RUTGERS
Robert Wood Johnson Medical School

DEPARTMENT OF MEDICINE

22nd ANNUAL RESIDENCY & FELLOWSHIP RESEARCH DAY

May 26, 2021

Poster Viewing: 7:30am - 8:00am
Grand Rounds Oral Presentations: 8:00 – 9:00am

Vimal and Pappu Sodhani have been friends and supporters of Robert Wood Johnson Medical School (RWJMS) since 2017. Their generosity has provided essential funding to support research conducted by our residents & fellows in the Division of Education, the Division of Infectious Diseases and the Infectious Diseases Grand Rounds Series. The Division of Education thanks Mr. and Mrs. Sodhani for their support of Research Day. Their investment in training today helps shape tomorrow's physicians.

DEPARTMENT OF MEDICINE
RESIDENCY & FELLOWSHIP
22nd ANNUAL RESEARCH DAY
May 26, 2021
ZOOM MEETING

7:30 - 8:00 a.m. **Poster Viewing**

8:00 a.m. **Introduction:**
David A. Cohen, M.D.
Vice Chair, Education, Department of Medicine
Rutgers Robert Wood Johnson Medical School

Chair's Message:
Fredric E. Wondisford, M.D.
Chairman, Department of Medicine

Remarks:
Mr. Vimal Sodhani
Sodhani Foundation

Introduction and Moderation:
Michael B. Steinberg, MD, MPH, FACP
Vice Chair for Research and
Chair, Residency Research Committee
Moderator for Oral Presentations (below)

8:00-9:00 a.m. **Resident & Fellow Presentations**

Janet Cai, M.D., PGY 3 Internal Medicine Resident
Primary Causes of Hospitalization Among Patients with Left Ventricular Assist Devices

Mohammad Arsalan, M.D., PGY 5 Fellow in Infectious Disease
Impact of Rapid Diagnostic Assay on Duration of Broad-Spectrum Antibiotics for Gram-negative Bacteremia

Noah Mahpour, M.D., PGY 3 Internal Medicine Resident
Choice of Colonoscopy Preparation Impacts Presence of Intraluminal Residual Bubbles

Varun Bhasin, M.D., PGY 4 Fellow in Cardiology
Disparities in Drug Eluting Stent Utilization in Patients with Acute ST Elevation Myocardial Infarction

9:00 a.m. **Poster Awards**

"I remember fondly how important this event was to me during my training. The research questions that I first asked as an intern were to become the basis for a research theme that still permeates my work today. I want to congratulate you all on this large body of work. Finding out something new in medicine takes intelligence, persistence, and sometimes a little luck. There is, however, nothing like the feeling of accomplishment that comes from discovery. Regardless of your future career choice, we hope this experience will be a formative one."

Fredric Wondisford, M.D.
Professor and Chair; Department of Medicine

"I am excited to see so many physicians-in-training get involved in research. Asking important questions and searching for the answers is at the heart of scientific exploration. I hope for all of you that this is just the beginning of a career-long passion to find solutions to our clinical challenges."

Michael B. Steinberg, MD, MPH, FACP
Professor and Chief
Division of General Internal Medicine
Vice-Chair of Research
Department of Medicine
Director - Rutgers Tobacco Dependence Program

"We are pleased to publish this booklet of abstracts representing the current research by Residents and Fellows. For the advancement of knowledge, maintaining and fostering curiosity – the ability to ask questions is indispensable. A foundation in research design will help them question peers, consultants and reference sources about the appropriateness of medical interventions and therapies. As advocates for patients, we must inspire our learners to remain critical thinkers who continue to learn. Our primary purpose is to encourage critical thinking, and the self-confidence to continue to ask questions long after training is completed. We congratulate our residents and fellows for their contributions and we thank the faculty for their mentorship."

Ranita Sharma, MD, MACP
Program Director
Internal Medicine Residency
Chief, Division of Education

ORAL PRESENTATIONS

PGY 3
ORAL PRESENTATION

Abstract Title: Primary Causes of Hospitalization Among Patients with Left Ventricular Assist Devices

Associate & Authors: Janet Cai, MD; Weiyi Xia, MS; Patricia Greenberg, MS; Ike Okwuosa, MD; Soko Setoguchi, MD; Ehimare Akhabue, MD

Purpose: Severe complications after left ventricular assist device (LVAD) placement remain a major issue. Socioeconomic markers have been examined as risk factors for immediate post-operative complications and short term (within 90 days) readmissions; however, the total burden of re-hospitalizations and whether primary causes and frequency of severe complications differ by sociodemographic factors has not been well described.

Methods: Using hospitalization data from the Healthcare Cost and Utilization Project: National Inpatient Sample, we identified all hospitalizations between 2012 and 2016 of adults ≥18 years old with history of prior LVAD placement. Primary causes for hospitalization were categorized initially into 15 groups and then presented in 7 groups (Figure 1). Distribution of primary causes were assessed in subgroups of age (18-44, 45-64, ≥65), sex, and race. Differences within subgroups were assessed by chi-squared statistics.

Results: We identified 48,405 hospitalizations during the 5-year study period (41% age ≥65, 77% male, 25% Black, 58% White, 5% Hispanic). Infection was the most frequent primary cause in younger adults (age 18-44) (Figure 1). GI bleed was the most common cause in adults ≥65 (18.2% of hospitalizations) but less frequent in younger adults (ages 18-44: 3.7% and 45-64: 13.7%, X^2 p=<0.001). Device complications occurred most frequently in younger adults (ages 18-44: 6.4%, 45-64: 4.4%, and ≥65: 3.7%, p=<0.001). Frequencies of hospitalizations were similar by sex. Hispanics had the highest frequency of heart failure (16.0%) which differed from blacks (14.7%) and whites (13.0%) (p=<0.001).

Conclusion: Significant demographic differences exist in frequency of primary causes of hospitalization in adults with prior LVAD placement. Future study is necessary to understand how distribution of causes vary by socioeconomic differences after adjusting for demographic and clinical characteristics during long term follow-up.

PGY 5
ORAL PRESENTATION

Abstract Title: Impact of Rapid Diagnostic Assay on Duration of Broad-spectrum Antibiotics for Gram-negative Bacteremia

Associate & Authors: Mohammad Arsalan, MD, Sana Mohayya, PharmD, MHS, BCPS, Navaneeth Narayanan, PharmD, MPH, BCIDP, Pinki Bhatt, MD, Christin Hong, Kinjal Solanki, MD, Tanaya Bhowmick, MD

Introduction: Empiric use of broad-spectrum antibiotics for prolonged duration can lead to emergence of drug-resistant pathogens and development of *C. difficile* infection. This can result in prolonged hospital stay and increased morbidity and mortality. Routine microbiology laboratory practices for positive blood cultures result in identification of the organism and susceptibility results in approximately 48 hours. Accelerate Pheno is a rapid diagnostic instrument that identifies gram-negative organisms from signal positive blood cultures in less than 2 hours and antimicrobial susceptibilities in approximately 7 hours.
The objective of this study is to measure the clinical impact of the Accelerate Pheno on patients with gram-negative bacteremia compared to standard laboratory practice. We hypothesize that rapid diagnostics along with antimicrobial stewardship oversight will lead to decreases in duration of broad-spectrum antibiotic use and length of stay.

Method: We conducted a retrospective, before-and-after, observational cohort study of blood culture testing and reporting at Robert Wood Johnson University Hospital. From 6/1/2018 to 12/30/2018 standard laboratory practices were employed and from 6/1/2019 to 12/30/2019 the rapid diagnostic instrument with antibiotic stewardship oversight was used. All adult inpatients with a positive blood culture showing gram-negative rods on gram stain who received more than 72 hours of a systemic antibiotic were included.
Patients with polymicrobial infections or who were transferred from an outside facility and who received antibiotics based on the other institution's culture were excluded.
The primary outcome was duration of broad-spectrum antibiotic therapy. Secondary outcomes included modification within 24 hours of culture results, time to directed therapy, subsequent multidrug resistant organism (MDRO) infection and C. difficile infection within 30 days.

Results: There was a total of 224 patients who met inclusion criteria, 93 patients and 131 patients in the pre- and post-cohorts, respectively. The primary outcome of duration of antibiotics was significantly decreased in the post-intervention cohort (4.0 days vs 2.0 days, $p<0.05$). The secondary outcome of modification of therapy was higher in the post-cohort (69% vs 85%, $p<0.05$). Of patients who had a modification of therapy, there was no statistically significant difference in the proportion of patients who modified within 24 hours of culture results (91% vs 85%, $p=0.18$). Time to directed therapy was decreased in the post-cohort (25.9 hours vs 18.9 hours, $p<0.05$). The other secondary outcomes of MDRO infection and *C. difficile* infection were also significant (11% vs 2%, $p <0.05$ and 9% vs 0.9%, $p <0.05$, respectively).

Conclusion: The Accelerate Pheno was associated with a lower duration of empiric antibiotics in patients with gram-negative bacteremia. This led to a decrease in antibiotic complications, including MDRO infections and *C. difficile* infections. Overall, the Accelerate Pheno instrument may be an effective adjunct to current antimicrobial stewardship measures.

PGY 4
ORAL PRESENTATION

Abstract Title: Choice of colonoscopy preparation impacts presence of intraluminal residual bubbles

Associate & Authors: Peter Dellatore, MD; Savan Kabaria, MD; Noah Mahpour, MD; Amita Risbud, MD; Monica Saumoy, MD; Kevin Skole, MD

Introduction: Residual intraluminal bubbles found during colonoscopy have been shown to reduce adenoma detection rates by interfering with mucosal visualization. Simethicone is regularly used to reduce bubbles but this results in a biofilm in the endoscope-working channel leading to unknown infectious implications. The purpose of this study is to identify factors that may increase the presence of residual bubbles; specifically, colonoscopy preparation formulations or patient factors.

Methods: This was a prospective, single-center study of 453 patients who underwent outpatient screening colonoscopy from September 2019 to February 2020. Patients with a history of inflammatory bowel disease, bowel surgery, or those undergoing diagnostic evaluation were excluded. Prior to the exam, all patients completed a multiple-choice survey quantifying fiber, sugar and gelatin intake, as well as water source and dietary oils. It also assessed underlying health conditions, medication use, chronic gastrointestinal symptoms, and the type of colonoscopy prep used. After the exam, the endoscopist established if residual bubbles were present and if simethicone was necessary for visualization. The primary outcome was factors that resulted in increased residual bubbles. A binary variable for the presence of bubbles was used as the outcome variable. Various colon preparations were used as the dependent variables in the logistic regression model.

Results: The mean age was 58.3 years and 47.0% were female. 39.7% of patients used polyethylene glycol (PEG); 35.3% used sodium sulfate, potassium sulfate and magnesium sulfate (SS); 21.4% used sodium picosulfate, magnesium oxide, and anhydrous citric acid (SP); and 3.5% used PEG 3350, sodium ascorbate, sodium sulfate, ascorbic acid, sodium chloride, and potassium chloride (PEG-SA). Bubbles were present in 26.6% of patients, irrespective of the colon preparation. Following are the proportion of patients with the presence of bubbles and their respective colon preparation: PEG (23.6%), SS (33.3%), SP (14.1%), and PEG-SA (40%). Patients who used SP as their colon preparation were 59.1% less likely to have bubbles present during colonoscopy (OR 0.41; 95% CI 0.22 – 0.77; $p < 0.01$). Patients who used SS were 84% more likely to have bubbles present during colonoscopy (OR 1.84; 95% CI 1.18-2.86; $p < 0.01$). There were no statistically significant differences identified with the use of PEG or PEG-SA preparations.

Discussion: It has been established that residual bubbles reduce adenoma detection rate. Their prevalence is not insignificant as they have been found in approximately 30-40% of colonoscopies. This correlates with our study as bubbles were found in 26.6% of patients. There is limited information regarding what increases residual bubbles. The findings of our study demonstrate that the type of colon preparation used impacts the incidence of residual bubbles. Further research is needed to assess what additional factors might affect the presence, or absence, of residual bubbles, and whether certain colon preparations should be considered for specific patient populations. This study supports the idea that presence of residual bubbles should be included when evaluating the efficacy of a bowel preparation.

PGY 4
ORAL PRESENTATION

Abstract Title: Disparities in Drug Eluting Stent Utilization in Patients with Acute ST Elevation Myocardial Infarction

Associate & Authors: Varun Bhasin, MD, Ashish Awasthi, MD, Ankur Sethi, MD, and John Kassotis, MD

Background: The superiority of Drug-Eluting Stents (DES) compared to Bare-Metal Stents (BMS) has been well-established, but data regarding DES use in ST elevation myocardial infarction (STEMI) among different races is limited. We sought to examine stent utilization patterns and disparities based on race, socioeconomic status, and gender in patients with STEMI undergoing percutaneous coronary intervention (PCI).

Methods: The National Inpatient Sample (NIS) database was used to retrospectively compare DES versus BMS use in patients admitted with STEMI from 2009 to 2017. Multivariable logistic regression was performed to assess the independent predictors of DES use.

Results: DES utilization increased significantly from 62.8% in 2009 (95% confidence Interval [CI] 0.60-0.65) to 90.6% in 2017 (95% CI 0.90-0.91). Although DES use increased significantly over the study period, African Americans were still less likely to receive a DES (OR 0.80, 95%CI 0.75-0.85) compared to Caucasians even after adjusting for other variables (Figure 1). Patients insured by Medicaid (OR 0.81, 95% CI0.77-0.85) or Self-pay (OR 0.64, 95% CI 0.61-0.67) were less likely to undergo DES implantation compared to those with private insurance (OR 1.36, 95% CI 1.31-1.41). Females were more likely to undergo DES implantation (OR 1.07, 95% CI 1.04-1.10).

Conclusion: Disparities based on race and insurance status continue to persist despite a significant increase in DES utilization in STEMI patients across the identified subgroups in recent years.

CLINICAL
AND/OR
BASIC SCIENCE
RESEARCH ABSTRACTS

Abstract Title: Venous Thromboembolism and Thyroid Cancer- A Retrospective Study

Associate & Authors: Chukwuka Akamnonu, MD, & David A. Cohen, MD, FACE, ECNU.

INTRODUCTION: Current guidelines from the International Society of Thrombosis and Hemostasis recommend limited screenings for deep vein thrombosis (DVT) or pulmonary embolism (PE) with no identifiable precipitating factor (termed unprovoked). There is paucity of data with regards to thyroid cancer screening in the setting of an unprovoked VTE. Studies from Europe have shown an association between VTE and thyroid cancer; however, these studies do not account for differences in iodine availability, thus the need for studies in the United States. Understanding the risk of thyroid cancer as a provocative factor in developing a deep venous thrombosis (DVT) or pulmonary embolism (PE) may be able to facilitate case detection of disease and prevent future morbidity and mortality from thyroid cancer and/or VTE.

OBJECTIVES: The primary objective of this study is to understand the risk of developing VTE in the setting of thyroid cancer.

METHODS: In this retrospective chart review study, we reviewed electronic medical records of patients with a history of DVT or PE between ages 18-99, presenting to all outpatient clinics at a single academic medical center in New Jersey between October 1, 2015, and Dec 31, 2018. We screened for coexistent cancer history among this group, and from this sample we further isolated cases of thyroid cancer.

RESULTS: 345 patients were found to have a history of VTE. 187 were female (54%) and 113 (29%) had a history of malignancy. The most common cancers were breast (19%), colorectal (9%), leukemia (9%), prostate (8%), and lymphoma (8%). Thyroid cancer accounted for 2% of all discovered cases.

CONCLUSION: In this retrospective analysis, 2% of all patients with VTE and cancer carried a diagnosis of thyroid cancer. Although this suggests a relatively low risk, given the medical burden of a venous thromboembolism and the comparable proportion of thyroid cancer in all new cancer cases, thyroid cancer should be considered a provoking factor in unprovoked VTE.

Abstract Title: Endocrine Elective Primer for Clinical Medical Students

Associate & Authors: Sandhya Bassin MD, Sara Lubitz MD

Introduction: To provide clinical medical students with standardized information, we developed an endocrine primer for third- and fourth-year medical students to utilize while on their endocrinology elective rotation. The endocrine primer, defined as a set of introductory preparatory material, is in the form of a PowerPoint presentation. The primer reviews commonly seen adult endocrine disorders, including disease physiology, symptom presentation, diagnosis, treatment and management.

Methods: Third- and fourth-year medical students enrolled in the endocrine elective from Jan 2020-April 2021 (n=16) completed a 15 question pre-and post-knowledge assessment, as well as an endocrine primer satisfaction survey. The knowledge assessments evaluated students' knowledge of topics surrounding hyper- and hypothyroidism, type 1 and 2 diabetes mellitus, adrenal insufficiency, hypercalcemia, osteoporosis, and pituitary adenoma. The endocrine primer was made available to students after completing the pre-knowledge assessment at the beginning of the endocrine elective. The post-knowledge assessment was completed at the end of the two- or four-week endocrine elective.

Results: There was a significant improvement from pre-knowledge scores (M= 8, SD= 2.4) to post-knowledge scores (M=10.2, SD= 2.3), paired-t test: $t(15) = 3.6$, $p<0.01$. Student satisfaction with the endocrine primer was high, with everyone agreeing the primer made them more prepared for the elective.

Discussion: The endocrine primer standardized students' endocrinology knowledge and enhanced satisfaction with the endocrinology elective. This self-paced learning opportunity was well received by medical students and should be included in other clinical electives.

Study approved by NB Rutgers Health & Sciences IRB – 12/17/2019

Abstract Title: Frailty is Associated with High Readmission Rates and Mortality Among Diverticulitis Patients: A Nationwide Cohort Study

Associate & Authors: Savan Kabaria, Abhishek Bhurwal, Darren N Seril

Introduction: Diverticulitis is a common manifestation in the older population. Frailty is a significant predictor of outcomes in the older patient population in many chronic medical conditions. The implications of frailty in diverticulitis have not been well-established. We identify the mortality and readmission rates associated with frailty and diverticulitis.

Methods: In a cohort of 27,930 hospitalized diverticulitis patients from the Nationwide Readmissions Database, we applied a validated definition of frailty using International Classification of Disease 10 codes. We compared frail diverticulitis patients to those without a frailty-related code. We constructed a multivariate logistic regression model adjusting for clinically pertinent confounders such as demographics and co-morbidities and Charlson Comorbidity Index [CCI] to determine whether frailty predicts mortality and readmissions. Adjusted Odds Ratio (aOR), 95% confidence interval (CI), median, and interquartile ranges (IR) are depicted where applicable.

Results: Over a follow-up time of 10 months, adjusting for demographic and comorbid conditions, frailty was independently associated with an increased mortality rate (aOR 9.18; 95% CI 7.22 – 11.68; $p < 0.001$). The absolute adjusted mortality rates of non-frail and frail patients with diverticulitis over a 10-month follow-up period was 0.46% and 4.08%, respectively. Additionally, frail patients with diverticulitis were more likely to have subsequent re-admission (aOR 1.71; 95% CI 1.60 – 1.83; $p < 0.001$). Frail patients with diverticulitis spent more days in the hospital annually (aOR + 4.2 days; 95% CI 3.8 – 4.5 days; $p < 0.001$). Absolute median days in the hospital for non-frail and frail patients were 8 days (IR 6-12) and 11 days (IR 7-18), respectively. Frail patients with diverticulitis had higher hospitalization costs (+$8,703; 95% CI $7,704 - $9,701; $p < 0.001$). Absolute median hospitalization costs for non-frail and frail patients were $19,354 (IR $12,608 – $29,768) and $24,396 (IR $15,147 - $40,350), respectively.

Conclusions: Frailty is independently associated with higher mortality and burden of hospitalization in patients with diverticulitis. Frailty should be considered in the treatment approach, especially in older patients with diverticulitis. Screening tools should be developed to classify frailty in setting of diverticulitis easily.

Abstract Title: Association of Prosthesis Oversizing or Under Sizing Balloon-Expandable Transcatheter Aortic Valve Replacement and Clinical Outcomes

Associate & Authors: Alexis K. Okoh MD, Kush Patel MD, Amy Suhotliv MD, Chamaka Kalutota MD, Justin Johannesen MD, Leonard Lee MD, Mark Russo MD, Chunguang Chen MD

Background: In patients undergoing TAVR who have natural aortic annular areas in an overlapping range between 2 valve sizes (ex. 23 mm or 26 mm Edward S3 valve), pre-operative valve sizing with multi-slice computed tomography (MDCT) based on aortic annular size will create variability in the prosthetic valves used to repair the defect, resulting in discrepancies between manufacturer recommendation and the valves actually used (oversizing vs undersizing). We sought to compare post-procedure clinical outcomes of under- or over-sizing in regards to prosthetic mismatch, pacemaker implantation rate, aortic root injury and pericardial effusion

Methods: Patients who had TAVR with the Edward Sapien S3 valve were reviewed from a prospectively maintained database. Aortic annular areas were measured by MDCT at mid systole and then compared to the best recommended TAVR size based on manufacturing recommendation and then to the actual implanted valve size which was determined by clinical, multi-disciplinary decision making. Patients were stratified into 3 groups based on comparisons between actual implanted valve size and manufacturer recommended valve size: regular, under and over-sizing for TAVR valve sizes of 20, 23, 26, or29mm. The association between valve sizing and patient prosthesis mismatch (PPM) and other procedural outcomes (pacemaker implantation rate, rates of pericardial effusion and aortic root injury) was investigated

Results: The patient population consisted of 198 patients who fulfilled the study criteria. The demographic characteristics of these patients included a mean age of 81yrs., male female ratio 12:13, average STS mortality risk score: 5.58%. 23 (11.6%) were oversized, 58 (29%) were undersized, and 117 (59%) were regularly sized compared to standard manufacturer recommendations. No PPM was observed in 29 mm TAVR (0/34) patients. Moderate or severe PPM was seen in 20mm (n=2), 23 mm (n=10), 26 mm (n=8) valve sizes.

The outcome of moderate or severe PPM was more common in patients with under sizing (18.4%, 9/49 patients) than oversizing (0/20 patients) in patients with valve sizes 26 mm or less ($P<0.05$). Immediate pacemaker implantation [Oversize (13%) vs. regular size (17%) vs. undersize (7%) $p=0.151$] were comparable among groups. There was no association between valve sizing and overall complication rates or all-cause mortality at 30 days.

Conclusion: The results of this study indicate that, in patients with less than 29mm TAVR size, undersizing based on manufacturer's recommendation may increase PPM. However, there was no association between valve sizing and immediate post-procedural outcomes. Further evaluation of long-term outcomes beyond 1 month would be helpful in further analysis.

Abstract Title: Do elective cardiac procedures increase risk of symptomatic COVID-19 transmission with current hospital precautionary measures

Associate & Authors: Amy Suhotliv, MD, Justin Johannessen MD, Ikenna Erinne MD, Lori Amandeep, Alexis K Okoh MD, Chamaka Kalutota MD, Nikita Mishra MD, Anthony Lemaire MD, Leonard Lee MD, Abdul Hakeem MD, Ashok Chaudhary, Subhashini Gowda, Tudor D . Vagaonescu MD, Mark Russo MD, Chunguang Chen MD

Background: During the height of the COVID epidemic, elective procedures within hospitals were often delayed in an effort to maintain patient safety and avoid nosocomial infection. With the advent of more effective therapies and novel COVID vaccines, there has been a strong impetus for these same elective procedures to resume. Yet, this has come with concern about the spread of nosocomial transmission. This retrospective review intended to elucidate whether the implementation of already existing standard hospital precautionary measures (face masks, etc.) would help curtail the theoretical risk of patients undergoing elective cardiac procedures in the setting of reopening post-surge.

Methods: A standard questionnaire via telephone and retrospective chart review was performed to inquire participating patients who underwent cardiac procedures between 5/22/2020 and 7/23/2020 about contacts with COVID-positive individuals, pre-defined COVID-19 symptoms (fevers, cough, shortness of breath, nausea, vomiting, and diarrhea, loss of taste/smell) post-procedure as well as readmissions within 1 month following their procedures. 3 positive symptoms were considered to be highly suspicious for COVID, and deemed a "COVID equivalent." The incidence of hospital readmission, repeat COVID testing, and reason for readmission was also noted

Results: The study examined 367 participating patients who underwent elective cardiac procedures during the post COVID peak. 20 underwent structural heart or surgical procedures such as TAVR or CABG, 245 underwent cardiac catheterization, and 102 had other procedures such as EP ablations, venograms, aortograms, tilt table testing or pacemaker insertions. Of the 367 patients contacted, 11.2% (n=41) reported any COVID -19 related symptoms. Of these 41 patients, 31 had a cardiac catheterization procedure, 1 had a TAVR, and 9 had EP or other procedures. The average length of stay of the 41 patients was 76 hours with a median of 36 hours. There were no readmissions for COVID-19 within 1 month. It was noted that one patient who underwent a cardiac catheterization during his admission appeared to develop COVID and subsequently died. His LOS was 480 hours, which is much longer than the average or median time for this procedure. Only 0.54% (n=2) of all patients qualified as COVID equivalents per our definition.

Conclusion: This study suggests that symptomatic COVID transmission for cardiac procedures during reopening after pandemic shut-down is rare with current hospital precautions and protective measures for patients. Recall bias can, of course, present an issue regarding study validity which is why follow-up of more patients (especially in the setting of actual further reopening) is required to confirm our results.

Abstract Title: A survey of antibiotic use during insertion of cardiovascular implantable devices amongst United States implanters

Associate & Authors: Stephen F. Kranick, MD; Arjun Theertham, MD; Nikita Mishra, MD; John Kassotis, MD

Background: Antibiotic use for cardiovascular implantable devices (CIED) prophylaxis is a well-accepted strategy despite little data supporting this practice. Pre-procedural prophylaxis has been shown to effectively lower rates of CIED infections; however, data is lacking to support the use of intra- and post-procedural antibiotic use. Additionally, the use of antibiotic-eluting envelopes has been increasingly shown to significantly reduce post-procedural CIED infections. Understanding implanter practices will provide insight into whether more antibiotic stewardship is needed.

Objective: The purpose of this survey was to assess the practices of implanters nationally.

Methods: An anonymous online survey was sent to 150 implanters across the US. Participants were board certificated, implanters of CIEDs, and had practice experience between 1 and 25 years in various hospital settings.

Results: Ninety-seven percent of respondents reported routine use of systemic antibiotics pre-operatively; the most common antibiotics used were cefazolin (81%) and vancomycin (65%). About two-thirds of implanters continue systemic antibiotics post-operatively, with half of respondents continuing antibiotics for greater than 24 hours. Eighty-three percent use antibiotics intra-operatively with irrigation/pocket flush. Fifty-five percent of respondents routinely use antibiotic-eluting envelopes on approximately thirty-eight percent of their patients. The most common reasons cited by respondents prompting use of antibiotic-eluting envelops were infection concerns, significant risk factors, prior device infection, and immunosuppressed status. Two-thirds of respondents use systemic antibiotics during generator changes, with more than half of respondents continuing antibiotics for greater than 24 hours.

Conclusion: Despite increasing data regarding use of antibiotics systemically, via intra-operative pocket irrigations, and via antibiotic-eluting envelopes for CIED infection prophylaxis, this study suggests wide variation in practice among device implanters. Additional attention to existing guidelines and evidence regarding appropriate use of pocket irritation, post-procedural systemic antibiotics, and antibiotic-eluting envelopes is still needed.

Abstract Title: Per Oral Endoscopic Myotomy for Zenker's Diverticulum: A Novel and Superior Technique Compared to Septotomy?

Associate & Authors: Mahpour, Noah Y.; Kahaleh, Michel; Tyberg, Amy; Bareket, Romy; Shahid, Haroon M.; Sarkar, Avik; Abdelqader, Abdelhai; Gjeorgjievski, Mihajlo; Marino, Daniel; Kats, Daniel; Gaidhane Monica

Introduction: Zenker's Diverticulum carries significant risk for dysphagia, weight loss, and aspiration events due to pooling of food and oral secretions into the pseudo-diverticulum. Endoscopic tunneling for Zenker's Diverticulum has been shown to have promising data in regards to symptom alleviation and reduced morbidity and mortality. We report our data from a multicenter study comparing per oral endoscopic myotomy (Z-POEM) versus traditional septotomy for the treatment of Zenker's Diverticulum.

Methods: Patients with a Zenker's Diverticulum treated either by Z-POEM or Septotomy from 7 international centers (3/2016 - 11/2019) were included. Patient demographics, pre intervention functional markers and scores (Functional Oral Intake Scale Score {FOIS Score}, Eckardt Score), size of the diverticulum, procedural data, adverse events, and hospital length of stay (LOS) were collected. Independent and paired T-test analyses and chi-square analyses were conducted to compare means and proportions respectively.

Results: A total of 101 cases were analyzed: 49 Septotomy, 52 Z-POEM (Table 1).

For the Septotomy cohort, mean age was 73, average pre-intervention FOIS score was 5.3, and average pre- intervention Eckardt score was 5.4. The average procedure time was 44 minutes, the average length of myotomy was 3.51 cm. Technical success was achieved in 100% of cases. There were 15 adverse events (21%): bleeding (n=5), leak (n=4), nausea/vomiting (n=3), or other (n=3). 7 patients experienced recurrence; both required an additional procedures. The average LOS was 1.9 days. Post procedurally, the FOIS score was 6.6, the Eckardt score was 1.6, and overall clinical success was reported in 84% of cases.

For the Z-POEM cohort, mean age was 75, average pre-intervention FOIS score was 5.9, and the average pre-intervention Eckardt score was 5.15. The average procedure time was 42 minutes; the average length of myotomy was 3.32 cm. Technical success was achieved in 98% of cases. There were no adverse events. Three cases required an additional procedure. The average LOS was 1.5 days. Post procedurally, the FOIS score was 6.82, the Eckardt score was 1.3, and overall clinical success was reported in 92% of cases.

The Z-POEM group had significantly less adverse events than the septotomy group ($p = .016548$). All other outcomes were not statistically different.

Conclusions: In the treatment of Zenker's Diverticulum, multiple therapeutic modalities exist; however, our experience and data reveal an important and significant advantage of Z-POEM over traditional septotomy in a statistically significant difference in terms of adverse events. We believe that Z-POEM will shift towards becoming a standard of care in the endoscopic treatment of Zenker's Diverticulum, and endoscopists should familiarize themselves with the technique.

Abstract Title: Rising Prevalence of Anxiety and Depression in Chronic Pancreatitis: A Nationwide Analysis

Associate & Authors: Michael Makar, MD, Ziga Vodusek, MD, Weiyi Xia, BS, Patricia Greenberg, MS, George Abdelsayed, MD

Objective: Chronic pancreatitis (CP) is a complex progressive fibro-inflammatory condition that has been shown to lead to long-term sequalae including chronic pain and decreased pancreatic function. While pain is the most common presenting factor, the burden of this disease can be severe and has a significant effect on quality of life. We aim to characterize the prevalence and impact of anxiety and depression (AD) in hospitalized patients with chronic pancreatitis (CP).

Methods: We performed a retrospective analysis using the National inpatient Sample from 2007-2014. The primary outcome was the prevalence and trend of AD in hospitalized patients with CP. Secondary outcomes were independent predictors of AD in CP.

Results: A total of 75,744 patients with CP were included in our analysis, of which 23, 323 (31%) had anxiety or depression. The prevalence of anxiety increased from 7.33% in 2007 to 20.02% in 2014. Depression increased from 18.49% in 2007 to 23.89% in 2014. A diagnosis of Anxiety and Depression has increased from 23.79% in 2007 to 33.44% in 2014. Independent predictors of AD were decreasing age, female sex and multiple comorbidities. Decreased risk was seen in African Americans, Hispanics and those from the South and West. AD did not impact overall mortality, length of stay or healthcare utilization costs.

Conclusion: Anxiety and depression are increasingly recognized diagnosis in patients with chronic pancreatitis. Careful management and treatment of psychiatric illnesses and improving quality of life need to be addressed for these patients.

Abstract Title: Glycemic Management in CABG Surgery Patients by Telemedicine Versus In-Person Consultation

Associate & Authors: Andrew J. Newman MD, Anupam Ohri MD, Leonard Y. Lee MD, and Ankit Shah MD

Objective: Optimal blood glucose management improves outcomes in hospitalized patients. Endocrine consultative services often provide this care with daily in-person encounters. As many consultative services became virtual during the COVID-19 pandemic, it became possible to investigate whether in-person and virtual consultations result in differing glycemic control.

Research Design and Methods: We conducted a retrospective chart review of adult patients with type 2 diabetes who underwent coronary artery bypass graft (CABG) surgery from December 2019 through February 2020 (in-person) and patients from March 2020 through May 2020 (virtual).

Results: Thirty-one patients were included in the in-person group and thirteen in the virtual group and were similar in age, diabetes control, and hospitalization duration. Mean blood glucose levels were similar between the in-person and virtual consultation groups (182.18 ± 31.04 versus 175.60 ± 43.88, p=0.57) as were mean fasting blood glucose levels (155.54 ± 27.33 versus 158.67 ± 37.82, p=0.76). Incidence of severe hypoglycemia and severe hyperglycemia did not differ between the two groups nor did final dosages of basal, mealtime, or correction insulin during hospitalization.

Conclusion: Virtual endocrine consultation led to similar glycemic control and treatment strategies in CABG surgery patients as traditional in-person consultation.

Abstract Title: A Retrospective Analysis of Fluid Balance in Patients with Acute Kidney Injury and Respiratory Failure due to COVID-19

Associate & Authors: Pranav Sharma MD, Frank Portugal DO, Steve Khalil MD, Patricia Greenberg MS, Brielle Formanowsk

BACKGROUND: The optimal amount of hydration for patients with severe COVID-19 infection and AKI is unknown. This study aims to investigate whether there is an association between fluid management strategy and outcomes in patients with AKI and respiratory failure due to COVID-19.

METHODS: Data was retrospectively analyzed from 58 patients with critical hypoxia (requiring a nonrebreather mask, high flow nasal cannula or mechanical ventilation) due to COVID-19 infection and stage 2 or greater AKI. We assessed whether there were differences in net fluid balance between patients who were successfully weaned to lower levels of oxygen support and discharged compared to those who expired or could not be liberated from mechanical ventilation.

RESULTS: Of 58 cases, 41 expired (70.7% mortality), 3 remained chronically ventilator-dependent, and 14 survived to discharge without supplemental oxygen. The groups differed in net fluid balance (-10,065 cc vs +7,980 cc, $p < 0.001$) and daily fluid balance (-367 vs. 515 cc/day, $p < 0.001$) with a substantially lower mean fluid balance in patients who survived with a minimal requirement for supplemental oxygen. Patients maintained in positive fluid balance were significantly more likely to experience an unfavorable outcome of chronic ventilator dependence or death (OR: 40.7, 95% CI: 5.3 - 312.9). A fluid restrictive strategy did not reduce the likelihood of recovery from AKI or increase the need for renal replacement therapy.

CONCLUSION: In this cohort, patients with COVID-19 and AKI who survived with minimal or no oxygen requirements tended to have negative fluid balance in contrast to those who expired or remained ventilator-dependent. A fluid restrictive strategy with judicious volume removal using diuretics or dialysis may lead to improved outcomes in COVID-19 patients with AKI.

Abstract Title: EUS-guided pancreatic duct compression in surgically altered or failed ERCP – A systematic review, meta-analysis and meta-regression

Associate & Authors: Augustine Tawadros, MD; Abhishek Bhurwal, MD; Anish Patel, MD; Avik Sarkar, MD

Introduction: EUS-PD (EUS guided pancreatic duct drainage) is classified into two types: EUS-guided rendezvous techniques and EUS-guided PD stenting. Prior studies showed significant variation in terms of technical success, clinical success and adverse events.

Methods: Three independent reviewers performed a comprehensive review of all original articles published from inception to June 2020, describing pancreatic duct drainage utilizing EUS. Primary outcomes were technical success, clinical success of EUS-PDD and safety of EUS-PD in terms of adverse events. All meta-analysis and meta-regression tests were 2-tailed. Finally, probability of publication bias was assessed using funnel plots and with Egger's test.

Results: A total of sixteen studies (503 patients) described the use of EUS-PD for pancreatic duct decompression yielded a pooled technical success rate was 81.4% (95% CI 72-88.1, I 2 = 74). Meta-regression revealed that proportion of altered anatomy and method of dilation of tract explain the variance. Overall pooled clinical success rate was 84.6% (95% CI 75.4-90.8, I 2 = 50.18). Meta-regression analysis revealed that the type of pancreatic duct decompression, proportion of altered anatomy and follow up time explained the variance. Overall pooled adverse event rate was 21.3% (95% CI 16.8-26.7, I 2 = 36.6). The most common post procedure adverse event was post procedure pain. Overall pooled adverse event rate of post EUS-PD pancreatitis was 5% (95% CI 3.2-7.8, I 2 = 0).

Conclusion: The systematic review, meta-analysis and meta-regression provides answer to the questions of the overall technical success, clinical success and the adverse event rate of EUS-PD by summarizing the available literature.

Abstract Title: Curative Surgery After EUS-Guided Biliary Drainage: An International Multicenter Feasibility Study

Associate & Authors: Scott Ventre DO, Amy Tyberg MD, Abdelhai Abdelqadar MD, Avik Sarkar MD, Haroon Shahid MD, Mihajlo Gjeorgjievski MD, Monica Gaidhane MD, John Nasr MD, Miles Graves MD, Matthew Krafft MD, Elia Armellini MD, Michael Lajin MD, David Lee MD, Paul Tarnasky MD, Prashant Kedia MD, Javier Tejedor-Tejada MD, Jay Patel MD, Jose Nieto MD, Michel Kahaleh MD

Introduction: Endoscopic ultrasound-guided biliary drainage (EUS-BD) has become the procedure of choice for relieving biliary obstruction in patients for which traditional endoscopic retrograde cholangiopancreatography (ERCP) is unsuccessful. Certain patients may require hepatobiliary surgery after EUS-BD. The outcomes of patients undergoing interval surgery after EUS-BD is unknown. We compare feasibility and outcomes of interval surgery after EUS-guided BD to standard published data on interval surgery after conventional ERCP.

Methods: We conducted a multicenter international cohort study of patients who underwent hepatobiliary surgery after having undergone EUS-BD from 5 centers between 7/20/2016 through 10/9/2020. Patient demographics, procedural data (endoscopic and surgical), and follow-up care were collected. Data was compared to published data on outcomes of patients who underwent surgery after conventional ERCP (Garcia-Ochoa et al, Surgical Endoscopy 2020). The primary outcome was rate of surgical events after EUS-PD compared to after conventional ERCP.

Results: Twenty (20) patients were included, with a mean age 66, 50% male. All patients had malignant biliary obstruction except 1 (cholangiocarcinoma n=7, pancreatic cancer n=8, other malignancy n=4). Two patients had cholangitis.
Ten (10) patients underwent extrahepatic approach with choledochoduodenostomy, 10 patients underwent intrahepatic approach (hepaticogastrostomy n=5, rendezvous n=4, both n=1). All patients had metal stents (LAMS n=10, FCSEMS n=9) except 1 (plastic). 2 patients had an adverse event from EUS-BD (10%), 1 major (fluid collection requiring drainage).
Surgical technical success was 95% (n=19, 1 aborted due to metastatic disease). Whipple was the most common surgery (n=13). Mean follow-up time post-surgery was 10 months. 13 patients were alive at the conclusion of the study (4 lost to follow-up, 2 deceased).
Peri/post-surgical adverse event rate was 25% (n=5; bleeding n=4, chyle leak n=1); 3 were severe (15%). For comparison, surgery after conventional ERCP had a 55% overall complication rate, 19% major.

Conclusions: Surgical resection after EUS-BD is safe and feasible for the management of malignant biliary obstruction and associated with fewer surgical complications when compared to published surgical complications after conventional ERCP. If patients' underlying medical conditions improve, prior EUS-BD should not preclude patients from undergoing resection as part of standard of care.

Abstract Title: Appropriate cutoff for 25 vitamin D levels in the diagnosis of normocalcemic primary hyperparathyroidism (NPHPT): A systematic review.

Associate & Authors: Niharika Yedla MD. Xiangbing Wang, MD.,Ph.D

Introduction: The Fourth International Workshop in 2014 delineated guidelines for the diagnosis of NPHPT which include ruling out secondary causes of hyperparathyroidism, and recommended cutoffs to rule out vitamin D deficiency is that 25 hydroxy vitamin D (25OHD) level should to be ≥20ng/mL. Keeping in mind that the exact levels to optimize 25OHD in hyperparathyroid states are unknown, we aim to review possible variation in the prevalence of NPHPT if 25OHD cutoffs were to be raised to rule out vitamin D deficiency with more specificity.

Methods: A PubMed search was conducted with key words "normocalcemic primary hyperparathyroidism" to review studies about NPHPT and 25 OHD status. 533 articles were found, and 127 articles were identified by title/abstract screening with year of publication between 2014 to 2020. Ten studies were identified for the systematic review based on full text review for relevance.

Results: Studies have been conducted in various countries across all continents to characterize NPHPT further. 5/10 studies used 25OHD cutoff of ≥20ng/mL and 4 studies had a cutoff of ≥30ng/mL and 1 study looked into the difference in prevalence with both cutoffs. All 3 studies from Italy used the higher cutoff of ≥30ng/mL. Rosario et al from Brazil reported a decrease in prevalence of NPHPT from 6.8% (25OHD≥20ng/mL) to 0.74% by supplementing those subjects to 25OHD ≥30ng/mL without any increase in serum calcium or parathyroid hormone (PTH) levels[1]. Wang et al found that even with total 25OHD between 30-40ng/mL, their free 25OHD levels were lower compared to normal subjects and the free 25OHD levels correlate better with PTH levels as compared to total 25OHD[2].

Discussion and Conclusion: It is well known that vitamin D insufficiency (25OHD 20-30ng/mL) drives up the PTH and supplementation to 30-40ng/mL is required to reduce such effects. A recent study suggested that even 25OHD ≥30ng/mL may fail to rule out 25OHD deficiency in NPHPT patients. We concluded that a diagnostic criterion of ≥30ng/mL would be more appropriate in ruling out 25OHD deficiency in this special population. The role of free 25OHD levels in PHPT patients needs further evaluation.

Abstract Title: Diagnostic Factors in COVID-19 Patients with Atrial Fibrillation and Atrial Flutter

Associate & Authors: Andrew Aboyme MD, Meghan Nahass MD, Jayanth Vaston MD, James Coromilas MD, Sabiha Hussain MD, Tom Nahass MD

Background: Atrial arrythmias (AA) and COVID-19 were associated early in the pandemic. Relationship between variables contributing to arrythmias remain under investigation.

Objective: To evaluate demographics, laboratory data and outcomes in patients diagnosed with AAs (either atrial fibrillation or atrial flutter) and admitted for COVID-19 infection.

Methods: A retrospective chart review of 904 confirmed COVID-19 infected patients admitted March-July 2020 at a quaternary hospital was performed. Arrhythmia incidence, demographics, and outcomes were identified and stratified based on ECG diagnosis. Descriptive and univariate analysis were used to assess the data.

Results: AAs were identified in 14.9% of patients (11.9% atrial fibrillation, 1.7% atrial flutter, and 1.2% both). There was similar racial, income and gender distributions (Chart 1). AA patients were significantly older (75 vs 60, p<0.001), with higher cardiovascular disease prevalence (62% vs 15%), longer length of stay (14.3 vs 9.7 days, p<0.001), and mortality (OR 2.8, 95%CI 1.9-4.1). Available cardiac and inflammatory markers revealed significantly elevated maximal pro-BNP (11989 vs. 5340, p < 0.0001) and ferritin (3499 vs 2047, p = 0.025) and, trended higher in troponin (0.64 vs 0.39), CRP (20.1 vs 18.5), d-dimer (15267 vs 11075), and LDH (733 vs 571).

Conclusion: AAs are common in hospitalized COVID-19 patients. These patients had significantly worse outcomes with increased length of stay and mortality. AA presence appears associated with severe viral infection and increased cardiac and inflammatory markers. Diagnosis of AAs should prompt aggressive work up and treatment to mitigate poor outcomes.

Chart 1: Demographics, laboratory values and outcomes in patients with COVID-19 and with or without atrial arrhythmias

	No Atrial Arrhythmias	Atrial Arrhythmias	
Total # of Patients (%):	769 (85%)	135 (15%)	
DEMOGRAPHICS			
Age	60	75	P < 0.001
Gender (%M)	61%	55%	
Race:			
White	29%	41%	
Black	14%	16%	
Latino	31%	17%	
Asian	11%	8%	
American Indian	0%	1%	
Other	15%	16%	
Income:			
High (>$70,000)	16%	13%	
Mid ($50,000-70,000)	47%	50%	
Low (<$50,000)	37%	36%	
Prevalence of Prior CV disease	15%	62%	
Prevalence of Prior Atrial Arrhythmia	2.4%	26.6%	
LABARATORY DATA			
Max Pro-BNP (ng/mL)	5340	11989	P < 0.0001
Max Troponin (ng/mL)	0.39	0.64	P = 0.4016
Max CRP (mg/L)	18.54	20.12	P = 0.2144
Max D-dimer (ng/mL)	11075	15267	P = 0.0617
Max Ferritin (ng/mL)	2047	3499	P = 0.0253
Max LDH (U/L)	571	733	P = 0.0776
OUTCOMES			
Length of Stay (Days)	9.7	14.3	P < 0.001
Mortality	20%	41%	OR 2.8 (95%CI 1.9-4.1)

Atrial arrhythmias were defined as either atrial fibrillation or atrial flutter. Income distribution was based on zip code average income level. CV disease comprised of atrial fibrillation or flutter, CAD, CHF, and valvular heart disease.

Abstract Title: Heart Mate 3 ECG Interference, Does It Lead To Inappropriate ICD Shocks?

Associate & Authors: Arjun K Theertham, MD, Ilja Dejanovic, Andrew Aaron Aboyme, MD and John Kassotis, MD, FHRS.

Background: The newest generation Heart Mate 3 (HM3)(Abbot, Plymouth, MN) Left Ventricular Assist Device (LVAD) is a magnetic levitating device. Interference between this device and 12 lead electrocardiograms (ECG) and Implantable Cardioverter Defibrillators (ICD) have been reported. This is a single center retrospective study examining inappropriate ICD discharge in our HM3 patients.

Objective: Review HM3 patients at risk for inappropriate device shocks.

Methods: We queried our electronic medical records for patients with HM3. Baseline demographics were obtained. Charts were reviewed for presence of ICD and for device shocks. Shocks were categorized as appropriate or inappropriate.

Results: 20 patients, ranging in age from 21 to 72 years, underwent HM3 implantation over a 12 -month period. Of the 20 patients, 5 were women, 8 had an ischemic cardiomyopathy with the remainder classified as non-ischemic cardiomyopathies. All patients had ECGs with high frequency electromagnetic interference (EMI). Of the 4 patients who experienced ICD shocks only one was deemed inappropriate, which was the only patient with a subcutaneous implantable defibrillator (S-ICD). This patient experienced multiple shocks shortly after HM3 implant.

Conclusion: In our experience patients following HM3 implantation exhibit high frequency EMI on ECG, attributed to the fully magnetic levitating mechanism. Of the 20 patients only one experienced an inappropriate device discharge. This was the only patient who had a pre-existing S-ICD. Although the sensing vectors can be reprogrammed, to improve S-ICD performance, it is recommended that the device be de-activated. There is limited experience regarding inappropriate ICD discharges and HM3; most transvenous systems do not result in inappropriate ICD shocks. In this study, of the 19 patients who had previously implanted transvenous ICDs no one experienced an inappropriate ICD following HM3 implantation, due to EMI. This study suggests avoidance of S-ICDs in patients who are potential candidates for HM3 implantation with normal function of transvenously implanted devices.

CASE REPORTS

Abstract Title: Manifestations of Cardiac Sarcoidosis

Associate & Authors: Constance Fiocco, MD; Sandy Bassin, MD; Kenneth Dulnuan, MD

Sarcoidosis is a multisystem inflammatory disease characterized by non-caseating granulomas, most commonly recognized by its pulmonary symptoms. However, up to 25% of patients with systemic sarcoidosis will have clinically silent cardiac involvement identified at autopsy and 5% of patients will develop symptomatic cardiac manifestations. Common presentations of cardiac sarcoidosis (CS) include ventricular arrhythmias, heart failure, and/or high degree heart block. Manifestations vary based on the location and extent of granulomatous inflammation or scarring within the myocardium. A striking 13-25% of deaths from sarcoidosis in the U.S. have been linked to cardiac involvement.

A 28-year-old African American male with no past medical history presented with 1 week of progressively worsening shortness of breath, orthopnea, and cough. In the ED, he was noted to be hypoxic, tachypneic, and using accessory muscles of respiration in tripod position. Physical exam was remarkable for tachycardia, bi-basilar crackles, and bilateral trace pitting edema to the mid-shins. EKG and telemetry revealed supraventricular tachycardia (SVT) with rates in the 160s. The SVT did not break with adenosine, but converted to sinus rhythm with frequent PVC's following administration of ibutilide. The patient became hypotensive requiring norepinephrine and was ultimately intubated for airway protection. CT chest showed extensive ground glass opacities, as well as hilar lymphadenopathy (LAD). Echocardiogram revealed an LVEF of 20-25% and ischemic cardiomyopathy was ruled out after a LHC was done showing no evidence of CAD. A cardiac MRI was performed, which identified a small focal area of gadolinium enhancement involving the distal anterolateral region. Given the findings of hilar LAD, African American ethnicity, new onset heart failure, frequent PVCs and cMRI findings, cardiac sarcoidosis was the top differential diagnosis. Once initiated on systemic corticosteroids for suspected CS, in addition to guideline-directed medical therapy and diuretics for heart failure, the patient's clinical status significantly improved. He was successfully extubated and discharged home with a life vest. Outpatient work-up with FDG-PET and lymph node biopsy are underway.

The life threatening symptoms and clinical response to steroid therapy in this case highlights the importance of recognizing CS. Clinicians must maintain a high degree of suspicion when evaluating patients between ages 25 to 45, who present with unexplained ventricular arrhythmias, heart block, or non-ischemic cardiomyopathy. Patients with CS more often present with arrhythmias (up to 40% of cases). Less than 20% of CS cases will initially manifest as heart failure, as was seen in our patient. The formal diagnosis of CS is challenging as the sensitivity and specificity of diagnostic modalities is limited. The two commonly used diagnostic criteria are the Japanese Ministry of Health and Welfare (JMHW) criteria (1999) and the HRS Expert Consensus Statement (2014). With both guidelines, a definitive diagnosis can be made with non-caseating granulomas seen on endomyocardial biopsy (EMB). If the EMB is negative, diagnosis requires either the presence of extra-cardiac sarcoidosis via histology or clinical evidence for JMHW or via histology for HRS. Cardiac MRI is the highest yield imaging for CS, with excellent sensitivity (>90%) and a high negative predictive value (CS can be excluded when no gadolinium enhancement is present). If cMRI is contraindicated, the FDG-PET is the alternative initial test. In patients with definitive or probable CS, immunosuppression therapy with corticosteroids (prednisone) and/or a prophylactic implantable cardioverter-defibrillator (ICD) is the mainstay of treatment. Overall, CS is an elusive diagnosis that requires an appropriate level of clinical suspicion and integration of clinical data with cardiac imaging results.

Abstract Title: Development of agranulocytosis during an extended course of cefepime and rifampin

Associate & Authors: Kevin C. Kohm M.D., Kinjal G. Solanki M.D., Vincent J. McAuliffe M.D., Susan E. Boruchoff M.D.

Drug induced neutropenia (absolute neutrophil count below 0.5 x 10^9 cells/L) due to an agent other than chemotherapy is rare[1]. We report a case of a patient who developed agranulocytosis during treatment with cefepime and rifampin of post-operative infection requiring right hip one stage exchange arthroplasty.

A 67-year old woman underwent a one stage exchange arthroplasty of the right hip for post-operative infection. At the time of surgery her white blood cell (WBC) count was 8.0 x 10^9 cells/L with ANC of 6.7 x 10^9 cells/L. Fluid cultures obtained from the surgical site grew Methicillin sensitive Staphylococcus aureus (MSSA) and Pseudomonas aeruginosa (P. aeruginosa). She was discharged with plan to complete a 6-week course of intravenous cefepime and oral rifampin. However, eighteen days after discharge she developed fatigue and fever so she presented to our facility. On presentation she was febrile to 101.8 F and her WBC count was 0.9 x 10^9 cells/L. Her ANC was 0.00 x 10^9 cells/L. Her hemoglobin and platelets were normal. She had no pain at her surgical site and the wound was well healed. Rifampin was stopped, she was continued on IV cefepime, and started on IV vancomycin. Her fever resolved by her second hospital day. Blood and urine cultures were without growth. Her WBC was 1.0 x 10^9 cells/L and her ANC remained at 0.00. Cefepime was stopped after two doses and she was switched to IV aztreonam. Filgrastim-sndz once daily was started which resulted in improvement of her WBC count. She was switched from IV vancomycin to IV daptomycin prior to discharge with the plan to complete a course of aztreonam and daptomycin. As with our patient, post-operative infections caused by MSSA when hardware is left in place are managed with an IV antibiotic active against MSSA, with the addition of oral rifampin, the agent with the greatest activity against organisms in biofilms[2]. The cause of our patient's agranulocytosis was either cefepime, rifampin, or the combination of both together. While this has been associated with cephalosporins, typically during extended use, rifampin is not usually considered myelotoxic[3]. Treatment of drug-induced agranulocytosis requires stopping the offending medication(s) and monitoring blood counts to ensure recovery. Marrow stimulating agents can be used to expedite the recovery of WBCs, though the benefit to the treatment of active infection is unclear. This case illustrates the potential for a rare and life threatening adverse drug reaction associated with use of a combination of two potentially myelotoxic antibiotics. It is important to regularly monitor blood counts during extended course of such regimens so that the offending agent can removed as quickly as possible and another antibiotic started to allow for adequate treatment of the underlying infection.

Abstract Title: Pasteurella multocida Epiglottitis and Bacteremia in an Immunocompetent Host: A Rare Disease from a Rare Microbe.

Associate & Authors: Mahpour, Noah Y. ; Namasivayam, Krithika ; Harangozo, Andrea

Pasteurella multocida is a gram-negative bacterium that is an uncommon pathogen in human carriers. It is part of the typical oral flora of felines and canines, with P. multocida isolated in approximately 80% and 35% of these animals, respectively[1]. Infection in humans is most commonly associated with exposure to these animals' oral secretions, frequently from bites or scratches[2]. Only a handful of cases of bacteremia from P. multocida epiglottitis have been reported on in the literature. We report a case of Pasteurella bacteremia resulting from epiglottitis infection, and a subsequent review of the reported cases, microbiology, and management of Pasteurella infections.

Case Description: The patient is a 46 year old female with a history of asthma, who presented to the hospital with 2 days of worsening sore throat, left sided neck swelling, hoarse voice, and shortness of breath. The patient had endorsed receiving all usual childhood and adult vaccinations, but notably, did have a pet dog at home, which often licked her face.

CT scan revealed diffuse soft tissue thickening involving the hypopharyngeal soft tissues, the base of the epiglottis, and the aryepiglottic folds, with narrowing of the hypopharyngeal airway, raising concerns for epiglottitis.

Blood Cultures drawn on admission were positive for Pasteurella multocida, and she was treated with Ampicillin-Sulbactam intravenously. Sensitivities of the bacteria were sensitive to multiple antibiotics, and the patient was eventually discharged on a course of oral antibiotics after multiple days of intravenous antibiotics.

Discussion: Pasteurella multocida is a Gram negative coccobacillus, and is an uncommon pathogen in humans[3]. It is a facultative anaerobe, and very commonly isolated from feline or canine hosts[2].

There are few case reports of bacteremia associated with P. multocida, and less than thirty reports of bacteremia associated with upper airway infection[5,6]. Almost all reported cases had some association with animal exposure, and typically the patient had an immunosuppressing condition[6,7]. Classically there was an inciting event to inoculate the patient, such as bite, scratch, or even kissing[7,8]. There is observational data supporting that the most severe cases are not associated with bites, with a higher association with bacteremia or critical care admission[1].

Treatment of P. multocida infections involve clinical stabilization and antibiotic administration[2]. Penicillin has been cited as a first line agent, with fluoroquinolones or cephalosporins as alternative agents[2]. Mortality of Pasteruella bacteremia has been reported approaching 30% at the higher end, thus requires prompt diagnosis and management[6,7].

Conclusions: Pasteurella multocida bacteremia is a rarely encountered clinical situation, and can progress to life threatening disease. It is almost always associated with animal exposure, typically felines or canines. Prompt antibiotic administration and source control are paramount to prevent worsening clinical conditions. Reported mortality rates are approach one third of cases, and high clinical suspicion is required to obtain a rapid diagnosis.

Abstract Title: Solitary Juvenile Polyps in Adults, and Associations with Juvenile Polyposis Syndrome

Associate & Authors: Mahpour, Noah Y.; Skole, Kevin S.

Introduction: Juvenile Polyps represent rare polypoid lesions of the gastrointestinal tract, at an estimate of less than 1% of all colorectal polyps[1]. Juvenile Polyposis Syndrome (JPS) is an uncommon disease entity, typically inherited in an autosomal dominant fashion.[2] The most common associated mutations involve the gene products *SMAD4* and *BMPR1A*[3]. There is an increased risk for colorectal carcinoma in patients affected by the syndrome; however, solitary Juvenile Polyps are not thought to increase an individual's risk for neoplasm[4]. We describe a case of a large solitary juvenile polyp discovered on routine screening colonoscopy, and a brief review of the literature and management of lone juvenile polyps and JPS.

Case Report: The patient is a 59-year-old female with a history of Scleroderma, who presented for routine screening colonoscopy. Her only gastrointestinal complaint was occasional flatus; she denied melena, bright red blood per rectum, constipation, or diarrhea. There was no personal or family history of colorectal carcinoma. On screening colonoscopy, in the mid descending colon, a 25-mm, semi-pedunculated polyp was found and removed via snare polypectomy technique [Image 1-4]. Pathology revealed adenomatous colonic mucosa with cystic changes, muscular bands, and edema. The constellation of findings were concerning for juvenile polyp, and possible juvenile polyposis syndrome.

Discussion: Solitary Juvenile Polyps are a rare finding in adult patients, with an estimated incidence of 1/65,000 in certain populations[5]. Juvenile polyps in isolation do not typically carry an increased risk for neoplasm, however, they are prone to dysplastic changes[4,7]. In pediatric populations, the reported recurrence rate of juvenile polyps is directly related to the number present on initial colonoscopy, with 1 polyp carrying a 1.5% recurrence, and 5-10 polyps carrying a 82.6% recurrence rate[8]. In contrast to solitary Juvenile Polyps, Juvenile Polyposis Syndrome (JPS) is a rare hamartomatous polyposis syndrome, commonly discovered in childhood. The transmission of JPS is autosomal dominant, with the incidence of the syndrome reported at approximately 1/160,000[9]. The typical distribution of juvenile polyps is colorectal, with less than 15% being gastric, jejunal, or illeal[10]. The current American College of Gastroenterology clinical guidelines recommend screening for Juvenile Polyposis Syndrome if there are five or more juvenile polyps in the colon or rectum, or any juvenile polyp in a different region of the gastrointestinal tract. Juvenile Polyposis Syndrome is significantly associated with the development of carcinoma, with some estimates of nearly 40% risk of lifetime colorectal carcinoma[6]. Therefore, screening guidelines recommend continued surveillance in those patients with JPS[10]. The discovery of a juvenile polyp in a patient should always prompt the clinician to entertain a diagnosis of JPS, as there are numerous clinical and patient important outcomes associated with JPS.

Conclusions: Juvenile Polyps and Juvenile Polyposis Syndrome are two separate but exceedingly rare clinical entities. JPS has a well-established association with an increased risk of gastrointestinal neoplasm. The discovery of a juvenile polyp should prompt a thoughtful undertaking on whether further gastrointestinal evaluation is indicated.

Abstract Title: Atraumatic Splenic Rupture in a End Stage Renal Disease Patient treated with Apixaban and Clopidogrel: A rare case

Associate & Authors: Sharma, Pranav MD, Patnaik, Pooja P, Khalil, Steve MD, Portugal, Frank MD

Background: Atraumatic splenic rupture (ASR), although extremely rare, is often life threatening with high mortality rate. Atraumatic ruptures are described in the context of malignancy, inflammation or infection directly affecting the spleen but rare in the setting of anticoagulation therapy. We present a case of atraumatic splenic rupture (ASR) in a patient treated with apixaban and clopidogrel who was on regular hemodialysis for end-stage renal disease (ESRD). Splenic ruptures occurring in patients taking apixaban, a factor Xa inhibitor (DOACs), is challenging due to the scarcity of a direct reversal agents. .

Clinic Case: An 82-year-old woman with atrial fibrillation, transient ischemic attack, end stage renal disease on hemodialysis three times per week, hypertension, diabetes, deep vein thrombosis, presented with new left sided abdominal pain to which radiated to her chest. Her blood pressure was noted to be 60s mm Hg systolic so she was referred to the emergency department for evaluation. There was no known prior trauma, inciting event, or other abnormal signs or symptoms. She was on apixaban 2.5 mg twice daily for her known atrial fibrillation and clopidogrel 75mg daily for prior TIA. An urgent abdominal CT scan revealed splenic rupture and significant hemoperitoneum. An emergency exploratory laparotomy and splenectomy were performed to control hemorrhage. She received 10 units of packed red blood cells, 8 units of fresh frozen plasma, 2 units of platelets, and 1 unit of cryoprecipitate during the operation. The patient's postoperative hospital stay was unremarkable. She was discharged home four weeks after laparotomy with recommendations to discontinue apixaban and clopidogrel.

Discussion: Anticoagulant therapies such as heparin, tissue plasminogen activator and DOACs have been reported to be associated with ASR. DOACs, are factor Xa inhibitors, commonly used in non-valvular atrial fibrillation to prevent stroke and in patients with venous thromboembolism. While DOACs have been shown to significantly reduce stroke, intracranial hemorrhage and mortality in patients with atrial fibrillation, they are associated with an increased risk of gastrointestinal bleeding. Furthermore, patients using a DOAC in combination with add-on antiplatelet agents are more to have a major bleeding event than those who are not. Additionally, DOACs are metabolized renally and are therefore associated with an increased risk of bleeding in patients with renal dysfunction.

Abstract Title: Atrioesophageal Fistula: A Unique Presentation of a Rare but Deadly Procedural Complication

Associate & Authors: Scott Ventre, DO; Anish Patel, MD

Introduction: Atrioesophageal fistula (AEF) is a known and feared complication of catheter ablation. While it is considered rare, there is reason to believe that the true incidence may be higher due to under-recognition and misdiagnosis, often in the setting of a nonspecific presentation.

Case Description: We pose the case of an 80-year-old man with history of atrial fibrillation and electrical storm complicated by ventricular tachycardia. He presented several weeks after radiofrequency catheter ablation with hematemesis and hemorrhagic shock. Overall, he demonstrated classic symptoms consistent with a diagnosis of AEF. The imaging findings, however, confounded the diagnosis due to the lack of blood extravasation into the esophagus on CT angiogram and the presence of both left and right atrial air embolism. The latter is rather unlikely in AEF, making the diagnosis unclear. Due to the uncertainty this generated, an esophagogastroduodenoscopy was ultimately performed, providing a rare and striking endoscopic view of the culprit: a large mid esophageal atrioesophageal fistula. The patient was deemed not a candidate for open surgical repair and, given his poor mental status and the absence of other possible alternatives, died under comfort care measures.

Discussion: The signs and symptoms of AEF are generally nonspecific and can include fatigue, fever, nausea, vomiting, chest discomfort, dysphagia, odynophagia, hematemesis, and melena. Onset of symptoms typically occurs between 1 and 4 weeks after catheter ablation, however earlier and later presentations have also been reported. Although our patient presented with classic symptoms, his imaging illustrated yet another manner by which this deadly condition can be misconstrued. The underlying cause of his right atrial air embolism remains unclear but was postulated to be due to air introduced during a difficult central venous catheter placement into his internal jugular vein.

Conclusion: Despite its rarity, AEF carries a with it a fatality rate reported between 67 and 100%. It is thus imperative to maintain a high index of suspicion for AEF under the right clinical circumstances.

Abstract Title: Multiple lymphomatous polyposis from primary gastrointestinal follicular lymphoma

Associate & Authors: Scott Ventre DO, Kevin Skole MD

Introduction: Multiple lymphomatous polyposis (MLP) is an exceedingly rare disease characterized by a primary non-Hodgkin's lymphoma of the gastrointestinal tract with numerous polypoid lesions spread diffusely across long segments of bowel. MLP has been classically associated with mantle cell lymphoma, and while rare cases of MLP in the setting of follicular lymphoma (FL) have been reported, fewer still have shown endoscopic evidence of diffuse GI involvement.

Case Description: The patient is a 45-year-old man who presented to his primary care physician for a routine physical exam and was found to have leukocytosis which persisted on repeat blood draw despite the patient being asymptomatic. He was referred to a hematologist, and the resulting peripheral blood flow cytometry showed findings concerning for a B-cell lymphoproliferative disorder, with subsequent CT scans of the chest, abdomen, and pelvis revealing several enlarged mesenteric lymph nodes. He underwent esophagogastroduodenoscopy and colonoscopy with biopsies of the duodenum, ileum, and transverse colon altogether consistent with low-grade B-cell FL. Further testing including bone marrow biopsy and PET/CT were consistent with this diagnosis, but the degree of GI tract involvement was only made clear when a video capsule endoscopy was performed. The capsule study revealed the presence of diffuse nodularity and polyposis from the distal duodenum throughout the entire visualized small intestine, ultimately consistent with MLP. Given the low grade and asymptomatic nature of his malignancy, the patient chose to proceed with active surveillance and remains clinically well.

Discussion: Given the rarity of primary FL of the GI tract even in the absence of MLP, the general course and prognosis of this disease are generally unknown. Increasing evidence suggests that MLP may be more prevalent than once thought, even in the setting of FL. However, it is rarer still that in these illnesses, the entire GI tract is viewed endoscopically. This case shows endoscopic and biopsy-proven evidence of disease throughout the small and large bowel, which remained largely asymptomatic for the patient. While FL of the GI tract typically imparts an indolent course even with active surveillance alone, data is limited regarding treatment regimens, especially in the presence of MLP, making the case of this patient of high clinical value moving forward.

Conclusion: MLP is a rare entity, especially in the setting of FL, and more data is needed before recommendations can be made regarding treatment and prognosis. Advanced endoscopic approaches will likely be invaluable in order to shed more light on the true prevalence of these diseases, especially for the sake of investigating disease course and treatment response.

Abstract Title: Checkpoint inhibitor-induced versus paraneoplastic vasculitis

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Introduction: Immune checkpoint inhibitors (ICIs) are relatively novel antineoplastic agents utilized in various malignancies. While these medications are known for their efficacy, they are unfortunately associated with a variety of immune-related adverse events (irAEs) due to activation of the body's immune response. This case discusses a 64-year-old gentleman with history of invasive bladder cancer treated with Nivolumab and bladder resection, who was found to exhibit small and medium vessel vasculitis noted on his resected bladder, ureters, and lymph node biopsies.

Case presentation: A 64-year-old male presented initially to his primary care physician after experiencing recurrent gross hematuria for 2 months. CT scan of the abdomen/pelvis with contrast demonstrated moderate to severe left hydroureteronephrosis. Cystoscopy showed tumor involving the bladder floor/left ureteral orifice. This necessitated resection, with pathology consistent with a high-grade urothelial carcinoma invasive into the muscularis propria. The patient was evaluated by Urological Oncology as well as Medical Oncology. He was offered a trial of neoadjuvant immunotherapy and randomized to Nivolumab for 3 cycles in pre-op setting prior to radical cystectomy/prostatectomy. Interestingly, extensive non-granulomatous vasculitis involving small and medium sized arteries within and around the bladder, ureters and prostate were seen, with microscopy demonstrating a necrotizing, predominantly lymphoplasmacytic vasculitis of small to medium vessel vasculitis involving arteries and arterioles. The patient was evaluated by Rheumatology within 1 week of the pathology findings, and found to be very cachectic, with no other systemic complaints. Autoimmune workup included negative ANA and ANCA levels. The patient did have an elevated ESR of 46mm/Hr and a CRP of 94.2 mg/dl, but this was during the post-operative period. A CTA of his chest/abdomen/pelvis was subsequently performed, and this was negative for medium or other large vessel vasculitis. On re-evaluation by medical oncology approximately 1 month later, the patient was noted to have gained weight and was no longer anorexic. The patient was ultimately restarted on Nivolumab as he remained without systemic autoimmune disease, and to date has been tolerating therapy well without other manifestations of vasculitis noted.

Discussion: There have been over 200 reports of rheumatologic immune-related adverse events associated with ICIs, with the prevalence estimated around 1-10%. In particular, vasculitis due to ICIs is an uncommon adverse effect, ranging from single organ involvement to systemic involvement of small, medium, and large vessels. Vasculitis may also occur as a paraneoplastic phenomenon. Many cases of paraneoplastic vasculitis have been described in literature, including polyarteritis nodosa, giant cell arteritis, and leukocytoclastic vasculitis. Vasculitis specifically localized to areas adjacent to tumor can be either due to paraneoplastic effect or due to adverse effect of immunotherapy, and a specific diagnosis in his regard based on pathology is not feasible. The development of any immune related adverse effects can be an indication that the therapy is immunologically effective against the malignancy, and therefore careful thought must be taken prior to prematurely discontinuing therapy. If patients remain otherwise asymptomatic and without systemic manifestations of autoimmune disease, it is certainly reasonable to resume immunotherapy and monitor for signs of subsequent adverse effects, particularly when the tumor has been surgically addressed.

Abstract Title: A Rare Case of Scleroderma-Related Fibrotic Biventricular Failure

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Background: Scleroderma can present with a myriad of cardiac manifestations including cardiomyopathy, arrhythmias, CAD, and pericarditis. We report a rare case of scleroderma-related fibrotic biventricular heart failure.

Case: 66-year-old Female with history of scleroderma, hypertension and new-onset cardiomyopathy thought to be due to Takotsubo presented with dyspnea. Exam showed JVP at 8cm, bilateral rales, and 1 + lower extremity edema. Transthoracic echo revealed EF 20%, severely reduced RV function, and wall motion abnormalities inconsistent with Takotsubo cardiomyopathy. Cardiac catheterization showed LAD 50%, RCA 40%, and PA pressure 32/20 (26), PVR 5, and PCWP 14. Non-ischemic work up was unremarkable. MRI showed nonspecific transmural enhancement in anteroseptal and anterolateral walls. Cardiac biopsy showed patchy fibrosis.

Decision-making: No pathognomonic features exist for scleroderma-related cardiomyopathy. Given our patient's history of scleroderma and non-specific findings on cardiac MRI, cardiac biopsy was pursued. Cardiac biopsy pathology revealed patchy fibrosis suggestive of scleroderma myocardial involvement. Guideline directed medical therapy was initiated with subsequent clinical improvement.

Conclusion: This rare case highlights the importance of building a broad differential, including rare causes, in patients with new-onset cardiomyopathy. Cardiac biopsy is a valuable tool for confirming the proper diagnosis in non-ischemic cardiomyopathy.

Abstract Title: Reversible Complete Heart Block in A Patient with Coronavirus Disease 2019

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Introduction: Patients infected with novel coronavirus (SARS-CoV-2) can present with a variety of rhythm disturbances. We report an unusual case of reversible complete heart block (CHB) in the setting of acute COVID-19 infection.

Objective: To highlight a cardiac complication and management of COVID-19.

Case: A 23-year-old male with a history of Stage IIIB Hodgkin's Lymphoma presented with dizziness and recurrent syncope. Vital signs were remarkable for heart rate of 128, blood pressure of 114/63, and oxygen saturation of 98% on 4 liters nasal cannula. He rapidly became bradycardic and was found to be in CHB (sinus rate 140 bpm, ventricular escape 40-58 bpm) associated with hypotension requiring a transvenous pacemaker. Labs were remarkable for elevated troponin-T 3.06 ng/mL, ferritin 6246 ng/mL, LDH 726 IU/L, and C-reactive protein 6.39 mg/dL. SARS-CoV-2 polymerase chain reaction testing was positive with a cycle threshold of 14 suggesting a high viral load, and antibodies were negative. Echocardiogram revealed an ejection fraction (EF) of 35% with global hypokinesis and small pericardial effusion. Coronary angiography was unremarkable, and right heart catheterization showed a severely depressed cardiac index of 1.7. Milrinone was started along with methylprednisolone and remdesivir for COVID-19 myocarditis. Within 24 hours, CHB resolved and hemodynamics improved. Cardiac MRI on hospital day 5 showed full EF recovery.

Conclusions: CHB is a rare complication of SARS-CoV-2 infection. Further study is needed to determine the mechanism of COVID-19 induced CHB. This case underscores the importance of including COVID-19 in one's differential diagnosis for patients presenting in CHB.