work we aim to develop a strategy for assessing surgical infections as an indicator of surgical capacity.

Study Design: We instituted an infection surveillance system at a trauma hospital in Battambang, Cambodia. Staff were trained to assess and document surgical infections per CDC criteria in the inpatient and outpatient settings. Later a retrospective chart review was performed to identify patients with closed fractures who underwent internal fixation during that time and identify any who had been diagnosed with a surgical infection.

Setting and Participants: WMEH is a 100 bed trauma hospital in Battambang, Cambodia, performing over 2000 surgical procedures annually. Local and expatriate surgeons, nurse managers, and a designated infection control nurse participated in infection surveillance.

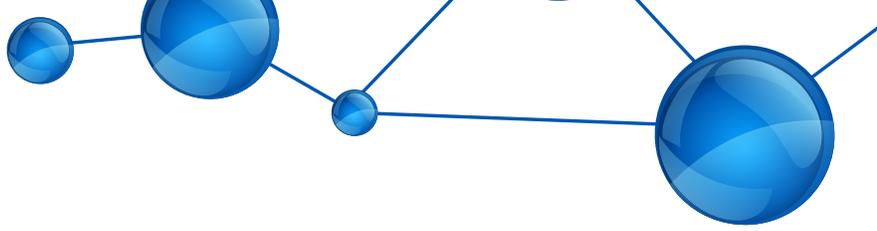
Methods: From October 1, 2016 to March 31, 2017 staff documented all newly identified surgical infections on the inpatient wards and in outpatient follow-up. Charts were reviewed to identify patients with closed fractures and internal fixation discharged from October 1 to December 31, 2016. Medical record

numbers were used to identify internal fixation patients who had been diagnosed with a surgical infection.

Results: Of 104 closed fractures with internal fixation, five surgical infections were identified, yielding a rate of 4.8%. Of those, four were identified during inpatient stay and one at follow-up. Successful surveillance required ongoing staff education and a cultural shift towards speaking openly about infections and other surgical complications.

Conclusion: Institution-led infection surveillance in resource poor settings has not been well described in the literature; this work demonstrates that meaningful surveillance is possible, but requires institutional buy-in and staff commitment. This hospital's infection rate for internal fixation of closed fractures is higher than the generally accepted rate of 1%; this assessment has resulted in institutional recognition of need for further infection control work before expanding use of internal fixation.

Limitations: Most staff was unaccustomed to diagnosing surgical site infections, possibly limiting accuracy of infection detection despite defined criteria. Identifying closed fractures with internal fixation retrospectively and poor patient follow up likely led to missed diagnoses.



Original Investigations

Comparison of Syndecan-1 Levels as a Marker of Endotheliopathy in Thermal Injury and Blunt Trauma

Robert Ball¹; Maria Bravo²; Kathleen Brummel-Ziedins²; Thomas Orfeo; ² Melissa McLawhorn²; Lauren Moffatt²; Jeffrey Shupp²

¹SEMC- Department of Surgery; ²Firefighters' Burn and Surgical Research Laboratory, MedStar Health Research Institute, Washington, DC; ³ The Burn Center, Department of Surgery, MedStar Washington Hospital Center, Washington, DC ; ⁴ Department of Biochemistry, University of Vermont Larner College of Medicine, Burlington, VT.

Background: Endotheliopathy is a complex process that leads to poor outcomes for critically ill patients. The role of endothelial dysfunction in blunt trauma and burn pathophysiology is largely unknown. Syndecan-1 is a component of the endothelial glycocalyx released into the bloodstream upon endothelial disruption and serves as a potential biomarker for endotheliopathy.

Study Design: This study is a retrospective review of prospectively collected blood samples of patients suffering varies degrees of thermal or blunt injury.

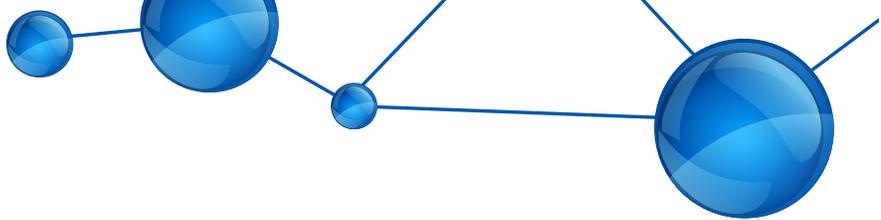
Setting and Participants: Study was conducted at MedStar Washington Hospital Center and the University of Vermont.

Methods: Blood samples were collected from 131 patients (55 burn, 76 blunt trauma) through Institutional Review Board approved protocols and informed consent. Baseline samples were collected with 6 hours of injury. Syndecan-1 levels were quantified by ELISA. Patients were classified as having a severe injury if the Total Body Surface Area (TBSA) affected was > 30% for burns or if the Injury Severity Score (ISS) was >16 for blunt trauma. t-tests were used for analysis.

Results: At baseline, mean syndecan-1 levels were similar when all thermally-injured patients were compared to those suffering blunt trauma: 38.6 vs 33.5 ng/mL respectively ($p = 0.23$). Intra-group variability of baseline levels was captured by large standard deviations (51.9 and 52.4 respectively). Patients with $\geq 30\%$ TBSA had significantly higher mean levels than those with $<30\%$ TBSA (59.9 ± 68.2 vs 24.3 ± 31.2 ng/mL respectively; $p = <0.005$). Similar trends were seen comparing blunt trauma patients with $ISS \geq 16$ and $ISS <16$: 42.6 ± 72.6 vs 24.9 ± 16.4 ng/mL, although this did not reach statistical significance ($p = 0.07$).

Conclusion: Thermal and blunt injuries are impressively heterogeneous as evidenced by the large intragroup variation in syndecan-1 levels seen in this study. Nevertheless, higher levels of syndecan-1 are seen in patients with more severe burn and blunt injuries. Additional markers of endothelial dysfunction need to be evaluated along with a thorough review of outcomes of these patients to establish the clinical relevance of these findings.

Limitations: The study was limited by some variation in the difference between time of injury and sample collection across patients, although this was limited to six hours.



Original Investigations

Readily Available Clinical Metrics Have Moderate Discriminatory Ability for Hemodynamic Worsening in Patients with Persistent Septic Shock

Fahad Farooq¹; Frederic Celestin¹; Manasa Mullapudi²; Shujaat Khalil²; Peter LaCamera¹

¹SEMC--Division of Pulmonary, Critical Care, and Sleep Medicine, Department of Medicine; ²SEMC-Department of Medicine

Background: Septic shock is defined as hypotension requiring vasopressors to maintain MAP above 65 mmHg with a serum lactate above 4 mmol/L. Interventions within the first 6 hours have decreased mortality but many patients develop “refractory shock.” Much has been done to identify physiological measurements and biomarkers to aid in the early management of these patients. Less however is known about how best to assess patients in refractory shock. This study investigated the relevance of readily available clinical metrics in the setting of persistent septic shock.

Study Design: Observational, prospective pilot study.

Setting and Participants: Subjects that remained in shock requiring vasopressors for more than 12 continuous hours with subclavian or intrajugular catheter and arterial line present.

Methods: Clinical metrics including central CVP, ScVO₂, lactate level and V-A CO₂ gradient were obtained each morning. Vasopressor doses were recorded for the 6 hours prior and 6 hours after metric collection. IV fluid balance was recorded for the 6 hours after metric collection. Outcome was binary and defined as hemodynamic improvement over 6 hours or not based on vasopressor requirement and IVF balance. Are under the curve

(AUC) was calculated to assess discriminative ability of CVP, ScVO₂, lactate and V-A CO₂ gradient.

Results: We enrolled 25 patients that fulfilled the inclusion criteria. 10 were above age 65, 14 between 30 and 65 and 1 under 30 years. Pneumonia and UTI were the leading causes of sepsis. SOFA score was > 13 in 4, 7-12 in 15 and less than 7 in 5 patients. On day 1, 50% of the patients experienced hemodynamic worsening. Using univariate analysis, the AUC for each metric and hemodynamic worsening were: CVP 0.55, ScVO₂ 0.59, lactic acid 0.56 and V-A CO₂ gradient 0.62. Similarly on day 2, 57% of the patients experienced hemodynamic worsening. Using univariate analysis, the AUC for each metric and hemodynamic worsening were: CVP 0.69, ScVO₂ 0.59, lactic acid 0.25 and V-A CO₂ gradient 0.62.

Conclusion: In the setting of refractory septic shock, CVP, ScVO₂, Lactic acid and V-A CO₂ gradient have low to moderate ability to discriminate between patients with and without hemodynamic worsening.

Limitations: Under powered Single center Heterogeneity in this patient population Observational

New Mechanism of AF induction? Observation from the RATE registry

Ioannis Koulouridis¹; Michael V. Orlov¹

¹SEMC-Division of Cardiovascular Medicine, Cardiac Electrophysiology Section, Department of Medicine

Background: AF induction by competitive atrial pacing (CAP) is a known phenomenon. However, the electrophysiological features of this mode of AF initiation are not clearly understood.

Study Design: Case Report.

Setting and Participants: In 1 patient from the RATE registry, 319 CAP induced AF episodes were registered from February 2010 to January 2012.

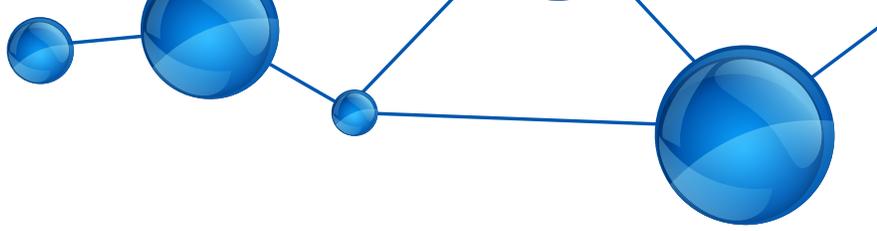
Methods: Two different types of AF induction were noted in this patient: “direct”(DIR) (Panel A) and “short-long”(SL) (Panel B). AF induction pattern, AF episode duration and coupling intervals were analyzed.

Results: There were 166 sustained AF episodes (continued after EGM's end) and 154 nonsustained (terminated within same

EGM). Of 241 EGMs with DIR pattern, 142 (58.9%) were non-sustained and 99 (41.1%) sustained. In SL group 13 (16.7%) episodes were nonsustained and 65 (83.3%) - sustained. SL pattern was associated with sustained AF (univariate OR 1.52 (95% CI 1.35 – 1.72; p < 0.001), multivariate OR 12.63 (95% CI 6.30 – 26.88; p < 0.001). Every additional 100 ms of the AS1-AS2 interval were associated with sustained AF (univariate OR 1.14 (95% CI 1.10 – 1.19; p < 0.001).

Conclusion: CAP induced short-long (SL) atrial cycles appear is a newly recognized mechanism of AF. Induction and appears to not only be associated with triggering sustained AF but also may represent atrial Torsades de Pointes.

Limitations: Retrospective data collection. Lack of generalizability.



Original Investigations

Direct Visualization of the His Bundle Pacing Lead with NavX during AV Nodal Ablation: Is It Helpful?

Ioannis Koulouridis¹; Wylie JV¹; Orlov MV¹

¹SEMC-Division of Cardiovascular Medicine, Cardiac Electrophysiology Section, Department of Medicine

Background: His bundle (HB) pacing is frequently used after AV nodal ablation (AVNA). Lesions may affect capture threshold. Direct electro-anatomical visualization of the PL may be helpful to guide AVNA.

Study Design: Prospective cohort.

Setting and Participants: Four consecutive patients (2 males, age 80+/-11 years) treated in SEMC were included.

Methods: HB area was mapped (Fig) with a 4mm ablation catheter (blue tip) from the femoral approach. HB sites were tagged using mapping. A standard lead was connected to mapping system and navigated to tagged HB sites. The lead was deployed after confirming capture. AVNA was performed, guided by mapping.

Contemporary Retrospective Review of Heart Failure Readmissions at an Academic Medical Center

Mansour Almajam¹; Mostafa Ghanim¹; Gemini Yesodharan¹; Maxwell Afari²; Lana Tsao²

¹SEMC-Department of Medicine; ²SEMC-Division of Cardiovascular Medicine, Department of Medicine

Background: Heart failure (HF) has significant morbidity and mortality. Readmission rates at 30-days and 6- months are estimated to be 25% and 50% respectively. Public reporting of readmission rates is required as financial penalties are imposed on hospitals with higher readmission rates. The Steward St. Elizabeth's Medical Center HF Task Force seeks to reduce readmissions.

Study Design: The purpose of this retrospective analysis is to determine HF readmissions are preventable.

Setting and Participants: 169 heart failure patients were readmitted to St. Elizabeth's medical Center between 2016 and 2017.

Methods: Heart failure readmissions between 01/01/2016 and 12/31/2017 were identified through the Steward HF admissions tracker. Subjects were categorized as: HFrEF (HF with reduced ejection fraction (EF) < 40%), HFbEF (HF with borderline EF 40-50%), and HFpEF (HF with preserved EF >50). Risk factors, comorbidities, time to readmission, and cause of readmission were reviewed at the multidisciplinary HF task Force monthly meetings.

Results: The average age of our readmissions cohort was 77.6. The majority of the cohort was HFrEF patients (44.9%) compared to HFbEF (12.5%) and HFpEF (42.6%). Renal dysfunction,

Results: HB PL was visualized by NavX and placed successfully in all pts. NavX mapping, fluoroscopy and procedure times were 18+/-16, 11+/-2 and 148+/-75 min respectively. HB pacing threshold was 2.9+/-1.1 V at 1.1+/-0.3 ms. AVNA was achieved with 4+/-2 lesions (RF time 160+/-96 sec). Distance between HB PL tip and ablation lesions was 9+/-3 mm. No change in HB pacing threshold was noted post ablation except for temporary rise in 1 pt with ablation 5 mm away from PL tip.

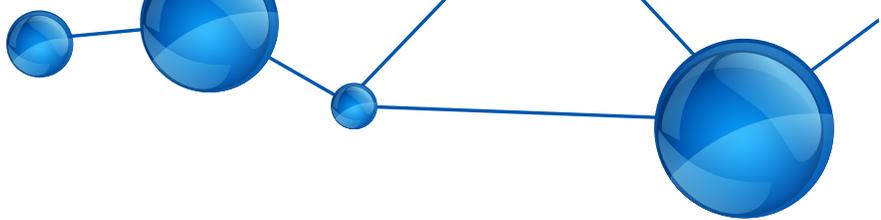
Conclusion: Direct visualization of HB PL during AVNA allows guiding ablation away from PL. This may improve safety and efficacy and reduce fluoroscopy.

Limitations: Limited sample size. Lack of external validity.

DM, and hypertension was similar between all categories. The prevalence of coronary artery disease was highest in HFrEF (64%) compared to HFbEF (52%) and HFpEF (44%). More men had HFrEF (64%) than HFpEF (38%). The average time to readmissions (12.46 days) and was similar in all three groups. 25.4% were readmitted from home with self-care, 32.6% from home with health services and 42% from long-term and skilled nursing facilities. A Cardiac etiology for readmission was almost two times more frequent in HFrEF (52%) than the other categories. For all patients, infections (20.1%), advanced renal failure (11.4%), and ischemia (11.2%) were the most common causes of readmission. From this cohort, only 20% of readmissions were considered to be preventable for not meeting the American Heart Association Get With The Guidelines core measures during the index hospitalization.

Conclusion: The majority of HF readmissions are not due to recurrent HF. One fifth of heart failure readmissions are preventable. Attention is warranted for non- cardiac comorbidities as part of the strategy to prevent HF readmissions.

Limitations: Single Center and retrospective study.



Original Investigations

Regional Variation in Patient Outcomes in Carotid Artery Disease Treatment in the Vascular Quality Initiative (VQI)

Shean, Katie E. ¹; Pomposeli, Frank²

¹SEMC-Division of Vascular Surgery; ²SEMC-Department of Surgery

Background: Quality metrics were developed to improve outcomes following carotid artery revascularization; however, few studies have evaluated regional differences in perioperative outcomes. This study aims to evaluate regional variation in mortality and perioperative outcomes following carotid endarterectomy (CEA) and carotid artery stenting (CAS).

Study Design: Retrospective cohort

Setting and Participants: We identified all patients who underwent CEA or CAS from 2009-2016 in the Vascular Quality Initiative.

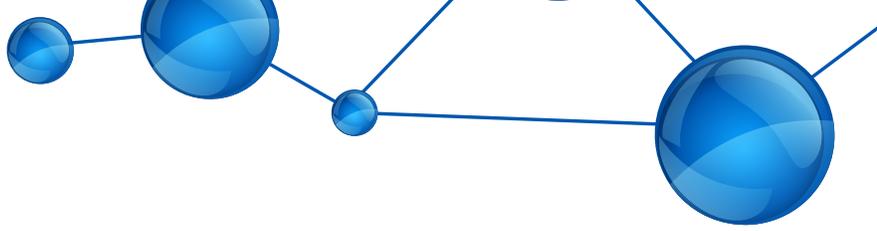
Methods: Patients were analyzed based on their symptom status. We assessed variation in perioperative outcomes using Chi square analysis, fisher-exact, and t-test, where appropriate.

Results: A total of 78,467 carotid interventions were identified; 85% were CEA, with 69% of those asymptomatic. Within CAS, 39% were asymptomatic. Perioperative stroke/death varied across regions within both CAS groups (Asymptomatic: 0- 5.8%, $P=.03$; Symptomatic: 2.4-8.1%, $P=.1$), and several regions did not meet the American Heart Association (AHA) guidelines of 3% for asymptomatic patients and 6% for symptomatic patients, which persisted after risk-adjustment. For CEA, the stroke/death rates fell within the standards set by the AHA guidelines in all regions for both the unadjusted and risk-adjusted models, however, there was significant regional variation in the cohorts (Asymptomatic:0.9-3.1%, $P<.01$;

Symptomatic:1.3-4.9%, $P<.01$). Variation in 30-day mortality was significant in symptomatic patients (Asymptomatic: CEA: 0-1.3%, $P=.2$, CAS: 0-2.4%, $P=.2$; Symptomatic: CEA: 0-1.8%, $P<.01$, CAS: 0- 4.6%, $P=.01$). Rates of in-hospital stroke, post-operative myocardial infarction, prolonged length of stay (>2 days), and the use of IV blood pressure medications all varied significantly across the regions. Following CEA, there was significant variation in the rates of cranial nerve injuries (Asymptomatic:0.9-4.9%, $P<.01$; Symptomatic:1.5-7.7%, $P<.01$), return to the operating room (Asymptomatic:0.9-3.4%, $P<.01$; Symptomatic:0.6-3.4%, $P=.02$) and discharge on antiplatelet and statin (Asymptomatic:75-87%, $P<.01$; Symptomatic:78-91%, $P<.01$). Following CAS, significant variation was found in the rates of access site complications (Asymptomatic: 2.3-18.2%, $P<.01$; Symptomatic: 1.4-16.9%, $P<.01$) and discharge on dual antiplatelet therapy (Asymptomatic: 79-94%, $P<.01$; Symptomatic: 83-93%, $P<.01$).

Conclusion: Unwarranted regional variation exists in outcomes following carotid artery revascularization across the regions of the VQI. Significant variation was seen in a number of outcomes where quality metrics currently exist, such as length of stay and discharge medications. Additionally, following carotid artery stenting, several regions failed to meet the AHA guidelines for stroke and death. Given these results, quality improvement projects should be targeted to improve adherence to current guidelines in order to promote best practices.

Limitations: Large, multicenter database



Original Investigations

Acute Systolic Dysfunction Immediately Following Valve Deployment in TAVR; When Should Gradients be Evaluated

Gerard Daly¹; Nate Riddell¹; Caroline Zahm¹; Gemini Yesodharan¹; Michael Maysky¹; Joseph Carrozza¹

¹SEMC-Division of Cardiovascular Medicine, Department of Medicine

Background: Despite the number of TAVR devices implanted there exists no standardized timing for evaluation of the replacement valve's function. In the periprocedure time window, mean gradients and peak velocities have been noted to be abnormally low, which may suggest post deployment left ventricular stunning. The objective of this study is to better understand ventricular stunning and its effects on the temporal functioning of TAVR valves. Ultimately this information will help guide assessment of the TAVR valve baseline function.

Study Design: The medical records of 207 patients who underwent successful TAVR procedure between October 2013 and June 2017 from a single center in Boston, MA were reviewed.

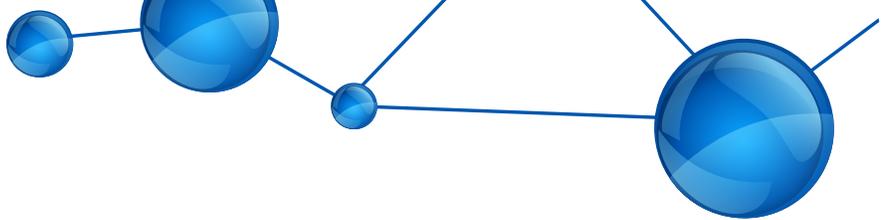
Setting and Participants: All participants were patients who underwent TAVR at SEMC

Methods: From the in house database we collected: baseline demographics (age, gender, etc.), clinical comorbidities (hypertension, diabetes, etc) and echocardiographic parameters done in the pre-procedure period, immediately post procedure and pre-discharge (within 7 days). From the above data the EF and stroke volume were calculated. For validation the pre-procedure TTE data was compared against the TEE data. This data was subsequently compared with the post-procedure TTE data.

Results: Preliminary review of 207 patient files showed the following: No significant difference between the pre-TAVR TTEs and TEEs on any of our recorded parameters. Thus far we have observed a 0.2% difference (p-value = 0.18) in stroke volume from the periprocedure TEE versus follow up TTE. The average mean gradient of the periprocedural TEE versus follow-up TTE were 5.19 mmHg and 8.84 mmHg respectively (p-value <0.0001). The average relative increase in mean gradient between the periprocedural and follow up echos equaled 101.6%. Once data analysis is complete we intend to compare change in stroke volume with change in mean gradients for each individual patient.

Conclusion: Preliminary data shows a striking relative increase in mean gradients (101.6%) between the periprocedural TEE and follow up TTE. We postulated that this previously observed phenomenon was secondary to left ventricular stunning. We hope that with completion of our data analysis the role of left stunning in regards to change in mean gradients will become clear.

Limitations: The study was done as a retrospective data review



Original Investigations

Direction of Groin Incision and its Effect on Post-Operative Outcomes Following Femoral to Above-Knee Popliteal Bypass

Shean, Katie E.¹; Pomposelli, Frank¹

¹SEMC-Division of Vascular Surgery, Department of Surgery

Background: Wound infections are a concern following infrainguinal bypass operations. Limited studies have evaluated direction of groin incision as a possible contributor; however the results have been contradictory. Therefore, this study aims to evaluate incisional direction as a variable and its effect on patient outcomes after lower extremity bypass.

Study Design: Retrospective cohort

Setting and Participants: Patients with peripheral vascular disease who underwent femoral to above-knee popliteal artery bypass using PTFE graft between 2010 and 2015 were identified in the Vascular Quality Initiative (VQI).

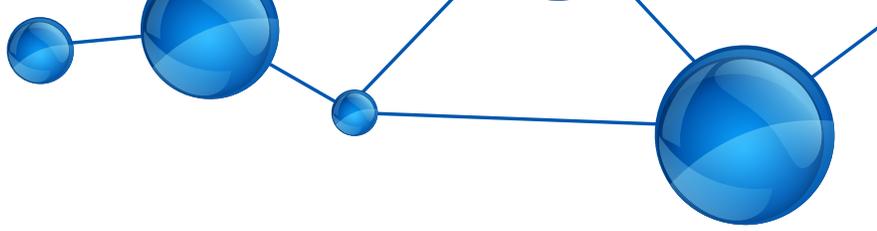
Methods: Patients were compared by direction of groin incision: vertical or transverse. Patients without a defined direction of incision, asymptomatic patients and those with a graft origin other than common femoral artery, superficial femoral artery or profunda artery were excluded. Patient characteristics, operative details, and outcomes were compared between the incisional direction groups using univariate analysis. Multivariable logistic regression was utilized to account for patient demographics and operative details.

Results: 2587 patients underwent bypass, of which 1758 (68%) had a vertical incision and 829 (32%) had a transverse

one. Claudication was the indication for surgery in 45% of patients in both groups. Concomitant endarterectomy was performed in similar percentages between the groups (vertical: 34% vs. transverse: 32%, $P=.04$). Patients with a vertical incision were less often white (80% vs. 85%, $P=.002$), obese (27% vs. 31%, $P=.04$) and more often on pre-operative ASA/P2Y12 antagonist (82% vs. 76%, $P<.001$). Operative time was higher in the vertical incision population (162 minutes vs. 141 minutes, $P<.001$). No statistical difference was seen in wound infections (vertical: 2% vs. transverse: 2%, $P=.9$) or graft infections (vertical: 0.5% vs. transverse: 0%, $P=.06$). Other important 30-day outcomes, including 30-day mortality and stroke, were similar across the populations. Following multivariable adjustment, no post-operative complications were found to be statistically significant.

Conclusion: Incisional direction is not an independent predictor of major adverse outcomes following lower extremity bypass, including 30-day mortality and wound complications. These results are specific to femoral to above-knee popliteal bypass using PTFE as the conduit. Additional studies should be performed to evaluate the effects of incisional direction on alternate bypass locations and conduit types.

Limitations: VQI is a large, multicenter database (potential for coding errors, missing data and inability to alter variables).



Original Investigations

Effect of Duty Hour Restrictions on Autologous Breast Reconstruction Complication Rates

Justin McCarty¹; Elizabeth Kiwanuka²; Edward Caterson²

¹SEMC-Department of Surgery; ² Rhode Island Hospital -Department of Plastic and Reconstructive Surgery; ³ Brigham and Women's Hospital- Department of Plastic and Reconstructive Surgery.

Background: Resident duty hour regulations have continued to be a topic of intense debate since their inception in 2003. Current evidence suggests that duty hour regulations do not adversely affect outcomes for most surgical procedures. However, the impact of duty hour regulations on plastic surgery outcomes remains unknown.

Study Design: A retrospective analysis of all adult patients who underwent immediate autologous tissue breast reconstruction (iABR) after mastectomy included in the Nationwide Inpatient Sample (NIS) 2001-2011 was performed. ICD-9 diagnosis and procedure codes were used to define surgery specific and non-surgery specific systemic complications.

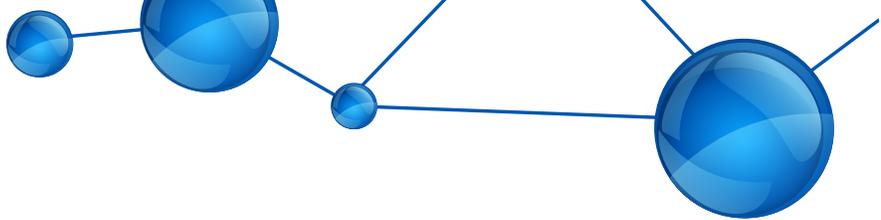
Setting and Participants: adult patients who underwent immediate autologous tissue breast reconstruction (iABR) after mastectomy included in the Nationwide Inpatient Sample (NIS) 2001-2011

Methods: A difference-in-differences analysis was performed to evaluate the effect of resident duty hour policy implementation comparing the years 2001-2002 to 2003-2011 on composite complication rates at teaching versus non-teaching hospitals (controls). This allows for analysis of the difference in trends over time.

Results: There were 1,848 teaching hospitals and 916 non-teaching hospitals. A total of 10,012 patients were included with 67% (n=6,715) undergoing surgery at teaching hospitals. Overall complication rate for iABR was 14.9% in the sample. At teaching hospitals the complication rates increased after duty hour restrictions for composite complications (12.2% to 16.5%), surgery-specific (7.9% to 11.6%), and non-surgery specific (5.4% to 6.5%). At non-teaching hospitals the complication rates also increased after duty hour restrictions for composite complications (12.3% to 14.5%), surgery-specific (8.3% to 9.6%), and non-surgery specific (5.1% to 6.4%). On unadjusted analysis, the complication rate was higher after duty hour restriction implementation at both teaching and non-teaching hospitals. However, no significant increase in complication rate was noted using the adjusted difference-in-differences approach for composite [OR 1.18, 95%CI (0.89-1.55)], surgery-specific [OR 1.31, 95%CI (0.94-1.82)], or non-surgery specific complications [OR 0.95, 95%CI (0.63-1.43)].

Limitations: Retrospective, administrative data set, granular data on long-term outcomes of reconstruction unavailable

Conclusion: Among patients undergoing immediate autologous breast reconstruction after mastectomy, complications did not increase significantly after resident duty hour implementation.



Original Investigations

Correlation in Trauma patients between Mild Traumatic Brain Injury and Facial Fractures

Justin McCarty¹; Elizabeth Kiwanuka²; Edward Caterson²

¹SEMC-Department of Surgery; ² Rhode Island Hospital -Department of Plastic and Reconstructive Surgery; ³ Brigham and Women's Hospital- Department of Plastic and Reconstructive Surgery.

Background: The diagnosis of mild traumatic brain injury (mTBI) remains a diagnostic challenge that can lead to delay in diagnosis preventing early intervention. Force can be transmitted through the facial skeleton to the intracranial space leading to direct injury or coup/contrecoup insult. Facial fractures can serve as an objective surrogate marker of potential force transmission to the neural cavity. We hypothesize that, within the National Trauma Data Bank (NTDB), we can characterize the association of facial fractures and mTBI at all injury severity scores (ISS). A secondary hypothesis is as injury moves up the craniofacial skeleton from the mandible, a stronger correlation of mTBI with facial fractures due to proximity to the cranial vault and required impulse to cause fractures of these bones.

Study Design: Retrospective cross-section analysis of the NTDB.

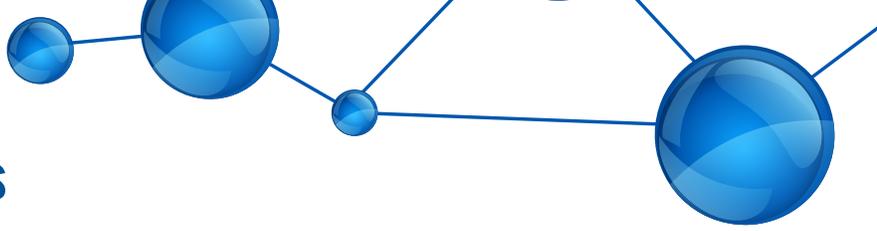
Setting and Participants: Patients in the NTDB 2007-2014 with mTBI and facial fractures identified using ICD9 codes.

Methods: mTBI was identified with ICD9 codes using 2003 CDC definition for mTBI. Facial fractures were codified into nasal bone, mandible, malar and maxilla, orbital floor, and "other facial fractures." Frontal bone fractures were not assessed for correlation as they are included with parietal and other skull vault fractures in ICD9 coding. Absence of diagnostic codes for other skull or facial fracture was then used to characterize individual types of facial fracture as the only type present. Further subdivision by ISS was performed.

Results: Of 5,855,226 patients diagnosed with a traumatic injury, 19.2% were found to have a mTBI. The prevalence of mTBI in patients with isolated facial fractures ranged from 18.2% to 33.3%. The correlation strengthened going up the craniofacial skeleton with the lowest incidence within mandible fractures and highest within the other facial fracture category. At lower ISS similar trends were demonstrated showing the lowest association of mTBI with mandible fractures though the highest incidence was with isolated nasal bone fractures.

Conclusion: Isolated facial fractures have a high incidence of concurrent mTBI at all ISS levels. Without distracting from already in place trauma protocols and their focus on treatment of immediate life threatening injuries, clinicians can use this information in poly-trauma patients to alert to potential mTBI presence.

Limitations: administrative data



Quality Improvement Reports

Improvement in Restraint Documentation with Implementation of a Restraint Educational Module

Tiruvedhula, Vedavani¹; Marquez-Castro, Henry¹; Malur, Chitra¹
¹SEMC-Department of Psychiatry

Background: Lack of standardized training in restraint documentation has led to inconsistencies in restraint documentation. We created an educational module for restraint documentation for the psychiatrists and residents to see if there would be improvement in restraint documentation.

QI Plan: We developed a survey where psychiatrists and residents could raise their concerns regarding restraints, in areas such as documentation, types of restraints and overall knowledge of restraint implementation. Through this survey, we developed an educational module by gathering major concerns. We administered pre-intervention questionnaire. Four weeks after implementing the restraint education module, we administered a post intervention questionnaire to assess the reduction in errors in restraint documentation.

Results: The pre-assessment survey identified the need for education surrounding restraint documentation. The education module regarding restraint documentation was developed based on the needs assessments. We used t-test for the analysis of the questionnaires and found that the pre-questionnaire p-value was 0.06 while post-questionnaire p-value was 0.00. We identified the educational module has led to the improvement of overall documentation regarding restraints by psychiatrists and psychiatry residents.

Conclusion: It is well known that errors in the administration of both physical and chemical restraints and documentation can lead to poor patient care and there by an increase in morbidity. Educating Psychiatrist and residents leads to decrease in errors contributing to safer and reduced morbidity, which will ultimately lead to more effective patient care.

Improving Obesity Screening

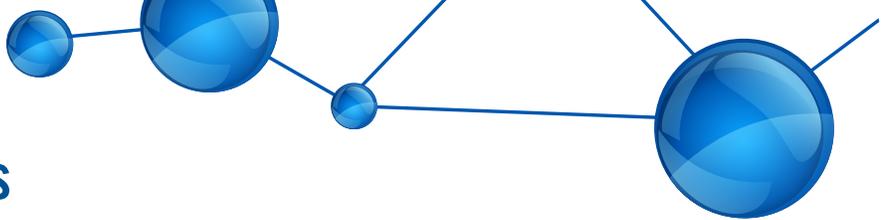
Ghanim, Mostafa¹; Maroun, Ralph¹; Mullapudi, Manasa¹; Larry Chin¹
¹SEMC-Department of Medicine

Background: The prevalence of obesity in the United States exceeds 30% in adult men and women. Obesity is associated with an increased risk of coronary heart disease, type 2 diabetes mellitus, and disability. These comorbidities are associated with higher use of health care services and costs among obese patients. The USPSTF recommends screening all adults for obesity and clinicians should offer or refer patients with a body mass index (BMI) of 30 kg/m² or higher to intensive, multi-component behavioral interventions.

QI Plan: Our intervention included educating residents through a video regarding the importance of obesity screening and strategies for obesity counseling. This educational video was shown during multiple forums including morning report and noon conference. Nursing staff was also involved in the intervention and were asked to notify the physician of a patient BMI greater than or equal to 30% prior to entering the exam room.

Results: Prior to intervention, 52 out of 222 obese patients (23%) had obesity documented as a problem in their clinical record. We found a direct correlation between the severity of obesity and the likelihood of documentation. Obesity was documented in 12% of mildly obese patients (BMI 30-34.9), 40% of moderately obese patients (BMI 35-39.9), and 73% of morbidly obese patients (BMI ≥40). After 1 month of intervention, 48 out of 110 obese patients who came for a yearly physical exam (44%) had obesity documented and addressed as one of their problems (P<0.05 by Chi-squared test).

Conclusion: After our intervention the rate of documentation of obesity significantly improved in the outpatient setting; however there is more room for improvement. Using electronic notifications in the medical record system to remind physicians to screen for obesity is the next best step.



Quality Improvement Reports

Prevalence of *Pseudomonas* from Intraoperative Cultures in Diabetic Foot Infections

Adams, Katherine¹; Shirazi, Sara¹; Nalbandian, Gina¹; Marcoux, Johnt¹

¹SEMC-Division of Podiatry, Department of Surgery

Background: Empiric therapy directed at *Pseudomonas aeruginosa* is usually unnecessary except for patients with risk factors for true infection with this organism. Other studies have corroborated the prevalence of the organism at their institutions.

QI Plan: Consecutive diabetic patients that required debridement in the operating room at SEMC secondary to a diabetic foot infection between July 2017 and January 2018 will be enrolled.

Results: Bacterial etiology was most overwhelmingly Gram positive aerobes such as staphylococcus aureus and Group B streptococci. The more serious infections were polymicrobial which included a mix of Gram positive, Gram negative, aerobic, and anaerobic organisms including MRSA. *Pseudomonas* was not isolated as a pathogen in any cultures.

Conclusion: *Pseudomonas aeruginosa* was not isolated from diabetic foot infection and its importance as a pathogen is questionable. Treatment should be empirical with anti- MRSA therapy.

A Retrospective Analysis of Factors Affecting Length of Stay and Time to Readmission for Heart Failure

Joe Aoun¹, Sarthak Khare¹, Mostafa Ghanim¹, Gemini Yesodharan¹, Maxwell Afari², Shruti Hedge², Lana Tsao²

¹SEMC-Department of Internal Medicine; ²SEMC- Division of Cardiovascular Medicine, Department of Internal Medicine

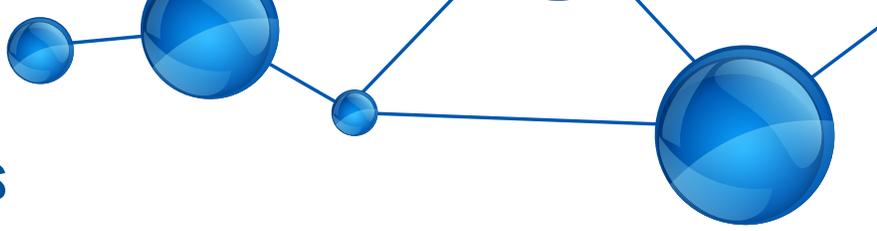
Background: The Hospital Readmissions Reduction Program mandates public reporting of readmissions as financial penalties are imposed on hospitals with higher readmission rates. The 30 day readmission rate for heart failure (HF) patients is 25%, with an average length of stay (LOS) of 6 days.

QI Plan: HF patients readmitted within 30-days of discharge from June 2014 to June 2016 were identified. Demographics, medical history, LOS, and TTR were obtained. A forward stepwise logistic regression analysis for early and late TTR determined risk factors (age, hypertension, diabetes mellitus, ejection fraction, baseline blood pressure, pulse pressure, Charlson Comorbidity Index (CHI) and chronic kidney disease) associated with LOS > 6 days.

Results: 152 patients were identified, 8 were excluded because of incomplete data. The mean age was 79 ± 12 with a male predominance (72%) and an average length of stay of

7.29 days. Patients were readmitted within 13.91 ± 8.69 days. Additional characteristics included ejection fraction (49.51 ± 15.41), ACC/AHA class C (82.89%), NYHA III-IV (59.87% - 38.15%). Multivariate analysis showed that patients with higher LVEF (OR: 0.97, $p=0.032$) are less likely to have LOS beyond 6 days, and patients with lower CHI are less likely to have TTR < 7 days (OR: 0.80, $p: 0.008$) or LOS > 6 days (OR: 0.86, $p: 0.049$).

Conclusion: Patients with risk factors of high CHI and low LVEF are at high risk for readmissions. While hospitalized, clinicians should be alerted that these patients might have longer LOS. Thus, prompting more aggressive and faster diuresis of these patients with close monitoring for complications as well as earlier post discharge appointments and frequent phone monitoring. Identifying patients with high CHI and low LVEF could help reduce TTR. A larger, prospective study is needed to confirm these findings.



Quality Improvement Reports

Longitudinal study on the effects of weekly random audits on compliance with HBIPS Core Measures

Prasad, Aishwarya¹; Malur, Chitra¹

¹SEMC-Department of Psychiatry

Background: Use of two or more antipsychotics is termed as antipsychotic polypharmacy (APP). APP increases long term side effects; therefore, in 2008 the Joint Commission released Hospital based inpatient psychiatric services (HBIPS) core measures, two of which targeted APP at discharge with the goal of decreasing APP and appropriate documentation for justifiable use of APP.

QI Plan: HBIPS compliance data was studied from January 2015 to December 2017. During this period, random weekly audits of discharge summaries was conducted by residents at three different occasions from Oct- Dec 2015, Oct-Dec 2016 and Oct-Dec 2017. In total, 311 discharge summaries were reviewed by the chief resident and subsequently sent to all the inpatient providers with physician specific feedback.

Results: Compliance data was reviewed on a weekly basis during the audits and on a quarterly basis at other times. Primary outcome measure was defaults in HBIPS compliance. The deficiencies in the Compliance data for the Antipsychotic HBIPS core measure significantly decreased and reached a compliance of 100% in 10-12 weeks.

Conclusion: Weekly audits and providing data with physician specific feedback were associated with an increase in the rate of compliance with HBIPS core measure. A continuation of random audits was associated with maintenance of compliance. Involvement of residents in this process was shown to be beneficial.

Make Every Drop Count: A Quality Improvement Project to Reduce Overutilization of Blood Tests in a Community-based Teaching Hospital

Almeqdadi, Mohammad¹; Hill, Jeffrey; Nair¹, Hari Krishnan¹; Sanchez-Cruz, Julian¹; Jaber, Bertrand¹

¹SEMC-Department of Internal Medicine

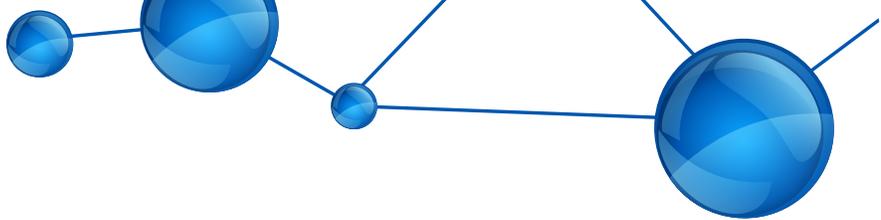
Background: In this era of value-based care, healthcare organizations are under increasing pressure to reduce costs while maintaining quality. Unnecessary laboratory testing is often targeted to control healthcare expenditures yet laboratory utilization rates continue to rise, contributing to higher costs and resource utilization, iatrogenic complications, patient discomfort and the reflexive performance of invasive follow-up testing and procedures.

QI Plan: We implemented an intervention to discourage overutilization and promote conscientious usage of routine laboratory tests via a multifaceted approach comprising resident education, encouragement of competition, use of social proof, and positive reinforcement. We provided medical residents with pocket cards and displayed analogous placards on the medical wards which detailed both the financial burden and the appropriate clinical indications of laboratory tests. Over the following seven months, a bimonthly “report card” contrasting utilization patterns of the two distinct resident teams on the teaching medical service was disseminated throughout the

residency program followed by public presentation of a culinary reward to the team exhibiting less overutilization. We compared pre and post-intervention laboratory test indices to examine the impact of our intervention.

Results: Baseline BMP and CBC indices were established through retrospective analysis of laboratory tests ordered from November 2016 until April 2017. Intervention was initiated on May 2017 and continued through November 2017. The CBC and BMP indices fell from 1.57 and 1.35, to 1.45 and 1.14, respectively, representing a 7.6% and 15.5% decrease. While there exist no official national benchmarks, similar experiences report an average CBC and BMP indices of 1.15 and 1.2, respectively.

Conclusion: Our intervention to heighten awareness of laboratory test overutilization, availing accountability and positive reinforcement represents an effective mechanism to reduce health care costs and improve quality of care.



Case Reports

Rare Presentation of Charcot Collapse Caused by Brown-Séquard Syndrome Spinal Cord Injury

Katherine Adams¹; Benjamin Saviet¹; Alfred J Philips¹

¹SEMC-Division of Podiatry, Department of Surgery

Introduction: Brown-Séquard Syndrome is a neurological condition that is caused by an injury to a portion of the spinal cord. It results in ipsilateral loss of motor function, vibratory and proprioceptive sensation at the level of the spinal cord injury. Additionally, the spinal cord injury causes contralateral loss of temperature and pain sensations two vertebral levels below the injury. Literature regarding Brown-Séquard Syndrome manifests as case studies resulting from blunt or penetrating spinal cord trauma, or disc herniation. These case presentations have shown varying levels of severity for loss of sensory and motor function contingent on extent of spinal cord injury. Charcot deformity, although commonly described with sensory loss secondary to diabetes mellitus, can occur in any condition that causes loss of protective sensation. This case study presents the first described Charcot deformity in a patient with Brown-Séquard Syndrome and offers a surgical approach for correction of the deformity.

Description of Case: This case is a presentation of a 58-year-old healthy female with history of Brown-Séquard Syndrome at C5 spinal cord level caused by automobile accident at age 17.

An Unusual Cause of Persistent Encephalopathy in Multiple Myeloma

Soontharee Congrete¹; Alice Lee¹; Bertrand Jaber¹

¹SEMC-Department of Medicine

Introduction: Encephalopathy in multiple myeloma (MM) can be from multiple causes such as uremia, hypercalcemia, hyperviscosity, infection. Hyperammonemia is a rare cause of encephalopathy in MM, and is associated with high mortality. The underlying mechanism is not well understood. Myeloma cells may cause excess ammonia production and hepatic dysfunction is not necessarily involved.

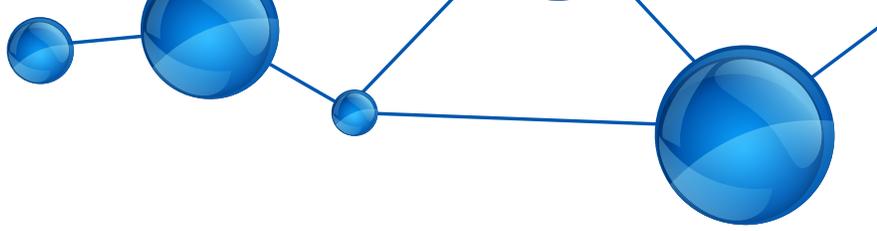
Description of Case: A 78-year-old female with IgG Monoclonal Gammopathy of Undetermined Significance (MGUS), presented with acute confusion and bone pain. She was disoriented and tachypneic on examination. Laboratory data revealed anemia, acute renal failure with a BUN of 31 mg/dL, serum creatinine of 1.7 mg/dL, hypercalcemia with a serum calcium of 12 mg/dL, and an elevated TSH with low T3/T4 levels, but no evidence of hepatic dysfunction. Serum immunofixation revealed an elevated monoclonal IgG at 6.3 g/dL. The serum viscosity was normal. Arterial blood gas showed respiratory alkalosis. Lumbar puncture revealed increased opening pressure, with an unremarkable cerebrospinal fluid analysis. Chest x-ray, electroencephalography, and blood cultures were normal. Urine culture grew *Escherichia coli*. Head CT scan revealed only an old infarction. A skeletal survey revealed multiple lytic lesions, and bone marrow biopsy was diagnostic for plasma cell myeloma. The patient

The patient experiences loss of protective sensation on her left side with contralateral muscle weakness. The patient has referred for surgical correction of left foot new-onset, progressive, collapsing pes valgus deformity following a period of erythema and edema consistent with acute Charcot. The patient's left foot was surgically reconstructed by performing a medial column fusion with a solid 6.5 bolt inserted in a retrograde manner from the 1st metatarsophalangeal joint (MTPJ). A medial extensile exposure was performed in the interval between the tibialis anterior and tibialis posterior tendons. The tibialis anterior tendon was detached and all joints along the medial column were prepared for fusion and temporarily fixated. The tibialis anterior tendon was reattached with a bone anchor. All remaining osseous prominences were planned to prevent ulcerations.

Discussion: This case is important for review by the podiatric medical and surgical community as it is the first described Charcot collapse caused by Brown-Séquard Syndrome without other neurological etiology and describes a successful surgical correction.

was treated for a urinary tract infection, hypothyroidism, and hypercalcemia. However, despite normalization of the serum calcium and thyroid levels, her altered mental status did not improve. Hyperammonemic encephalopathy was diagnosed after her serum ammonia level was found to be elevated to 123 umol/L (normal, 11- 51 umol/L). On day 11 of hospitalization, she received her first session of chemotherapy with bortezomib and dexamethasone. Unfortunately, she rapidly deteriorated and died after developing a hospital-acquired pneumonia.

Discussion: This case illustrates the challenge of diagnosing encephalopathy as a presentation of MM. Hyperammonemic encephalopathy should be considered in the differential diagnosis of encephalopathy in MM. Although hyperammonemia is generally associated with hepatic dysfunction, which could be from myeloma cells infiltrating the liver, this is not the underlying mechanism. In vitro studies suggest myeloma cells can cause excess ammonia production, leading to hyperammonemia. One diagnostic clue for hyperammonemia is respiratory alkalosis, which may be the result of stimulation of the respiratory drive from ammonia. Once the diagnosis is made, prompt chemotherapy should be initiated and has been associated with marked improvement of mental status. Lactulose, rifaximin, and dialysis could also be effective for reducing blood ammonia. Thus, early recognition could prevent both morbidity and mortality.



Case Reports

A case report on *Streptococcus pluranimalium* Bacteremia and Infective Endocarditis

Parikshit Duriseti¹; Jorge Fleisher¹

¹SEMC-Department of Medicine; ²SEMC- Division of Infectious Diseases, Department of Medicine

Introduction: Infective endocarditis is an infection of the endocardium of the heart commonly seen in individuals with underlying risk factors. We report the first case of *Streptococcus pluranimalium* endocarditis in the United States (two cases have been reported worldwide in literature so far on endocarditis due to the unusual *Streptococcus*). The organism has been associated with diseases in animals causing endocarditis in broiler parents and subclinical mastitis in cows.

Description of Case: A 51 year-old male non-IV drug user with a past medical history of mitral valve prolapse presented with a 3-month history of intermittent fevers associated with chills, weight loss, malaise, myalgias and arthralgias. He had poor dental hygiene with infection of the molars and peripheral stigmata of infective endocarditis. Blood cultures grew gram positive cocci in chains with the organism identified as *Streptococcus pluranimalium*. Transesophageal echocardiogram showed severe mitral valve prolapse with no vegetations on the heart valves. The diagnosis of definite infective endocarditis was made with the Modified Duke's Criteria with the patient meeting 0 major and 5 minor criteria. It is crucial to remember that the absence of a

vegetation does not rule out infective endocarditis or eliminate the possibility of systemic embolism. Patient improved with antibiotic therapy. *Streptococcus pluranimalium* was first isolated from genital tract and tonsils of cattle, tonsils of a goat and a cat. Due to the scarcity of *S.pluranimalium* infections in humans, it is difficult to establish the mode of transmission. This patient had no exposure to farm animals but did have an indoor cat. Literature review revealed that the organism was isolated from a dental plaque in a patient with periodontitis following tooth extraction and from a blood culture in a patient after dental piezocision procedure following transient bacteremia (with negative blood culture before the procedure). Hence, we hypothesize that *S.pluranimalium* could potentially be a part of the normal oral flora functioning as a commensal causing transient bacteremia secondary to poor dentition and/or dental procedures.

Discussion: This case report aims to remind physicians of novel pathogens emerging as a cause of endocarditis and to have a low clinical suspicion for endocarditis in patients with predisposing risk factors.

Daptomycin Induced Eosinophilic Pneumonia: A Commonly Missed Entity

Janak Adhikari¹; Alexander Merritt¹; Saba Khokhar¹

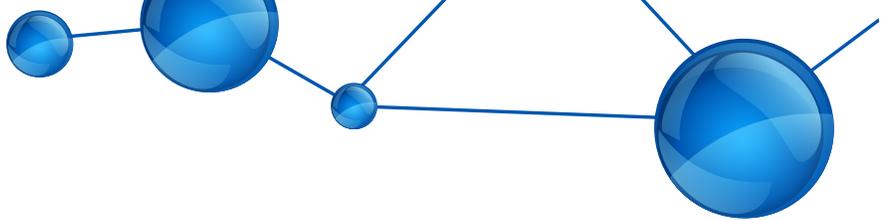
¹Carney Hospital- Department of Medicine

Introduction: Eosinophilic pneumonia after daptomycin is likely with the pentad of: fever, dyspnea with increased oxygen requirement, new infiltrates on chest x-ray or computed tomography scan, bronchoalveolar lavage (BAL) with >25% eosinophils and clinical improvement after daptomycin withdrawal. Associated symptoms and signs may include malaise, myalgias, night sweats, and pleuritic chest pain.

Description of Case: A 52 year Caucasian female with history of recurrent osteomyelitis of left great toe distal phalanx since one year presented to the emergency with shortness of breath and generalized weakness. She was being managed intermittently with debridement and vancomycin. However, 13 days back after a supratherapeutic vancomycin trough level in follow up, antibiotic was changed to daptomycin for methicillin resistant staphylococcus aureus (MRSA) coverage. Vitals on admission were remarkable for a pulse of 108/min and oxygen saturation of 88% on 2 liters. Left great toe was moderately tender with small ulcer and no surrounding erythema. Lab work was

remarkable for white count of 18.3 (neutrophil = 13.7%, eosinophil count of 7.6%). CT scan demonstrated peripheral ground glass opacity with septal thickening and areas of patchy opacities within the left upper lobe, right middle lobe and bilateral lower lobes. Daptomycin was withdrawn and she was started on vancomycin and cefepime, however she remained symptomatic for next 3 days. Repeat blood work showed white blood count of 14.8 and eosinophil of 17.7%. Bronchoalveolar lavage showed eosinophil count of 2.4%. On day 4, she received intravenous methylprednisolone and later oral dexamethasone that markedly improved her symptoms over the next 12 hours.

Discussion: Daptomycin induced eosinophilic pneumonia is an uncommon condition characterized by fever, nonproductive cough and progressively worsening dyspnea. Prompt recognition, initiation of steroids and cessation of daptomycin will rapidly improve the symptoms and avoid unnecessary intubation and clinical decline.



Case Reports

An Unusual Bug in the Sputum

Janak Adhikari¹; Jong Park¹; Ajit Thota¹; FNU,Zaffrullah¹; Isil Smith¹; Alexander Griffin¹

¹Carney Hospital- Department of Medicine

Introduction: A 81 year Albanian male presented to the emergency with pain in right upper abdomen. Abnormal vitals during presentation were temperature of 101.8F, respiratory rate of 24/min and blood pressure of 85/66mmg Hg. Right upper quadrant was tender to touch with positive murphy's sign. Lab work demonstrated WBC of 18.8 with band neutrophil of 20%. Abdominal ultrasonography demonstrated cholelithiasis and HIDA scan demonstrated complete obstruction of the gallbladder. The patient underwent laparoscopic cholecystectomy. His postoperative course was complicated by persistent leukocytosis, new oxygen requirement and cough. On postop day 6, repeat abdominal CT showed a significant subhepatic fluid collection after which a CT-guided percutaneous drain was placed, that drained 10 cc of thick sanguinous fluid. Over the next 24 hours there was minimal fluid drainage. On postop day 9 the drain was removed. Given persistent cough, increased oxygen requirement, shortness of breath and persistent leukocytosis,

chest X ray (CXR) and sputum culture was done. CXR showed small bibasilar atelectasis and sputum culture demonstrated comamonas testesteroni resistant to amikacin, tobramycin and gentamycin but sensitive to ceftriaxone, peperacillin-tazobactum, ampicillin-sulbactam and cotrimoxazole. He was started on ampicillin-sulbactam with resolution of his symptoms and leukocytosis within 48 hours.

Discussion: Comamonas testosterone occurs in soil, plants, water and also in hospital devices, such as intravenous lines and the humidifier reservoir water in respiratory equipment. It has been reported to cause infection such as cellulitis (1), peritonitis especially with a perforated appendix (2), bloodstream infection (3), infective endocarditis (4), purulent meningitis, (5), postoperative endophthalmitis (6) and hemodialysis catheter-related bacteremia. However to our knowledge, growth in respiratory tract is very uncommon.

Native Coronary Artery Thrombosis in the Setting of Heparin-induced Thrombocytopenia

Mohammad Almeqdad¹; Joe Aoun¹; Joseph Carrozza¹

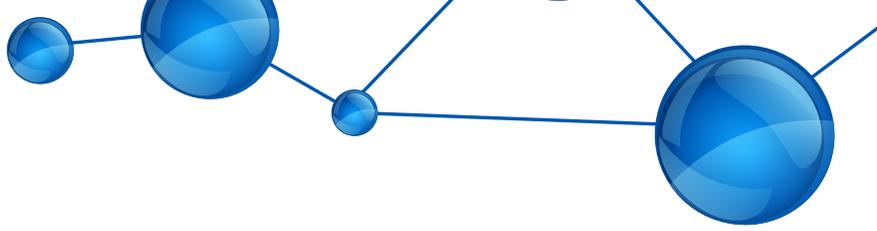
¹SEMC-Department of Medicine; ¹SEMC-Division of Cardiovascular Medicine, Department of Medicine

Introduction: Heparin-induced thrombocytopenia (HIT) is a rare complication of heparin therapy. Its pathogenesis involves thrombotic complications with higher propensity to the venous rather than the arterial side. Here, we describe a case of a native coronary artery thrombosis that developed in the setting of HIT.

Description of Case: The patient is a 67-year-old woman with history of pulmonary emboli and an inferior vena cava filter placement, hypertension and chronic kidney disease stage IV, who presented with bilateral lower extremity swelling and pain. She was found to have extensive occlusive thrombi throughout her lower extremities and subsequently received catheter-assisted thrombolytic therapy and was started on systemic intravenous heparin treatment. Thereafter, she was transitioned to apixaban for anticoagulation and the heparin was stopped. Her course was complicated by right lower extremity compartment syndrome, for which she underwent a partial fasciotomy, and was switched back to systemic heparin treatment. She developed a sudden onset of substernal chest pain and an electrocardiogram showed ST-elevation myocardial infarction and subsequent coronary angiography confirmed a thrombus

in the distal portion of the right coronary artery for which she received a drug-eluting stent. She was noted to have a new onset thrombocytopenia (>50% drop from baseline) related to the reintroduction of heparin and a 4T score of 7 which implied a 64% probability of having HIT. Heparin-PF4 IgG antibody and serotonin release assay were positive, confirming the diagnosis of HIT.

Discussion: Severe prothrombotic states, as seen in HIT, are associated with increased risk for coronary ischemia. HIT had been previously described to cause coronary complications in previously disrupted vessels and coronary bypass grafts, as venous thromboembolic complications of HIT dominate its spectrum. Here, we describe formation of an acute thrombus in a native coronary artery with no history of interventions, in the setting of HIT. This proves that, albeit the rarity of this condition, a high index of suspicion for HIT-induced myocardial infarction with appropriate alternative anticoagulation is required, to prevent fatal complications of this condition.



Case Reports

A Case of Aorto-jejunal Fistula: A Diagnostic Challenge.

Idrees, Najja¹; Almeqdadi, Mohammad¹; Tandon, Manish¹

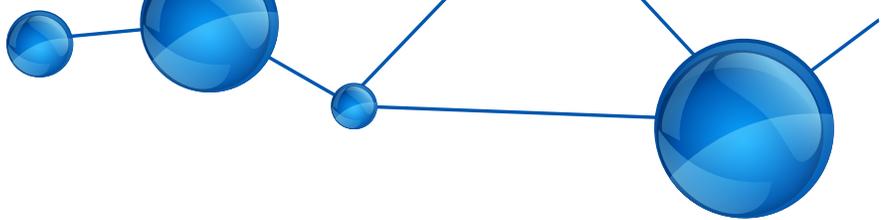
¹SEMC-Department of Internal Medicine

Introduction: Aorto-enteric fistula (AEF) is a life-threatening cause of gastrointestinal bleeding (GIB). It is classified as primary, where it occurs de novo, and secondary, where it arises in the setting of aortic reconstruction. It most commonly affects the duodenum; however, it rarely involves the jejunum which can be a challenging diagnosis. We present a case of aorto-jejunal fistula, with presentation of recurrent ‘Herald bleeds’, which was not visualized on multiple imaging studies.

Description of Case: The patient is a 55 year-old man with a past medical history of coronary artery disease, hypertension, and abdominal aortic aneurysm repair 10 years prior to presentation who had hematochezia and abdominal pain. This was the fourth recurrence of his symptoms within a month, requiring multiple hospital admissions. Prior colonoscopies revealed sigmoid diverticulosis and internal hemorrhoids presumed as the source of bleeding. Upon presenting, he was hemodynamically stable and his hemoglobin was 8.4 mg/dL. His hospital course was complicated by hypotension and hematochezia, after which an upper and lower endoscopies failed to reveal the source of bleeding. However, old blood in the entire colon was visualized including the right side. A video capsule study and a tagged red blood cell scintigraphy also did not identify location of the GIB. A computed tomography angiography (CTA) was done which showed no extravasation of contrast or other signs suggestive

of AEF and a 3.4 x 3.6 cm aneurysm at the distal end of the surgical aortic graft in close proximity to the bowel. This was compared to an earlier CTA without significant change. However, due to the high suspicion of an aorto-enteric fistula, an exploratory laparotomy was performed, and a fistula was found connecting the aortic graft with the jejunum, and subsequently, an aortic graft resection and small bowel resection was performed with cryopreserved aortic anastomosis and jejunojejunal anastomosis. He was discharged on post-operative day five in stable condition.

Discussion: AEF is a life threatening cause of GIB necessitating early diagnosis and appropriate surgical management for survival. CTA is considered the modality of choice for diagnosis, while upper endoscopy (EGD) detects a small percent of cases. The diagnosis of AEF in this case was particularly challenging as over 75% of AEFs are located in the duodenum, rather than jejunum. Negative imaging studies during recurrent admissions further added to the diagnostic dilemma. Final diagnosis was made during surgical intervention. This case highlights the importance of high index suspicion for AEF in GIB even with negative imaging studies in patients with prior aortic reconstruction. It shows that superior non-invasive modalities for accurate diagnosis of AEF are still needed and highlights the variable sensitivity of CTA in establishing the diagnosis.



Case Reports

Enterococcus Gallinarum Prosthetic Valve Endocarditis

Maythawee Bintvihok¹; Tinzar Basein²

¹SEMC-Department of Medicine; ²SEMC- Division of Infectious Diseases, Department of Medicine

Introduction: Enterococci are gram-positive facultative anaerobic bacteria which are the third leading cause of infective endocarditis and account for 10% of cases in non-intravenous drug users. The most common isolated strains are *E. faecalis* (97%) and *E. faecium* (1-2%). *Enterococcus gallinarum* (*E. gallinarum*) is rarely identified in human clinical specimens. However, it could potentially cause serious infection. We present a case of *enterococcus gallinarum* prosthetic valve endocarditis.

Description of Case: A 73 year-old gentleman with a history of bioprosthetic aortic valve replacement presented with a 4-week history of flu like symptoms. His initial vitals and physical examination were unremarkable except for tachycardia with a heart rate of 103. Laboratory investigation showed leukocytosis and later blood culture grew *Enterococcus gallinarum*. Transthoracic echocardiogram as well as transesophageal echocardiogram demonstrated highly mobile large (2.5cm) vegetation on the aortic valve prosthesis with a large abscess in the non-coronary part of annulus with a fistula formation. He was initially treated with Vancomycin and Piperacillin-tazobactam but later switched to Ampicillin and Ceftriaxone. Course was complicated by septic emboli to multiple organs. The source of bacteremia was un-

clear. Urine analysis was negative for infection. CT scan of the abdomen and pelvis did not reveal any new significant findings. Patient declined colonoscopy since he had normal colonoscopy 2 months prior. He subsequently underwent a redo composite aortic root and ascending aortic replacement with homograft and coronary artery bypass grafting. Antibiotic was continued for 6 weeks post-surgery.

Discussion: *Enterococcus gallinarum* endocarditis is rare, with only 3 published case reports on native valve and no reported case on prosthetic valve according to MEDLINE database. Although *E. gallinarum* strains are rare it can cause serious infection. Therefore, initiation of appropriate antimicrobial therapy is essential for favorable patient outcome. *E. gallinarum* strains have VanC phenotype, mediated by the chromosome VanC1 gene that causes intrinsic low-level resistance to vancomycin (minimum inhibitory concentrations 2-16 mcg/mL). However, the pathogen is almost always susceptible to ampicillin. Therefore, we need to aware the possibility of intrinsic Vancomycin resistant in *E. gallinarum*. Treatment failure can occur with the use of Vancomycin despite in vitro susceptibility result.

Atypical Neuroleptic Malignant Syndrome: A Case Report

Baisyat, Subha¹; Malur, Chitra¹

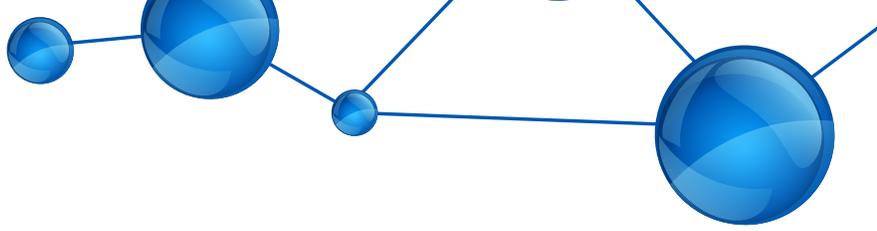
¹SEMC-Department of Psychiatry

Introduction: Neuroleptic Malignant Syndrome (NMS) is a life threatening adverse effect associated with antipsychotic agents, characterized by distinctive clinical syndrome of mental status change, muscular rigidity, fever and autonomic dysfunction. Cause of NMS is unclear but dopamine receptor blockade is postulated to be the central. Second generation antipsychotics predominantly block the serotonin receptors and reports of atypical NMS have increased. Atypical NMS can happen without fever and muscle rigidity. We describe a case of an elderly woman, who developed atypical NMS after receiving long acting injectable antipsychotic, to increase awareness regarding the atypical nature of NMS.

Description of Case: 69 year old woman with history of schizophrenia presented to the hospital due to auditory and visual hallucinations. Initial labs including urinalysis, EKG, Chest X-ray were within normal range. Her home medications included Prolixin decanoate, Zyprexa, Oxybutynin, antihypertensives. Unfortunately, Prolixin was initially confirmed as Q7days instead of Q2weeks. She received 2 doses within 7 days. After the first dose, she appeared confused. Oxybutynin was stopped but confusion continued. She refused medications, food and water.

Stiffness in her extremities was noted. She became tachycardic, creatine kinase (CK) mildly elevated, difficult to arouse. Collateral information revealed that she received a dose of Prolixin one week before admission. It turned out that within 2 weeks, she got 3 doses. She was treated with Ativan 1 mg QID. She started to improve. She was alert and oriented, engaged in conversation but mostly refusing food secondary to paranoia. As she was clearing from NMS and having clear sensorium, her paranoia/psychosis emerged. Clozaril was started with good benefit.

Discussion: Although fever is considered an essential part of NMS, cases have been reported without fever. Rigidity may be mild or even absent. Diagnosing NMS becomes even complicated because isolated presence of fever, dysautonomia, rigidity and CK elevation can occur with antipsychotics. NMS should be considered when two out of four symptoms are present in the setting of an offending agent. In this case, patient was afebrile but had tachycardia, rigidity, mental status change. CK was elevated mildly. Symptoms usually resolve in 1-2weeks but can last longer with longer acting medications.



Case Reports

Hemodialysis for Treatment of Levofloxacin-induced Neurotoxicity

Idrees, Najja¹; Almeqdadi, Mohammad¹; Jaber, Bertrand L.¹; Balakrishnan, Vaidyanathapuram S.^{1,2}

¹SEMC-Department of Medicine; ²SEMC- Division of Nephrology, Department of Medicine

Introduction: Levofloxacin, a third-generation fluoroquinolone antibiotic, is rarely associated with neurotoxicity. Patients with advanced kidney disease are particularly vulnerable to these adverse effects. We present two patients with kidney failure who developed levofloxacin-induced neurotoxicity, which was successfully treated with frequent hemodialysis, resulting in the full resolution of their symptoms.

Description of Case: The first patient was an 82-year-old woman with end-stage renal disease (ESRD) on thrice weekly hemodialysis who was hospitalized for right lower lobe pneumonia and started on levofloxacin. After receiving 750 mg intravenously, she developed myoclonic jerks of the facial muscles, upper extremities, and trunk, consistent with craniocervical dystonia. Her symptoms persisted despite stopping the levofloxacin. She underwent hemodialysis over 2 consecutive days, after which her symptoms fully resolved. The second patient was an 82-year-old woman with a history of dementia and Guillain-Barré syndrome who presented with bloody diarrhea and was found to have entero-hemorrhagic *Escherichia coli*-associated hemolytic uremic syndrome resulting in acute kidney injury. She was treated successfully with plasma exchange but developed a urinary tract infection for which she was started on levofloxacin. 24 hours

after receiving 750 mg of levofloxacin orally, she developed myoclonic movements of her upper and lower extremities. Four days later, she received an additional dose of 750 mg intravenously, following which she was switched to sulfamethoxazole-trimethoprim due to suspected levofloxacin-induced neurotoxicity. She continued to experience myoclonus, and as a result, underwent hemodialysis over 2 consecutive days, after which her symptoms completely resolved.

Discussion: Neurotoxicity is a well-known side effect of fluoroquinolone antibiotics. Postulated mechanisms include inhibition of GABA-A receptors and activation of excitatory NMDA receptors. Risk factors include older age, kidney disease, pre-existing neurological disorders, and drug-drug interactions. Our patients were elderly and had severe kidney disease. While management of the neurotoxicity includes discontinuation of levofloxacin and supportive care, hemodialysis is not recommended, despite available pharmacokinetic data in support of its dialyzability. The successful use of hemodialysis for the treatment of levofloxacin-induced neurotoxicity observed in our two patients with kidney failure merits further study for the treatment of this rare fluoroquinolone-related adverse effect.

Case Report: Severely Elevated Ferritin in a Patient with *Anaplasmosis Phagocytophilum*

Taufiq Zaman¹; Soontharee Congrete¹; Unterborn, John¹

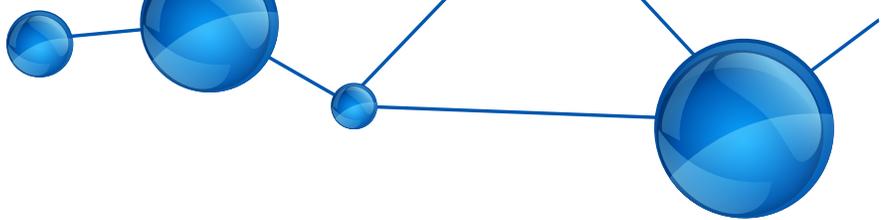
¹SEMC-Department of Medicine; ²SEMC- Division of Pulmonary, Critical Care, and Sleep Medicine, Department of Medicine

Introduction: *Anaplasmosis phagocytophilum* is the etiologic agent for human granulocytic anaplasmosis (HGA), a tick-borne illness, transmitted via the Ixodes tick species that is endemic to New England. HGA typically presents as fever, leukopenia, thrombocytopenia, abnormal liver function tests and could be complicated by multiorgan failure and death. Pathophysiology of disease suggests macrophage activation causing high ferritin and excessive cytokines production [1].

Description of Case: A 67 year old male hay cutter from Massachusetts who presented with increasing fatigue over the last 6 months, non-bloody diarrhea, and vomiting for several days. Physical exam was significant for dry mucosa and irregular tachycardia and EKG revealed as atrial fibrillation. Labs showed pancytopenia with WBC 3000/uL with band neutrophils 21%, hemoglobin 10.2 g/dL, hematocrit 30.1%, and platelet count of 14,000/uL. Chemistry showed elevated lactic acid 2.8, sodium 125 mmol/L, chloride 86 mmol/L, bicarb 20 mmol/L, BUN 51 mg/dL, creatinine 2.9 mg/dL (baseline 0.9). Total bilirubin 1.9 mg/dL, AST 79 U/L, and ALT 66 U/L. Ferritin level was noted to be elevated at 7506 ng/mL, iron 37 ug/dL, TIBC 235 ug/dL,

and high LDH 762 U/L. Normal haptoglobin and low reticulocyte count 0.7%. Peripheral smear showed minimal schistocytes. Imaging studies only showed mild splenomegaly. During hospitalization patient's pancytopenia improved and kidney function improved gradually. Patient's ferritin initially increased from 7506 to 7654 and then decreased to 6693. HGA was diagnosed after all infectious workup came up negative, except for being positive for *Anaplasmosis phagocytophilum*. Patient improved and was discharged on doxycycline. Patient was followed up in clinic one month later in which all pancytopenia had resolved except anemia.

Discussion: This case illustrates a severely elevated level of ferritin in a patient with *Anaplasmosis phagocytophilum*. Peak levels of 7654 were seen on day 2 of hospitalization (normal level 30-400 ng/mL). Highly elevated ferritin levels were also seen in a fatal case of a patient infected with *Anaplasmosis*, with peak ferritin levels of 8464 ng/ml on day 13 of hospitalization [2]. In conclusion, a highly elevated ferritin level can be seen in acute infections of *Anaplasmosis* and may be a useful tool for early recognition of disease severity of HGA.



Case Reports

Type B Lactic Acidosis in an End of Life Patient with Diffuse Large B-Cell Lymphoma

Nancy Kaddis¹; Chris Lathan¹

¹SEMC-Department of Hematology and Oncology, Department of Medicine

Introduction: Unlike the more commonly understood type A lactic acidosis, type B lactic acidosis is a rare entity seen in patients with various malignancies in which hypoperfusion is rarely present. It may often go unrecognized as a cause of acidosis in these patients. We present one case of an adult with DLBCL who developed type B LA, which was diagnosed within days of his death.

Description of Case: Our patient, SH, was a 49 year old man with history of diffuse large B-cell lymphoma, who had received previous therapy and had recurrence. Soon after recurrence, he was admitted to a hospital for work up of the liver failure. PET showed hepatic, splenic, and diffuse bony avidity consistent with widespread lymphomatous involvement. IR guided liver biopsy revealed diffuse large B-cell lymphoma as the etiology of the liver failure. Due to an anion gap acidosis, lactate was drawn on 6/11 and was high at 3.5 mmol/L. He was hemodynamically stable at this time, with no signs of diarrhea, renal failure, or any other clinical findings what would explain a lactic acidosis. He underwent the first infusion of Nivolumab on 6/14 without complication. However, no improvement in LFTs or clinical symptoms occurred. Soon after this, total bilirubin was 27.9 mg/dL, creatinine was 0.72 mg/dL and serum bicarb was

17 mmol/L. Several days later, when his serum bicarb had further decreased to 15 mmol/L, this author ordered a lactic acid level, and it came back quite high at 7.5 mmol/L, again with no evidence of sepsis, hypoperfusion, renal failure or diarrhea. His creatinine had worsened to 1.31 mg/dL but this did not explain the level of lactic acidosis. Due to his personal wishes, he was discharged two days after this last measurement, before his second treatment with Nivolumab, and died at home, later on the same day of discharge from our facility.

Discussion: In reviewing the literature, the exact pathophysiology of lactic acidosis of this type is unknown; however, several mechanisms of lactic acidosis have been proposed to explain type B LA. These proposed mechanisms include tumor microembolism, increased glycolysis, and decreased gluconeogenesis by abnormal tumor metabolism, or decreased degradation of lactic acid due to liver involvement. In patients with a known malignancy and who have evidence of metabolic acidosis, lactic acidosis should be considered, even if there is no history of hypoperfusion or other well known cause of lactic acidosis. Physicians should be aware of lactic acidosis in recurrent or advanced malignancy, especially as it is an under recognized and therefore underdiagnosed entity.

Fluoroquinolone-Induced Acute Kidney Injury

Bhagavatula, Seetha¹; Wright, Seth¹

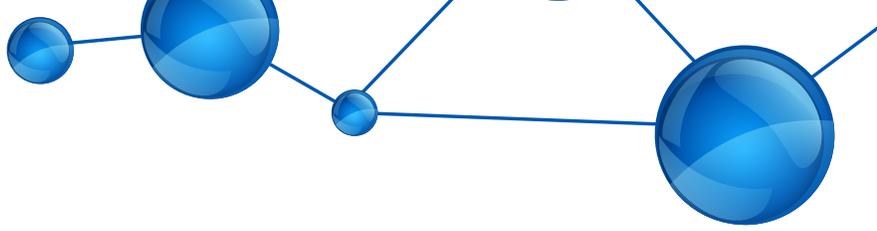
¹SEMC-Department of Medicine; ²SEMC- Division of Nephrology, Department of Medicine

Introduction: Acute kidney injury is a common presenting complaint in emergency departments. One of the rare causes is fluoroquinolone-induced acute kidney injury. Here, we present a patient with acute kidney injury after ciprofloxacin ingestion.

Description of Case: The patient is a 64 year-old women with no relevant past medical history, who had a three day history of reduced urine output and vomiting. Prior to this, she had a sore throat, fevers, and joint pain; she had a reserve of ciprofloxacin for travelers' diarrhea, which she started taking for 3 days prior to the presenting symptoms. Upon presentation to the emergency department, her blood pressure was 142/92 and her physical exam was unremarkable. Laboratory studies revealed a normal CBC with normal eosinophil count, creatinine of 8.1, with a baseline of 0.8. FeNa was 2%. Renal ultrasound was unremarkable. Urine sediment revealed no muddy brown casts and no hematuria; there were multiple free renal tubular epithelial cells and occasional tubular epithelial granular casts. Prominently, there were many stellate clusters of material, light brown under bright light field microscopy and strongly birefringent under polarized light. Autoimmune and infectious workup

was unremarkable. Patient's kidney function did not improve immediately with volume resuscitation; however she was no longer oliguric. After three days, the creatinine began to fall, therefore renal biopsy was deferred. She was discharged home and has since returned to baseline renal function.

Discussion: Fluoroquinolones are known to cause AKI from acute interstitial nephritis and/or obstructive crystalluria. In all known reports, patients develop oliguric AKI within two weeks of ingestion. Urinalysis reveals crystals of varying shapes, which are composed of ciprofloxacin salts. These crystals have a wide array of appearances and are strongly birefringent under polarizing light. If kidney biopsies are taken, needle-shaped birefringent crystals are seen within the tubules. Once fluoroquinolones are withdrawn, renal function returns to baseline. This case presented a patient with acute kidney injury with no obvious alternative cause of oliguric renal failure. Labs and response to fluids were not consistent with a prerenal cause and urine sediment revealed strongly positive birefringent crystals, concerning for obstructive ciprofloxacin induced acute kidney injury.



Case Reports

Difficult Diagnosis of a Lung Nodule

Rodolfo Alpizar-Rivas¹; John Tedrow²; James Tasch¹; Elizabeth Kyer³

¹SEMC-Department of Medicine¹; ²SEMC- Division of Pulmonary, Critical Care, and Sleep Medicine, Department of Medicine;

³SEMC-Pharmacy Department

Introduction: Granulomatosis with polyangiitis (GPA) is among the differential for lung nodules with an incidence of 5-10 cases per million/ year with no preference for sex.[1] There have been cases reported in all decades of life with the 7th decade of life being the peak incidence.[2] It was first described by Heinz Klinger in 1931 and in 1936, Friedrich Wegener described the triad of systemic vasculitis, necrotizing granulomatous inflammation of upper/lower respiratory tracts, and glomerulonephritis.[2,3]

Description of Case: We present a case involving a 78yo female with minimal past medical history with heavy second-hand smoke exposure that presented to the outpatient pulmonary clinic complaining of cough, fever, night sweats and 10-pound weight loss over the last 1 month. She originally underwent a chest x-ray that revealed a right upper lobe pulmonary nodule measuring 2.2cm. She completed a course of Bactrim DS 800/160 mg BID x15 days as well as Levaquin 500mg x10 days, but continued to complain of persistent symptoms. A chest CT revealed an irregular 18 x 18mm nodule with central cavitation in the peripheral right upper lobe with additional pleural-based mass measur-

ing 3.8 x 2.4 x 4.0cm. Bronchoscopy was unrevealing and the bronchoalveolar lavage was positive for inflammatory cells, but negative for infection and malignancy. A CT guided lung biopsy revealed a dense interstitial inflammatory infiltrate without signs of malignancy, vasculitis, or granulomas. Inflammatory lab work was obtained which was consistent with vasculitis which led the patient to be trialed on prednisone therapy.

Discussion: Lung nodules have a broad differential including but not limited to: malignancy, infection, inflammatory, and vascular etiologies. Starting with a comprehensive history and physical, the differential for a lung nodule may start to become focused, but usually due to only vague constitutional symptoms, the workup usually requires generalized lab work, further imaging, and possible biopsy. Overall, the consensus was that the diagnosis was likely early GPA. This diagnosis was difficult in that the symptomatology was not specific and pathology could not make a definitive diagnosis. Eventually, the patient improved with both steroids and cyclophosphamide, supporting the suspected diagnosis.

A Case of Lactic Acidosis Induced by a Diffuse Large B- Cell Lymphoma

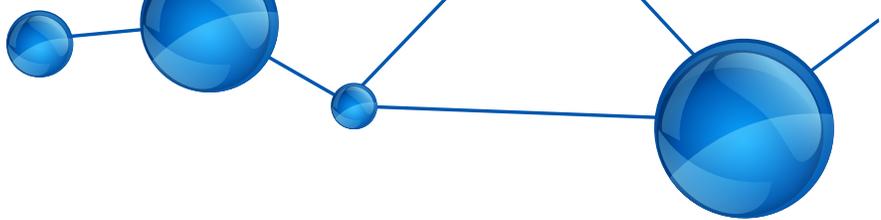
Feyza Erenler¹; Soontharee Congrete²; Nicolaos E. Madias², Bertrand L. Jaber²

¹Carney Hospital-Department of Medicine; ²SEMC-Department of Medicine

Introduction: Excess lactate accumulation occurs when lactate production exceeds lactate consumption. Malignancy-induced lactic acidosis (MILA) is defined as lactic acidosis developing on the background of a malignancy in the absence of global hypoxia or sepsis.

Description of Case: We describe the case of a 74-year-old man with newly diagnosed diffuse large B-cell lymphoma, who presented with tachypnea and altered mental status and was found to have high-anion gap metabolic acidosis. The lactic acid (LA) level was inordinately elevated at 19.9 mmol/L in the absence of apparent global hypoxia or sepsis, and the serum bicarbonate was 7 mmol/L. There was no renal or hepatic dysfunction. Following administration of sodium bicarbonate, the lactic acidosis worsened, with a rise in the LA level to 20.6 mmol/L. To prevent tumor lysis syndrome, allopurinol and normal saline were administered followed by CHOP- based induction chemotherapy. Within 48 hours, the LA level dropped to 3.3 mmol/L and the metabolic acidosis resolved with normalization of the serum bicarbonate to 25 mmol/L. Of note, the patient received high-dose thiamine one day after resolution of the lactic acidosis.

Discussion: Contrasted with malignancy-associated lactic acidosis, a common occurrence, MILA is a rare paraneoplastic syndrome. Approximately 80% of the cases involve hematologic malignancies and the remainder solid tumors. Commonly a presenting feature, MILA has adult preponderance (~80% of cases). Other clinical features include unusually high LA levels, hepatic invasion by the malignancy, and hypoglycemia refractory to glucose infusion. Central to its pathogenesis is the programming of the malignancy for aerobic glycolysis (Warburg effect) via aberrant P13K/AKT signaling and transcriptional oncoproteins; induction of the expression of glucose transporters and several glycolytic enzymes results in increased glycolytic flux by the tumor. Additional pathogenic mechanisms include regional ischemia (hypoxic microenvironment) due to tumor overgrowing its blood supply and tumor microemboli; hepatic or renal dysfunction; and vitamin B deficiencies (thiamine, riboflavin). The syndrome carries a bad prognosis. Prompt institution of cytoreductive therapy is key to a favorable outcome. Base therapy is discouraged because it promotes LA generation and can have adverse nutritional consequences.



Case Reports

An Unusual Case of Intracardiac Foreign Body Following a Neck Injury; a Case Report and Review of Literature

Mostafa Ghanim¹; Shahd Bsata¹; Braidie Campbell¹; Gerard Daly²; Arvind Agnihotri³; Lana Tsao²

¹SEMC-Department of Medicine; ²SEMC-Division of Cardiovascular Medicine, Department of Medicine; ³SEMC-Division of Cardiac Surgery, Department of Surgery

Introduction: Intracardiac foreign bodies are a rare occurrence in clinical practice. They are associated with significant morbidity and mortality. We report an unusual case involving the transmigration of a needle fragment from the lumen of the right internal jugular vein to the right ventricle, following a traumatic neck injury.

Description of Case: A 34-year-old male presented for foreign body removal after a traumatic neck injury. He reportedly was working underneath his truck when his toolbox dropped into the fan belt that caused some pieces of shrapnel to spray across his neck. On examination he was vitally stable. He had an entry-wound at the right base of his neck. Cardiopulmonary exam was within normal limits. CT scan and x-ray neck showed a linear radiopaque structure, 2cm in length, within the lower ventral right neck. Patient was taken to the operating room; however, the object could not be located after extensive neck exploration. A repeat CT scan and x-ray neck didn't show the foreign body in the neck. CT scan and x-ray chest showed migration of the foreign body to the right ventricle. Patient underwent surgical re-

moval of the foreign body, using a median sternotomy approach without complications.

Discussion: In our case, the foreign body entered through the neck and migrated via the right internal jugular vein into the right ventricle. On literature review from 1989-2017, we found 54 similar cases with intracardiac needles. The mechanism of injury was variable; 41% involved intentional injuries, 35% were accidental, and 24% involved IV drug use. Major complications were pericardial effusion (16%), pericarditis (11%), and cardiac tamponade (11%). Other complications (28%) included infective endocarditis, intracardiac thrombus, pulmonary embolism and stroke, while 37% had a benign course. Management options included, surgical removal in 83% of cases, transvenous removal in 6% of cases, and 11% of cases opted for conservative management. Intracardiac foreign bodies can be introduced through open neck wounds via the internal jugular vein. An accurate history is important, and a low threshold of suspicion should be maintained in high-risk patients such as IV drug users. With the use of multimodality tools, a diagnosis can easily be made.

An Unusual Case of Acute Myocardial Infarction with Normal Coronary Arteries

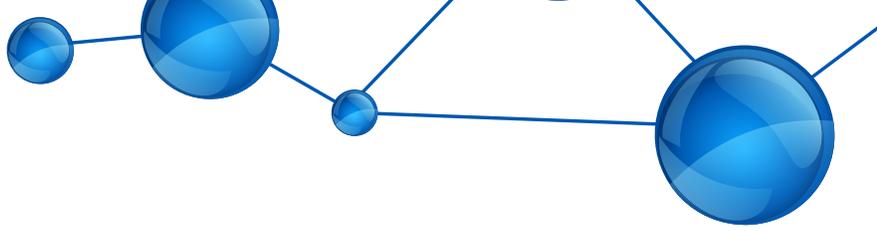
Sarthak Khare¹; Esilida Sula Karreci¹; Joe Aoun¹; Lana Tsao²

¹SEMC-Department of Medicine; ²SEMC-Division of Cardiovascular Medicine, Department of Medicine

Introduction: Myocardial infarction with non-obstructive coronary arteries (MINC) is a clinical syndrome characterized by presence of an acute myocardial infarction (AMI) in the absence of obstructive coronary artery disease ($\geq 50\%$ stenosis). We present a case of a young patient with Factor V Leiden mutation and multiple strokes, who presented with a MINC despite anticoagulation.

Description of Case: A 27-year-old male with bipolar disorder, Factor V Leiden mutation, four strokes, and patent foramen ovale closure presented with typical chest pain accompanied by shortness of breath. Upon arrival, vital signs were: blood pressure 135/74 mmHg, heart rate 84 bpm, O₂ saturation 100%. Physical exam was unremarkable. Workup revealed up trending troponins (0.01, 0.18, 0.33 ng/l). Electrocardiogram showed S1Q3T3 pattern concerning for right heart strain. Chest CT angiogram excluded pulmonary emboli and aortic disease. Transthoracic echocardiography showed normal ejection fraction, moderate aortic regurgitation, and regional wall motion abnormalities without apical ballooning. Thus, a non ST-elevation myocardial infarction (NSTEMI) was diagnosed. Aspirin, statin, beta-blocker, and heparin drip were initiated. Cardiac catheterization revealed normal coronary arteries.

Discussion: MINC occurs in 5%-10% of all patients with AMI and is associated with a 12-month all-cause mortality of 4.7%. Patients are typically younger and have a 12-month major adverse cardiac event rate comparable to patients with single or double-vessel coronary artery disease. Etiologies include coronary artery spasm, coronary microvascular dysfunction, spontaneous coronary thrombosis/emboli, and coronary dissection, viral myocarditis, takotsubo cardiomyopathy, auto-immunes and hematologic disorders. This is an unusual case of MINC in a young patient with Factor V Leiden mutation. Hypercoagulability is a common risk factor for venous thrombosis and to a lesser extent, arterial thrombosis. Likely, his NSTEMI was caused by a thrombus partially occluding a coronary artery. We hypothesize that this thrombus was dissolved by heparin. Early treatment of an AMI secondary to a hypercoagulable state using dual anti-platelet therapy and anticoagulation (heparin) may be sufficient to revascularize the culprit artery without the need for invasive interventions. Nevertheless, a left heart catheterization would still be required to confirm the diagnosis of MINC.



Case Reports

Percutaneous Access of an Expanding Internal Iliac Artery Aneurysm via a Direct Posterior Transgluteal Approach

Worgul, Christopher A¹; Kansal, Nikhil¹

¹SEMC-Department of Surgery

Introduction: Internal iliac artery aneurysms (IIAAs) are rare, comprising 0.3% of all aortoiliac aneurysms. Although they are frequently asymptomatic and discovered incidentally, most reports cite a 40% risk of rupture, with an associated 80% risk of mortality for large aneurysms. Open surgical repair has been considered the traditional “gold standard” approach for management, however, due to their deep location within the pelvis and their proximity to bowel and pelvic organs, endovascular management has proven to be a less invasive and effective treatment option. We present a patient with an enlarging internal iliac artery aneurysm that was directly accessed using a percutaneous, transgluteal approach under fluoroscopy.

Description of Case: The patient is a 91-year-old female who previously underwent endovascular repair to exclude a right internal iliac artery aneurysm, who subsequently developed a type II endoleak and was found to have expansion of the aneurysm to approximately 8 cm in diameter. Trans-arterial access to the aneurysm was not possible due to the prior stent graft placement. Under fluoroscopic guidance, using bony landmarks, and with

the patient in the prone position, a 10 cm long 18-gauge needle was used to directly access the right internal iliac artery aneurysm. The location was confirmed by visualizing contrast within the aneurysm, and a Glidewire was advanced into the sac, followed by a 6 French sheath. Aortography revealed robust filling of the aneurysm via a high-flow type II lumbar artery endoleak from the aorta. Multiple coils and plugs were placed within the aorta, the common iliac artery, and adjacent to the outflow branches of the IIAA. Completion angiography revealed minimal flow through the aneurysm. The patient tolerated the procedure well.

Discussion: Multiple endovascular techniques to access internal iliac artery aneurysms have been described in the literature; however, to the best of our knowledge, this is the first description of directly accessing the aneurysm via a percutaneous, transgluteal approach under fluoroscopic guidance. Endovascular surgeons should be aware that in patients who are not candidates for transarterial access to an IIAA, this innovative technique may provide a less invasive approach for aneurysm access and endovascular treatment.

Stroke Due to Nonbacterial Thrombotic Endocarditis as Initial Presentation of Metastatic Non-Small Cell Lung Cancer

Bhagavatula, Seetha¹; Aleatany, Yaseen¹; Diaz-Cruz, Camilo¹; Wisnieff, Cynthia²; Hohler, Anna²

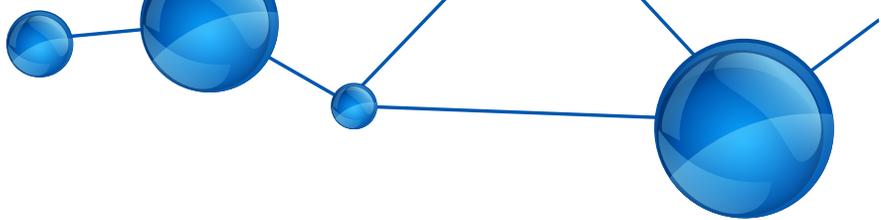
¹SEMC-Department of Medicine, ²SEMC-Department of Neurology

Introduction: Nonbacterial thrombotic endocarditis (NBTE) or marantic endocarditis is an uncommon cause of acute stroke in individuals with underlying cancer. Here, we present a patient who presented with an acute, multifocal ischemic stroke and found to have NBTE with metastatic non-small cell lung cancer.

Description of Case: Patient is a 44 years old female with no relevant past medical history who presented with acute onset word finding difficulties and vision changes. She also reported a 2-month history of worsening productive cough and intermittent hemoptysis. In the Emergency Department, she was hypertensive and tachycardic. Her NIHSS was 1. Head CT revealed a wedge-shaped hypodensity in the left parieto-occipital lobe. Brain MRI revealed multifocal infarcts, largest in the left parietal lobe, with others in the right parietal, bilateral cerebellar, right posterior frontal regions. She was out of thrombolysis window and received aspirin. Initial workup including HbA1c, lipid panel and CTA neck were unremarkable. Hypercoagulable workup was negative. Blood cultures remained negative. Transesopha-

geal echocardiogram revealed mitral valve thickening suggestive of myxomatous degeneration, concerning for vegetation. Due to her hemoptysis, she underwent a CTA chest revealing bilateral hilar and mediastinal lymphadenopathy, with biopsy confirming non-small cell lung cancer. Further work up revealed diffuse bony metastases. She was placed on anticoagulation and discharged for outpatient oncological workup.

Discussion: NBTE should be suspected in patients with underlying cancer, with imaging findings concerning for valvular vegetations. These patients usually present with multifocal strokes that cannot be explained by one arterial distribution. Unlike their infective endocarditis counterparts, these patients are routinely anticoagulated as studies have shown that these vegetations have a high rate of recurrence and extensive embolization. In our patient, her presentation and imaging were consistent with multifocal stroke. Given findings on transesophageal echocardiogram and that no other etiologies were found, the most likely cause of her stroke was cancer-associated NBTE.



Case Reports

A Case of Post-Babesiosis Warm Autoimmune Hemolytic Anemia in the Setting of Exchange Transfusion Treatment.

Radwan, Amr¹; Idrees, Najia¹; Evanchuk, Darren²; Yaqoob, Maidah¹; Nader, Claudia¹

¹SEMC-Department of Medicine, ²SEMC- Division of Hematology and Oncology, Department of Medicine

Introduction: Babesiosis is a tick-borne parasitic disease that infects red blood cells resulting in anemia. Warm autoimmune hemolytic anemia (WAHA) is a recently described complication of babesiosis, particularly in asplenic patients, after clearance of parasitemia. We report a case of WAHA in a patient, despite being treated with exchange transfusion, requiring immunosuppressive therapy.

Description of Case: 71-year old male with a past medical history of asplenia secondary to a motor vehicle accident, presented with weakness, confusion and fever, diagnosed with babesiosis relapse due to inadequate treatment two months prior. Babesia smear showed 4% parasitemia and a Babesia microti DNA PCR was positive. Co-infection with other organisms was ruled out based on negative serological tests. There was no history of recent travel, transfusion, or autoimmune disease. Patient was initially treated with Atovaquone and Azithromycin (AA). This was switched to Clindamycin and Quinine (CQ) in the setting of ongoing hemolysis, acute kidney injury and pulmonary edema. Parasitemia level increased to 10% and treatment with exchange transfusion was initiated. Despite decrease in parasitemia levels

to less than 0.1%, ongoing hemolysis was documented. A Direct Antiglobulin Test (DAT) was found to be positive and an antibody screen showed warm autoantibodies in conjunction with a peripheral smear that did not show parasitemia. Diagnosis of WAHA as a complication of Babesiosis was made and he was started on prednisone. Subsequently, his hemoglobin level stabilized and he was discharged with a prolonged anti-parasitic regimen (AA) for 6 weeks and a tapering course of steroids.

Discussion: Post babesiosis WAHA has been documented recently in a case series in 7% of patients infected with Babesia and in one third of the asplenic subgroup. However, none of these patients underwent exchange transfusion for the treatment of Babesiosis, a treatment modality reserved for severe babesiosis, known to clear the parasitemia and inflammatory mediators. This case illustrates that post Babesiosis WAHA can also occur in severe babesiosis despite exchange transfusion. Moreover, WAHA was diagnosed early on in our case in contrast to published cases in the literature. Therefore, more studies are needed to assess the pathophysiology and timeline of the risk for WAHA in Babesiosis.

N-terminal Pro B-Type Natriuretic Peptide Associated with Orthostatic Hypotension: A Case Report

Sidhu, Tahnee Kaur¹; Almeqdadi, Mohammad¹; Wylie, John V.²

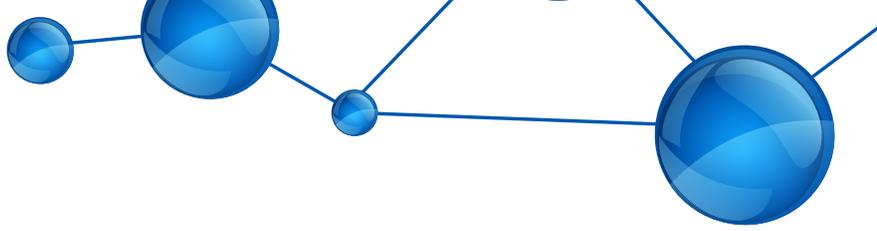
¹SEMC-Department of Medicine, ²SEMC- Division of Cardiovascular Medicine, Department of Medicine

Introduction: Orthostatic hypotension (OH) affects approximately 30% of patients above the age of 70. In 20-40% of these cases, an etiology cannot be identified [1]. A recent study showed an association between cryptogenic OH and unexplained elevated levels of endogenous N-terminal pro b-type natriuretic peptide (NT-proBNP) in 7 patients [2]. We report a case of cryptogenic OH associated with high levels of NT-proBNP.

Description of Case: An 88-year-old man with a 2-year history of OH presented to our hospital with recurrent falls. He was found to have severe orthostatic hypotension with a 30-50% drop in systolic blood pressure upon standing. His history included atrial fibrillation with a permanent pacemaker in place and left atrial appendage closure device implantation 3 weeks prior. Previous work up for endocrine, neurologic, and cardiac etiologies of his OH was unrevealing. He had a normal EF and no evidence of heart failure. He had been treated with midodrine, fludrocortisone, and compression stockings. Droxidopa had recently been added to his regimen but symptoms continued to worsen so this

was discontinued. Administration of normal saline markedly and transiently improved his symptoms. NT-proBNP levels appeared to track with degree of OH: levels were initially elevated upon presentation at 10,659 pg/mL. A standing dose of salt tablets was initiated and subsequently his orthostasis improved and NT-proBNP levels decreased to 5,381 pg/mL. Two days later his symptoms worsened and NT-proBNP rose to 7,614 pg/mL.

Discussion: Cryptogenic OH is a common disease and can be debilitating. Treatment options include central sympathetic agonists, mineralocorticoids, and lifestyle modifications. BNP acts as a vasodilator and natriuretic, and a relationship between NT-proBNP levels and the presence of OH has been suggested in one small study [2]. This case provides further evidence that levels of NT-proBNP, and perhaps other circulating neuropeptides, can be used to track response to therapy in patients with OH. This association suggests a possible causal role of BNP in some cases of OH.



Case Reports

Hand Ischemia Due to Improper Positioning during Robotic Prostatectomy

Karuppiah, Arunthevaraja¹; Al Assadi, Sadek¹; Shulman, Mark¹

¹SEMC-Department of Anesthesiology

Introduction: Compartment syndrome during robotic surgery is a potential devastating complication that typically involves the arms or legs.

Description of Case: A 65-year-old, 81 kg gentleman, underwent a 3 hour robotic prostatectomy with lymph node dissection under general anesthesia. A 18-gauge intravenous catheter was inserted on the dorsal surface of the right hand and a blood pressure cuff was placed on the left upper arm. The patient's arms were secured by tucking them at his sides using a standard draw sheet under the patient's back, looped over his arms. After undraping at the end of surgery, the right palm was swollen, tense and had ischemic changes (Fig). The intravenous catheter on the affected hand functioned well throughout the case. An orthopedic surgeon and vascular surgeon were consulted immedi-

ately. The intravenous catheter on the affected arm was removed and the patient's hand was elevated at once. The surgeons did not recommend measuring compartment pressures. The radial and ulnar arteries showed good pulsations and were confirmed by Doppler. Hand edema and ischemic changes resolved within the next few hours and the patient had intact neurovascular function.

Discussion: This case shows the potential tourniquet effect of the distal (caudal) end of the draw sheet. Whenever possible alternatives to draw sheets for arm positioning should be considered. We also suggest careful attention to be paid by anesthesia providers to confirm that the ends of the draw sheets are loose and also entire dorsum of the hand should be looped.

Encephalopathy Unraveled: A Case of Hyperammonemia in Multiple Myeloma

Radwan, Amr¹; Yaqoob, Maidah¹; KrishnanNair, Hari Krishnan¹; Kozyreva, Olga²

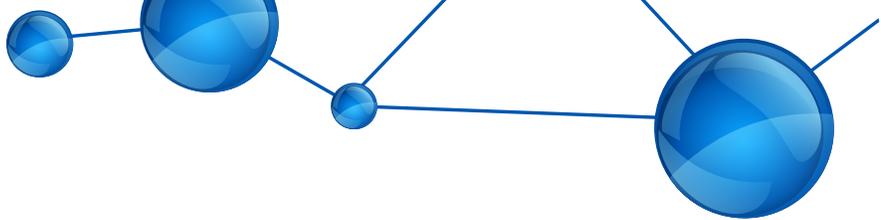
¹SEMC-Department of Medicine, ²SEMC-Division of Hematology and Oncology, Department of Medicine

Introduction: Multiple myeloma (MM) presents with a multitude of symptoms. Hyperviscosity, hypercalcemia, uremia, sepsis, and myelomatous CNS involvement can lead to encephalopathy. Paraneoplastic hyperammonic encephalopathy is a rare manifestation of cancer including MM. We present a case of MM presenting with encephalopathy.

Description of Case: 78 year old female with past medical history of IgG monoclonal gammopathy, cerebrovascular accident with left sided hemiparesis, hypertension, atrial fibrillation presented with altered mental status. Exam was significant for somnolence and chronic left sided hemiparesis. Diagnostic work up showed TSH 39 uIU/mL, acute kidney injury with a creatinine of 1.7mg/dL (baseline 0.8mg/dL), anemia with hemoglobin of 7.3g/dL, and hypercalcemia with corrected calcium 12mg/dL. Her liver functions were normal. Head CT and brain MRI showed no acute intracranial pathology. Serum gamma globulin level was 6.8 g/dL. CT abdomen and pelvis revealed multiple bony lesions. Bone marrow biopsy confirmed plasma cell myeloma. Hypercalcemia was treated with hydration and zoledronic acid. Suspected urinary tract infection was treated with ceftriaxone. Intravenous levothyroxine was given initially for possible myxedema coma. EEG was unrevealing. Cerebrospinal fluid analysis was within normal range. Elevated ammonia level (98 umol/L) was noted. Given normal liver function, hyperammonic encephalopathy due to

IgG lambda MM stage III was diagnosed. She was treated with bortezomib, dexamethasone, and lactulose; however, patient's clinical condition continued to deteriorate. Decision was made to withdraw treatment due to poor prognosis and lack of response to treatment.

Discussion: The pathophysiology of hyperammonemia in MM is unclear. Studies suggest excess production of ammonia in vitro by myeloma cells. MM associated hyperammonemia is associated with poor prognosis and reported in-patient mortality 31% in patients who received MM-directed therapy and 100% in those who did not receive disease specific therapy. Besides chemotherapy, there is no current consensus on management of paraneoplastic hyperammonemia. Hemodialysis is the fastest and most effective method to remove excess ammonia. The role of Lactulose, Rifaximin and ammonia scavengers is not well established. In patients with MM and altered mental status, primary hyperammonic encephalopathy should be considered in the differential diagnosis. There is a need for more studies, including case reports, and establishment of MM hyperammonemia management guidelines.



Case Reports

Variant of Median Arcuate Ligament Syndrome – A Rare Cause of Abdominal pain

Konturek, Thomas¹; Lizaola, Blanca¹; Puerta, Elizabeth²; Vaziri, Alireza²; Jouhourian, Caroline³

¹SEMC-Department of Medicine; ²SEMC- Division of Cardiovascular Medicine, Department of Medicine; ³SEMC-Division of Gastroenterology, Department of Medicine.

Introduction: Median Arcuate Ligament Syndrome (MALS) is defined as a cause of abdominal pain related to compression of the celiac artery by the median arcuate ligament during respiratory maneuvers. MALS comprises a spectrum of disease from incidental findings on imaging to extensive workup in patients with chronic abdominal pain. We are presenting a possible variant of MALS with celiac artery occlusion on inspiration as compared to the typically seen obstruction of flow on expiration.

Description of Case: This is an 85 year-old female with a recent diagnosis of IBS who presented with postprandial epigastric pain associated with weight loss and alternating watery diarrhea and constipation. Laboratory studies showed a normal CBC and BMP. Lipase, TSH, stool studies for bacterial culture/toxins/antigens and ova & parasites and celiac serologies were negative. Abdominal ultrasound and CT with oral and intravenous contrast did not suggest any acute or chronic abnormalities. Esophago-gastroduodenoscopy, colonoscopy and HIDA scan remained unrevealing. Suspecting chronic mesenteric ischemia, the patient underwent CTA, which showed two small aneurysms in the ileal branches of the SMA, however, polyarteritis nodosa was ruled out by rheumatology. After discussing this case with the

cardiovascular division, MALS was considered. Positional and inspiration/expiration duplex ultrasonography showed complete interruption of the celiac artery flow during inspiration. This is different from the classic mechanism of MALS where the arcuate ligament compresses the celiac artery during expiration.

Discussion: The incidence of MALS is not well known and its pathophysiology not completely understood. The median arcuate ligament can lead to compression of the celiac artery enhanced on expiration as the ligament moves cranially and relieved during inspiration. Abdominal pain, postprandial pain and weight loss are the most common manifestations. The diagnosis is made on advanced vascular imaging (CTA/MRA) frequently in combination with duplex ultrasonography during respiratory and positional maneuvers. This case report demonstrates a possible variant of MALS. Compared to the typical mechanism of MALS with increase of celiac artery compression during expiration, our patient showed reversely increased flow velocities and compression of the celiac artery during the inspiratory phase. In contrast to conventional surgical ligament release, our patient is currently being evaluated for endovascular treatment.

Recurrent Pulmonary Embolism on Rivaroxaban

Mostafa Ghanim¹; Shruti Hegde²; Alireza Vaziri²

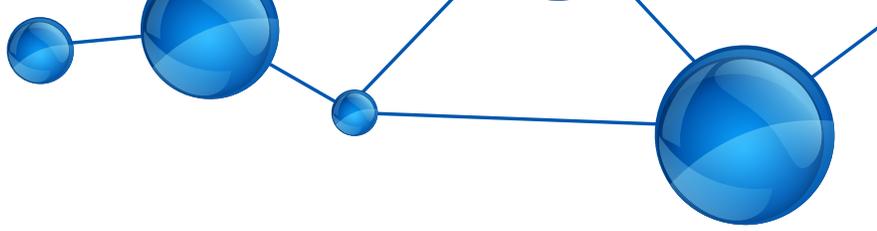
¹SEMC-Department of Medicine, ²SEMC- Division of Cardiovascular Medicine, Department of Medicine.

Introduction: Rivaroxaban is an oral factor-Xa inhibitor that demonstrated similar efficacy to conventional therapy (heparin followed by warfarin) for the treatment of acute venous thromboembolism (VTE). In this case study, we report a 36-year-old female who experienced recurrent acute bilateral pulmonary embolism (PE) despite being treated with Rivaroxaban.

Description of Case: A 36-year-old current smoker, obese female with history of first unprovoked pulmonary embolism for which she was taking Rivaroxaban 20mg once daily with breakfast, and recent hip replacement surgery, presented with acute onset shortness of breath, chest pain, tachycardia, tachypnea, with maintained blood pressure of 113/76 mmHg and oxygen saturation of 97% on room air. Electrocardiogram showed sinus tachycardia with signs of right heart strain and S1Q3T3-pattern. CT- pulmonary angiogram showed large hypodense areas in bilateral main pulmonary arteries suggestive of PE. Transthoracic echocardiogram showed normal ejection fraction of 59%, normal right ventricular systolic function with features of right ventricular strain. Workup for possible underlying conditions that may increase risk of recurrence, like cancer, antiphospholipid-syndrome, vasculitis, and pregnancy all came back negative. Patient

was started on intravenous unfractionated Heparin after which her symptoms improved. Patient was later discharged after on Fondaparinux 10mg subcutaneous daily. On follow up 1 month later, a repeat CT-pulmonary angiogram showed that the previously seen large bilateral PE has cleared.

Discussion: We reviewed the available literature on failure of Rivaroxaban and found that there are 2 main causes for recurrent VTE; underlying conditions and subtherapeutic drug levels. The most common underlying conditions that can result in recurrence are cancer, antiphospholipid-syndrome, vasculitis, and pregnancy. Subtherapeutic drug levels can be caused by poor compliance, interactions with other drugs or food, or inappropriate dosing. It is worth mentioning that because absorption of Rivaroxaban at 15-20mg doses decreases from nearly 100% to 66% under fasting conditions, it is recommended that VTE patients take Rivaroxaban with a meal. In our case none of the possible underlying conditions were present. Our patient was compliant and took appropriate dose of Rivaroxaban with food, and none of her home medications were known to have interaction with Rivaroxaban.



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Recurrent Thromboembolism in a Patient with Heparin-Induced Thrombocytopenia and Antiphospholipid Syndrome

Mullapudi, Manasa¹; Bekasiak, Anthony¹; Evanchuk, Darren²

¹SEMC-Department of Medicine, ²SEMC-Division of Hematology and Oncology, Department of Medicine

Introduction: Heparin-induced thrombocytopenia (HIT) often complicates the management of venous thromboembolism (VTE). Herein, we present an unusual case of recurrent thromboembolism in the setting of newly diagnosed concurrent HIT and antiphospholipid syndrome (APS). We review the salient aspects of this case and discuss the management of this complicated scenario.

Description of Case: A 43-year-old male with previous deep vein thromboses (DVTs) and pulmonary embolisms (PEs) presented with dyspnea. Regarding VTE history, he was diagnosed with a provoked DVT/PE and completed 18 months of Warfarin. He developed recurrent extensive DVT s/p thrombolysis, thrombectomy and angioplasty in 2017 requiring lifelong anticoagulation with apixaban. On presentation to the emergency department, he was found to have a right-sided PE noted on chest computed tomography. He was started on intravenous heparin, and underwent catheter-directed thrombolysis and inferior vena cava filter placement given right ventricular dysfunction noted on transthoracic echocardiography (TTE). However, a repeat TTE demonstrated worsening right ventricular dysfunction prompting a pulmonary artery embolectomy. Throughout his hospital

course, his platelet count decreased from 110K/uL on admission to 14K/uL on hospital day ten. Thrombophilia work up revealed elevated titers of anticardiolipin IgG Ab (146), anticardiolipin IgM Ab (18), and β 2 glycoprotein IgG Ab (>150) suggesting APS, for which he was continued on heparin. However, as a part of his thrombocytopenic workup, he was found to have a positive HIT antibody as well as an unfractionated heparin serotonin release assay confirming HIT. Therefore, the decision was made to initiate argatroban with the plan to transition to lifelong warfarin.

Discussion: The occurrence of arterial and venous thromboses is commonly seen in HIT and APS. However, co-occurrence of these conditions is rare and provides challenges in treatment options. Non-vitamin K antagonist oral anticoagulants (NOACs) have been considered in APS, however, the available literature has questioned their efficacy in this population. In our case, the patient developed a VTE despite being on NOAC therapy, arguing against the use of NOACs in APS. Given his concurrent HIT, heparin was contraindicated, prompting the need for argatroban, but with plan to transition to lifelong warfarin.

Tigecycline and the Management of Severe *Clostridium difficile* Infections Co-occurring with other Intra-abdominal Infections

Amr Dokmak¹; Maidah Yaqoob¹; Tamara Nawar¹; John Tedrow²; Jorge Fleisher³

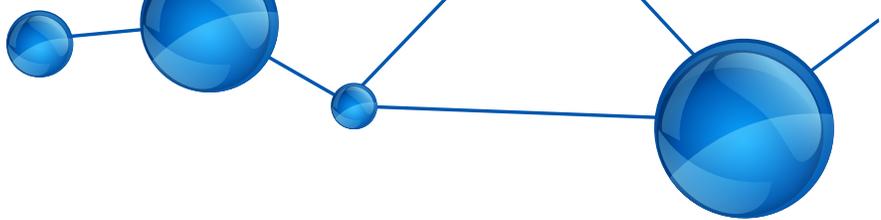
¹SEMC-Department of Medicine, ²SEMC-Division of Pulmonary and Critical Care Medicine; ³SEMC-Division of Infectious Diseases, Department of Medicine

Introduction: The incidence of *Clostridium difficile* infection (CDI) has risen in the past decade. The American College of Gastroenterology recommends intravenous metronidazole along with oral/rectal vancomycin for treatment of severe CDI. Tigecycline has been FDA approved for use in complicated intra-abdominal infections including CDI. We present a case series of three patients with severe CDI in association with other infections successfully treated with tigecycline and oral vancomycin.

Description of Case: 64-year-old woman was admitted with abdominal pain and diarrhea. A CT abdomen showed diverticulitis. Stool polymerase chain reaction (PCR) for CDI was positive. Laboratory data revealed an albumin of 2.9 g/dL confirming severe CDI. Patient received 5 days of tigecycline. Diarrhea resolved within 2 days and she was able to tolerate oral intake after 4 days. 58-year-old man was admitted with methicillin sensitive staphylococcus aureus endocarditis. Hospital course was complicated with abdominal pain and diarrhea. Stool PCR for CDI was positive. Laboratory data showed an albumin of 2.2g/dL confirming severe CDI. Treatment was started with vancomycin.

CT scan of the abdomen showed ileus. Tigecycline was added to his regimen. Tigecycline was administered for a duration of 3 days while vancomycin for 14 days. Diarrhea improved within 2 days and patient was able to tolerate oral intake after 15 days. 77-year-old woman was admitted with pneumonia complicated by diarrhea and severe abdominal pain. CT scan of abdomen showed diverticulitis. Stool PCR was positive for CDI. Laboratory data was significant for albumin of 2.3g/dL confirming severe CDI. Tigecycline was administered for duration of 6 days and vancomycin for 14 days. Diarrhea improved within 2 days and she was able to tolerate oral intake after 2 days.

Discussion: Tigecycline is an option for patients with severe CDI concurrent with other infections. Time to resolution of diarrhea and oral intake was also decreased as compared to the observed trends in conventional management. All of the patients in our study were discharged. No mortality was observed. It is important to note that tigecycline has a black box warning for increased mortality. More studies are needed to compare the efficacy of tigecycline with other antibiotics used managing severe CDI.



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Midfoot Collapse Associated with Spondyloepiphyseal Dysplasia Congenita: A Case Report

Kelly, Michael¹; Phillips, Alfred¹

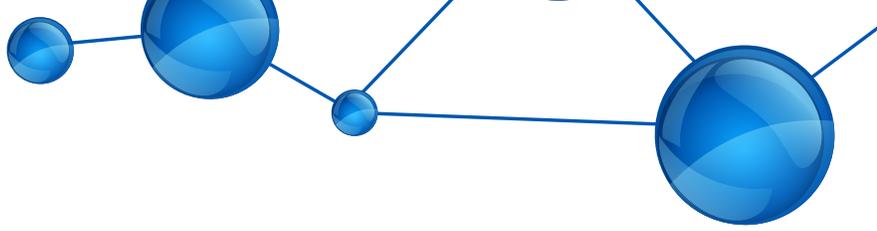
SEMC-Department of Podiatry, Division of Surgery¹

Introduction: Spondyloepiphyseal dysplasia is a group of rare disorders that cause deformation of vertebrae and abnormal growth at epiphyseal centers of peripheral bones. We present a case of a congenital foot deformity associated with this unique condition treated operatively. To the best of our knowledge, no similar case has previously been reported.

Description of Case: 26 year-old female with a PMH of spondyloepiphyseal dysplasia congenita presented with bilateral foot pain, right greater than left. Pain was localized to the medial arch. She has had chronic pain in her spine, hips and feet the majority of her life. Her foot pain was treated for several years with orthotics. The patient measured 4 feet 10 inches tall weighing 112 pounds. Clinically, she had medial arch collapse, a rigid subtalar joint in a fixed valgus position, and hypermobility in the midtarsal joint. There was significant equinus deformity of ~20 degrees plantarflexion with knee flexed and knee extended. Muscle strength 5/5 all lower extremity compartments. Gait evaluation revealed a propulsive gait with minimal dorsiflexion and severely abducted foot. She underwent a right foot triple arthrodesis involving

the subtalar joint, talonavicular joint, calcaneocuboid joint and naviculocuneiform joint along with an open frontal plane Tendo Achilles Lengthening. The rearfoot was stabilized to a slight valgus position with restoration of the midfoot collapse. After 2 months of non-weight bearing in a short leg cast she was walking in a CAM walker without pain and began physical therapy. At 3 months she comfortably returned to a supportive sneaker and normal walking.

Discussion: Spondyloepiphyseal dysplasia is a group of rare disorders where the main clinical features of short stature, chest malformations, and early onset joint degeneration are well documented. These patients may suffer from multi-joint pain and musculoskeletal difficulties. Foot pathology is rarely mentioned in previous case reports pertaining to this disorder. Pedal abnormalities can be debilitating to one's lifestyle and surgical intervention can help create a plantigrade, pain free functional foot. This case study provides a detailed clinical picture of a patient with a congenital pes valgus deformity associated with spondyloepiphyseal dysplasia congenita and subsequent surgical intervention.



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Validation and Comparison of Resting Gradient to Fractional Flow Reserve for Assessment of Coronary Artery Stenosis: A Real World Study

Joe Aoun¹; Saba Lahsaei²; Caroline Zahm¹; Tariq Bhat²; Joseph P. Carrozza²

¹SEMC-Department of Medicine; ²SEMC-Division of Cardiovascular Medicine, Department of Medicine.

Introduction: The visual interpretation of an angiographic stenosis may not always reflect the physiological significance of a lesion. Fractional Flow Reserve (FFR) is a reliable index to assess the significance of a lesion during hyperemia; however it carries a risk of misinterpretation and some adverse events due to adenosine use. This study sought to evaluate the accuracy of the resting distal coronary artery pressure to aortic pressure ratio (Pd/Pa) compared to hyperemic FFR therefore trying to bypass the need for adenosine.

Study Design: Retrospective cohort study.

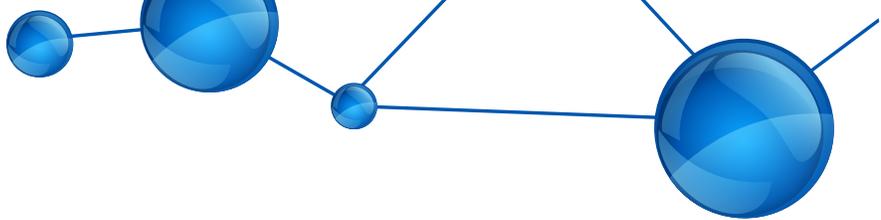
Setting and Participants: We reviewed electronic medical records at Steward hospitals to identify patients who underwent coronary stenting after utilization of FFR. Demographic characteristics, medical history and procedural data, including complications, were obtained.

Methods: We conducted a retrospective, multicenter study of 700 patients who underwent a pressure recording during coronary angiography using Pd/Pa and FFR measurements. Receiver operator characteristic (ROC) curve was constructed. Pd/Pa sensitivity, specificity, positive predictive value, negative predictive value and accuracy test were calculated. The most accurate Pd/Pa cutoff predicting a FFR cutoff of 0.8 was determined.

Results: The retrospective analysis of 700 procedures resulted in enrolling 449 pressure wire studies. By ROC analysis, the optimal cut-point for Pd/Pa was 0.93 to predict an FFR of ≤ 0.80 with an overall diagnostic accuracy of 78.84%. The sensitivity of this Pd/Pa cutoff was 85.06 %, specificity of 75.59 %, positive predictive value of 64.53% and a negative predictive value of 90.65%.

Conclusion: There was an overall accuracy of about 80% for predicting non-hyperemic index (FFR < 0.80) using a cutoff of Pd/Pa ≤ 0.93 . The use of Pd/Pa can be considered in certain clinical scenarios where adenosine is contraindicated or other challenges are faced; with the knowledge that hyperemia might be necessary if there is any high clinical suspicion as it still remains the reference standard for diagnostic certainty.

Limitations: This is a retrospective study. On the other hand, although all operators used a similar technique to measure the FFR, we cannot exclude minor technical differences.



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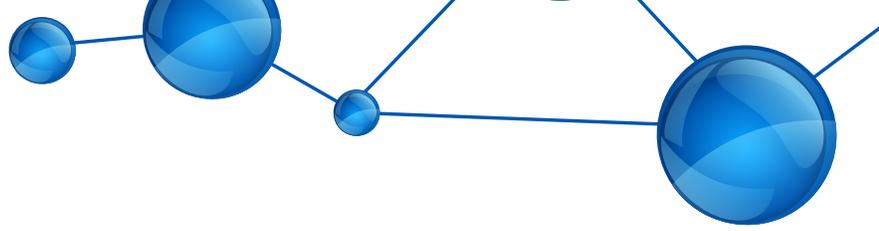
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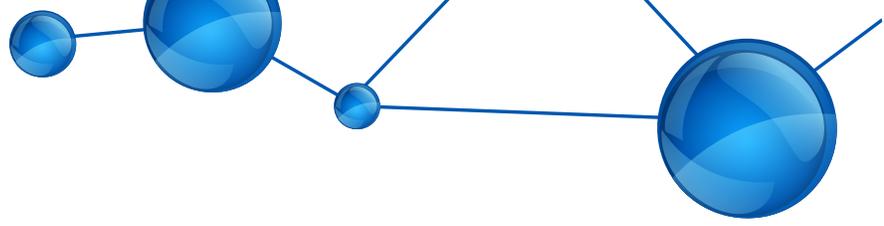
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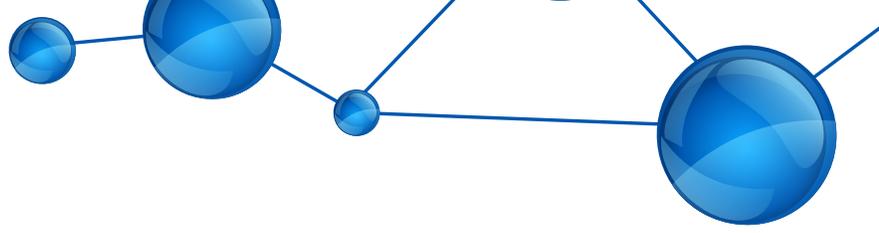
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