

AUGUSTA UNIVERSITY
MEDICAL
PARTNERSHIP
UNIVERSITY OF GEORGIA

*Medical Partnership
Student & Resident
Research Symposium*



October 22, 2018

UGA Health Sciences Campus
George Hall

*Welcome to the eighth annual
AU/UGA Medical Partnership Research Symposium!*

This event is an opportunity to showcase the activities of our students during the summer between the first and second years of their medical studies. Students were encouraged to engage in a scholarly activity which could include laboratory science, clinical, or other research. Students more interested in a participatory clinical experience were encouraged to also engage in “inquisitive observation and reflection” in order to derive a more complete understanding of the health problems within the context of the greater community. This is also an opportunity for Internal Medicine residents from the Medical Partnership and Piedmont Athens Regional to present their research work.

The posters represent the results of the students’ and residents’ endeavors. We are grateful to all of the faculty members at AU, UGA, and other institutions, who have mentored the students, and to the community clinicians, both in Athens and elsewhere, who have shared their expertise and provided the clinical settings to learn both the art and science of doctoring.

Michelle G. Nuss MD

Michelle A. Nuss, MD
Campus Dean

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Ocrelizumab Safety and Efficacy in the Treatment of Multiple Sclerosis

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Objective: To describe the patient experience of Multiple Sclerosis (MS) patients treated with ocrelizumab(OCR).

Background: OCR, used in the treatment of (MS), is a monoclonal antibody targeting CD20, resulting in B-cell depletion.

Methods: Patients diagnosed with MS and prescribed OCR at the Rocky Mountain MS Center at University of Colorado were identified and retrospectively followed for up to one year from OCR start date. Lab data, relapse history, adverse events, MRI outcomes, disease history and patient characteristics were collected from 78 patient charts. Descriptive statistics were used to describe the sample group.

Results: Patients had a mean age of 46 years at index date; were predominantly female (75.6%); and had a MS disease duration of 10 years. Of the sample group, 62(79.5%), 12(15.4%), and 4(5.1%) were relapsing-remitting, secondary progressive, and primary progressive, respectively. Eight(10.3%) patients experienced lymphopenia $\leq 500/\text{mm}^3$, and 1(1.3%) experienced neutropenia $\leq 1000/\text{mm}^3$. Two(2.6%) experienced IgG levels ≤ 500 , 7(9.0%) experienced IgM levels ≤ 40 . Infections resulting in an emergency department visit or hospitalization occurred in 7(9.0%) and 0(0.0%) of patients, respectively. During the first and second infusion, 5(6.5%) and 5(8.1%) experienced an infusion reaction that interrupted the OCR infusion, respectively, and none experienced a life threatening reaction. While being treated with OCR, 3(3.8%), 0(0.0%), and 4(9.1%), experienced a clinical relapse, enhancing lesion and new T2 lesion, respectively. Seven(9.0%) patients discontinued OCR at >12 months, 5 due to issues with insurance and 2 due to family planning.

Conclusion: Further analysis of additional patients and CD20/CD19 absolute values to examine reconstitution will be conducted.

Oxidative metabolism and diastolic function in heart failure with preserved ejection fraction

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Introduction: Heart failure with preserved ejection fraction (HFpEF) is a major public health problem affecting approximately three million people in the United States. However, few therapies have been identified to reduce mortality which suggests incomplete understanding of the pathophysiologic mechanisms underlying HFpEF. The purpose of this study was to compare myocardial oxidative metabolism and diastolic function in individuals with HFpEF versus those with hypertension and healthy individuals in order to understand underlying mechanisms in HFpEF.

Methods: Twenty-nine patients were recruited (14 healthy, 12 hypertensive, 3 HFpEF) to quantify myocardial oxidative metabolism and diastolic function using non-invasive cardiac imaging. Healthy and hypertensive volunteers were matched in age (± 5 years), race/ethnicity, and gender to the HFpEF group (59.1 years old, 96.5% white, 55.17% female). The design of the clinical trial not only allows for comparison of healthy and HFpEF individuals, but also allows to test whether a gradient of abnormal myocardial function exists by including hypertensive individuals without HFpEF. To determine myocardial oxidative metabolism, an established protocol for ¹¹C-Acetate PET imaging previously used within the lab was followed. The mono-exponential decay rate of ¹¹C-Acetate (K_{mono}) was quantified, which is a validated measure of myocardial oxidative metabolism. Echocardiography was used to quantify cardiac diastolic function.

Results/Conclusion: The results and conclusion of this study are pending data analysis. Patient recruitment is still ongoing.

Perceived fatigue and measured fatigue in older adults

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Background: Fatigue in older adults has been associated with higher rates of disease and mortality. Better understanding of age-related fatigue and its causes may be clinically useful in implementing effective, targeted treatment strategies.

Purpose: The purpose of this study was to compare muscle endurance in older and younger adults with and without self-reported fatigue.

Methods: Older participants ($n = 15$) were divided into groups based on presence of self-reported fatigue assessed using POMS score. Muscle endurance was measured using a surface mounted accelerometer during muscle contractions induced by twitch electrical stimulation. Young adults in their 20s served as a control group ($n = 13$).

Results: The older group with self-reported fatigue had the lowest endurance index at 6Hz of twitch electrical stimulation, significantly lower than that of the older adults without self-reported fatigue ($0.58 + 0.24$ vs $0.80 + 0.14$, $P = 0.037$). Six of the older adults used statins, and there was a trend for muscle endurance to be reduced with statin use ($p = 0.051$). There was no significant difference in endurance indices between the young group with self-reported fatigue and the non-fatigued young group ($0.86 + 0.09$ vs $0.84 + 0.15$, $P = 0.82$).

Conclusion: Presence of perceived fatigue in older adults was consistent with reduced muscle endurance. Presence of perceived fatigue in young individuals is not likely the result of reduced muscle endurance and may be attributable to non-muscle related causes.

Phosphatidylglycerol inhibits TLR2-mediated immune activation by β -defensin 2 and heat shock protein beta-4

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Introduction: Psoriasis is a skin disease characterized by immune cell infiltration and inflammation of the skin and hyperproliferation and abnormal differentiation of epidermal keratinocytes. This process may be mediated by the upregulation of anti-microbial peptides that serve as danger-associated molecular patterns (DAMPs) to activate toll-like receptors (TLRs) of the innate immune system. S100A9 and β -defensin are two DAMPs known to activate TLR2 and TLR4 that are upregulated in psoriatic skin. Phosphatidylglycerol (PG), a component of pulmonary surfactant, has been found to inhibit TLR activation in the lung; previous studies showed that in keratinocytes and a macrophage cell line, PG inhibits the production of pro-inflammatory cytokines induced by S100A9. The objective of this study was to investigate the ability of PG to inhibit TLR-mediated inflammation induced by two other proposed DAMPs, β -defensin-2 (hBD2) and heat shock protein B4 (HSPB4), a chaperone-like protein released by injured corneal keratocytes.

Methods: HEK-Blue-hTLR2 cells, a reporter cell line for TLR2 activation, were treated with hBD2 or HSPB4 in the presence and absence of PG and/or phosphatidylcholine (PC, a control for PG) for 24 hours. TLR2 activation was measured as absorbance of HEK-Blue detection medium, which changes color in the presence of secreted embryonic alkaline phosphatase released into the medium in response to TLR2 activation.

Results: Treatment with hBD2 induced a significant TLR2-mediated immune response, and PG inhibited this response. HSPB4 also significantly increased TLR2 activation in a dose-dependent manner, and PG, but not PC, inhibited this activation.

Conclusion: Our study supports the hypothesis that PG can inhibit inflammation mediated by multiple DAMPs, and so may prove to be an effective and targeted treatment not only for psoriasis but also other inflammatory dermatological conditions.

PHQ-9 Score Predicts Postoperative Outcomes Following Minimally Invasive Transforaminal Lumbar Interbody Fusion

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Purpose: Few studies have quantified preoperative depression symptoms using Patient Health Questionnaire-9 (PHQ-9) to predict postoperative outcomes after lumbar fusion. This study evaluates if an association exists between preoperative depression and postoperative outcomes following minimally invasive transforaminal lumbar interbody fusion (MISTLIF).

Methods: A surgical database of patients undergoing primary, single-level MISTLIF was retrospectively reviewed. Patients were stratified by predefined preoperative PHQ-9 scores: no depression (<5), mild depression (5-9), and moderate to severe depression (≥ 10). Inpatient pain scores and narcotics use were recorded. Oswestry Disability Index (ODI), Veterans RAND (VR)-12 Mental Component Score (MCS) and Physical Component Score (PCS), and Visual Analog Scale (VAS) back and leg pain scores were collected preoperatively and at 6-week, 12-week, and 6-month follow-up. One-way analysis of variance and chi-squared analysis determined if an association existed between PHQ-9 subgroups and baseline characteristics or perioperative outcomes. Multivariate linear regression assessed for an association between PHQ-9 and postoperative patient-reported outcomes.

Results: 94 patients were included. Patients with higher PHQ-9 scores were younger, obese, and carried workers' compensation insurance. Higher PHQ-9 scores were associated with worse preoperative ODI, VR-12 MCS and PCS, and VAS back and leg pain scores. Patients with higher PHQ-9 reported greater inpatient VAS pain scores on postoperative day 0 and 1, and demonstrated greater hourly narcotics consumption on postoperative day 0. Furthermore, higher PHQ-9 scores exhibited less improvement in all patient-reported outcomes.

Conclusions: Patients with severe depression symptoms reported greater pain, increased narcotics consumption, and less clinical improvement after MISTLIF. Thus, patients with greater PHQ-9 scores should be monitored more closely and may benefit from additional counseling regarding postoperative outcomes to better manage pain control and expectations of recovery.

The Effects of 1,25 and 24,25 Vitamin D on the Levels of Vitamin D Receptors and Vitamin D Metabolizing Enzymes in Corneal Keratocytes

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This study investigated the effects of 1,25(OH)2D3 and 24R,25(OH)2D3 on the vitamin D activating enzyme CYP27B1 and inactivating enzyme CYP24A1 on mouse and human corneal stromal cells. The effects of these vitamin D metabolites were also studied for the gap junction protein, connexin 30. The role of the vitamin D receptor (VDR) was examined. Western blotting and real-time PCR were used to investigate these proteins. In VDR wildtype mouse corneal stromal cells (WT), 1,25(OH)2D3 and 24R,25(OH)2D3 increased expression of CYP24A1. In VDR knockout mouse corneal stromal cells (KO), both 1,25(OH)2D3 and 24R,25(OH)2D3 decreased expression of CYP27B1. In human corneal stromal cells, 1,25(OH)2D3 increased CYP24A1 expression, while 24R,25(OH)2D3 had no effect on expression. 24R,25(OH)2D3 increased CYP24A1 and CYP27B1 mRNA expression in WT cells, however, the mRNA expression level decreased in VDR KO cells. We conclude that vitamin D metabolites do influence the enzymes responsible for Vitamin D metabolism, and the VDR is involved in these processes.

Thromboelastography predicts venous thromboembolism post-operatively: a systematic review and meta-analysis

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Introduction: Orthopedic surgery patients are at high risk for developing deep venous thrombosis (DVT) and pulmonary embolism (PE). Point-of-care tests like thromboelastography (TEG) and rotational thromboelastography (ROTEM) provide real-time information on clot dynamics and have been proposed as superior markers for directing resuscitation and predicting DVT/PE, when compared to conventional coagulation assays (CCT), like PT, aPTT, INR. We performed a systematic review of available literature to assess the ability of TEG and ROTEM parameters to predict hypercoagulability in post-surgical patients.

Methods: PubMed, EMBASE, and Cochrane online databases were queried by pairing the terms "thromboelastography," "viscoelastic hemostatic assays," and "rotational thromboelastometry" with "venous thromboembolism," "deep vein thrombosis," "pulmonary embolism," and "hypercoagulability." In studies that separated patients postoperatively by VTE development or no VTE development, a meta-analysis of a proposed hypercoagulable parameter (maximum amplitude) was completed by use of a random effects model.

Results: The initial search identified 1,893 articles, which yielded 370 abstracts. Of the 370 abstracts, 33 articles (5 retrospective cohorts, 27 prospective cohorts, and 1 randomized control trial) were included. Studies included post-surgical patients in a variety of surgical fields. A total of 8,865 patients were included. Within this population, 710 thrombotic events occurred, of which 378 were DVT, 228 were PE, 20 were other thrombotic events, and 84 were unclassified. TEG was utilized in 29 articles and ROTEM in 4 articles.

Discussion: TEG can be used to evaluate coagulopathy in a variety of patient populations and has been proposed as a superior predictor of hypercoagulability in post-surgical patients, when compared to conventional coagulation tests. Within the TEG profile, MA, a marker of clot strength, has been shown to predict hypercoagulability following traumatic injury and surgical intervention. Understanding how the TEG profile changes over time in trauma – likely from a period of hypocoagulability during the resuscitation phase to a period of hypercoagulability – is critical to allow both directed resuscitation and potentially vary prophylactic anticoagulation in the trauma patient.

Neutrophil/lymphocyte ratio and platelet/lymphocyte ratio as prognostic indicators for patients treated with yttrium-90 radioembolization for neuroendocrine tumors

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PURPOSE: Baseline serum biomarkers, such as neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR), predict treatment response and survival for a number of tumors, including chemoembolization for hepatocellular carcinoma. These biomarkers have not been evaluated in patients with neuroendocrine tumors (NET) undergoing arterial therapy. The purpose of our study is to evaluate if elevated baseline NLR (>3.5) and PLR (>150) predict progression-free survival (PFS) in patients treated with yttrium-90 (Y90) for NET.

MATERIALS: We reviewed patients with NET treated with Y90 at our center between 10/30/12 and 3/21/17. Pre-treatment NLR and PLR were calculated. Tumor grade was determined using mitotic index and/or Ki-67 staining. Tumor response was assessed by mRECIST criteria. The primary end-point was disease progression or death. Kaplan-Meier curves for patients with elevated and normal NLR and PLR were compared using log-rank tests.

RESULTS: Thirty-nine patients met inclusion criteria. In patients with elevated NLR (>3.5), the median time-to-progression or death was 33 months compared to 40 months in patients with NLR <3.5 (Hazards ratio: 0.6; one-sided p-value: 0.08). There was no difference in PFS in patients with an elevated PLR (>150) compared to patients with PLR <150 (Hazards ratio: 0.9; one sided p-value: 0.43).

CONCLUSIONS: There is a trend for a longer PFS for patients with NLR <3.5. A PLR > 150 does not predict PFS. This study motivates further prospective analyses of NLR as a non-invasive prognostic indicator of treatment response of NET to Y-90 therapy.

Use of an augmented reality-based neuronavigation system to improve external ventricular drain placement accuracy

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INTRODUCTION: External ventricular drain (EVD) placement is a common, life-saving neurosurgical procedure that is performed at the bedside in order to drain excess cerebrospinal fluid. Surgeons traditionally utilize a freehand technique, relying on surface landmarks to place a catheter just anterior to the foramen of Monro. A major limitation with this approach is that it does not take individual anatomic variations into account; in the context of small or shifted ventricles, the standard trajectory may fail to drain CSF and even do harm.

Augmented reality (AR) headsets allow the visualization of three-dimensional (3D) holograms in physical space. Using this technology, we developed a neuronavigation system that can overlay 3D models of patients' ventricles onto their skulls in the anatomically correct position, granting the wearer a form of "X-ray vision." This system allows surgeons to maintain their attention on the procedural field and receive real-time feedback as they place an EVD.

METHODS: Neurosurgical residents were shown CT scans of two patients. Patient A had dilated ventricles in a normal position. Patient B had collapsed, shifted ventricles. In a simulated scenario for each patient, the subjects placed an EVD on a phantom head model using the 1) freehand technique and 2) augmented reality guidance. A tracking system measured the Euclidean distance of the catheter tip to the ideal target and determined whether the catheter had successfully drained the ventricle. The results were compared.

RESULTS: Both the accuracy and precision of catheter placement were improved when subjects were wearing our AR neuronavigation system. As expected, this improvement was much more pronounced in the case of the patient with the collapsed, shifted ventricles.

CONCLUSION: These preliminary results show that an AR-based neuronavigation system has potential to improve accuracy of EVD placement and improve patient outcomes in clinical settings.

Syncope: Are We Choosing Wisely?

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BACKGROUND: Imaging modalities beyond EKG rarely provide useful diagnostic information in the evaluation of simple syncope. Multiple organizations, including the American Heart Association, have published firm recommendations for more than 5 years advising against the use of carotid ultrasound or ECHO in this setting. Nevertheless, subsequent studies indicate these tests are still ordered. We set out to determine if the gap between guidelines and practice persists in our institution.

METHODS: We conducted a retrospective chart review of all patients discharged from Piedmont Athens Regional Medical Center with a diagnosis of Syncope and Collapse (ICD10-R55) from January 2017 to January 2018. The initial cohort of 2,983 visits was reduced to 561 inpatient visits. Collected data included demographics, select testing results (ECHO, carotid Doppler, and EEG), comorbidities (diabetes mellitus, hypertension, and coronary artery disease), tobacco history, LDL, and HbA1c. Statistical analysis, including cost analysis and diagnostic yield, was carried out using Stata 11.

RESULTS: A total of 254 patients were included. The mean age of our patients was 68. ECHO was obtained in 48% of our patients; only 5% had relevant findings which included aortic stenosis and HOCM. Carotid Doppler was performed for 18% of our sample, yet only 2.36% had significant carotid stenosis. Electroencephalography was done in 13% of our patients, yet only 6% of those had abnormal results such as metabolic encephalopathy.

DISCUSSION: The diagnostic yield was 5% for ECHO and 2.36% for Carotid Doppler, yet none of these were found to be predictive of the underlying etiology of syncope despite the high frequency of use. These tests did not result in any intervention.

CONCLUSION: Implementation of a quality improvement intervention is needed to improve awareness regarding simple syncope guidelines since imaging had low diagnostic yield and was not associated with a subsequent change in patient care.

Treatment results for patients with Central Centrifugal Cicatricial Alopecia (CCCA): a multicenter prospective study

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BACKGROUND: Central centrifugal cicatricial alopecia (CCCA) is the most common form of scarring hair loss that predominately affects African-American women. The current management of CCCA is approached symptomatically rather than through evidence-based recommendations. A prospective, observational cohort study was designed and initiated to compare the efficacy of current treatment regimens.

METHODS: This study is a multicenter prospective observational cohort study enrolling African-American women ages 18-60 years old with biopsy-proven CCCA not previously treated with topical agents for CCCA within the past 4 months or more than two rounds of intralesional steroid injections to the scalp in the past one year. The primary objective of the study is to compare CCCA treatment outcomes between two different treatment groups, including topical steroids, intralesional steroid injections, oral antibiotics and topical minoxidil, in a randomized controlled trial. Secondary objectives include comparative efficacy and risk factor characterization.

Approximately 250 patients will be enrolled into the trial and randomized to one of the two treatment groups. Treatment will be given for an 18-20 month period of time. Photographs will be taken every 6 months to evaluate progression or worsening of disease. The first patient was enrolled in April 2018, and as of August 6, 2018, 5 patients are enrolled.

DISCUSSION: This study is expected to provide in-depth data on the efficacy of CCCA treatment regimens and the association between epidemiologic patterns and clinical outcomes.

Immune markers & BRAF-mutation in cutaneous sweat gland tumors: a pilot survey

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BACKGROUND: Cutaneous sweat gland tumors are rare. Many have risk for local recurrence, no established therapy, and poor prognosis upon metastasis. The utility of PD-1/PD-L1 and BRAF kinase inhibitors, promising treatments for many cancers, is unknown for these tumors. Physiologically, immune cells expressing programmed cell death ligand 1 (PD-L1) and its receptor (PD-1) interact to inhibit apoptosis of healthy cells. Many tumors upregulate PD-L1 to evade attack. PD-1/PD-L1 inhibitors allow T-cells to apoptose masquerading tumor cells. Mutant BRAF kinase over-activates MAPK, inducing tumorigenic growth. BRAF inhibitors limit this growth. Tumor expression of PD-L1 and mutant BRAF kinase provides evidence for the efficacy of their respective inhibitors. Tumor-infiltrating lymphocytes (TILs) correlate with responsiveness to immune-checkpoint therapy. By surveying cutaneous sweat gland tumors for TILs, PD-L1, and mutant BRAF expression, we hope to elucidate the potential relevance of inhibitors in their treatment.

METHODS: We reviewed 12 cutaneous sweat gland neoplasms. PD-L1 expression was assessed with ZR3 antibody and scored with the DAKO tumor proportion scale. BRAF V600E expression was assessed with VE1 antibody. TILs were assessed in H&E staining.

RESULTS: The case of invasive, metastatic Extramammary Paget's disease (EMPD) expressed PD-L1 and brisk TILs. Two cases of non-invasive EMPD did not express PD-L1. The case of Papillary Eccrine Adenoma expressed mutant BRAF. The case of Syringocystadenoma Papilliferum expressed both PD-L1 and BRAF.

CONCLUSIONS: PD-L1 expression and brisk TILs in invasive, metastatic EMPD suggests the relevance of PD-1/PD-L1 inhibitor therapy in advanced EMPD. Papillary Eccrine Adenoma and Syringocystadenoma Papilliferum show BRAF mutation. Their malignant counterparts should be assessed for BRAF mutation; anti-BRAF therapy could be useful in their treatment. Cutaneous sweat gland tumors should be evaluated individually for immune markers.

Targeted Immunomodulation of Th2-cells in Atopic Dermatitis

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Atopic Dermatitis (AD) is a chronic, pruritic skin disorder with an unclear pathogenesis that exhibits elements both genetic and allergenic. Growing understanding of the immunological aspects of AD has revealed the elevations of IgE, Eosinophilia, and the type 2 T cell (TH2) signaling pathway as a promising target for immunomodulatory therapy. Monoclonal antibody inhibition of IL-4 and IL-13 in this signaling cascade elicited a substantial clinical response in patients with moderate to severe adult patients with AD. In adult trials (SOLO-1 and SOLO-2) carried out by Simpson et al, 38% and 36% of patients respectively were found to have a reduction in 1-2 points of the Investigator Global Assessment (IGA) Scale and a significant response when compared to placebo for patients with an Eczema Area and Severity Index (EASI) score of 75%. The success of this therapy in adults and its recent approval by the FDA; therefore begs the question of this therapy's efficacy and safety in pediatric populations. This ongoing study is a double-blinded parallel group randomized control trial comparing the efficacy of dupilumab and topical corticosteroids compared to placebo across a 16-week period. Key endpoints will trace IGA score and EASI 75% scoring of participants ages ≥ 6 months to ≤ 6 years.

Outcomes of Transcatheter Aortic Valve Replacement at Piedmont Athens Regional Medical Center

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BACKGROUND: Conscious sedation has become a more commonly used method of anesthesia during the Transcatheter Aortic Valve Replacement (TAVR) procedure at Piedmont Athens Regional Medical Center. While a number of recent studies have examined the costs and benefits of using conscious sedation on a worldwide scale, a local population study can be more informative due to demographic differences.

OBJECTIVES: The objective of this study is to determine if there is a statistically significant difference in in-hospital, 30-day, and 1 year mortality rates between patients receiving conscious sedation as compared to general anesthesia during the TAVR procedure.

METHODS: Demographic, previous medical history, and outcome information was obtained from The Society of Thoracic Surgeons (STS)/American College of Cardiology (ACC) Transcatheter Valve Therapy (TVT) Registry (STS/ACC TVT Registry) on patients who have gone through the elective transfemoral TAVR procedure from December 2013 to December 2017. Patients were sorted into 3 separate groups: Conscious Sedation, General Anesthesia, and other. The in-hospital, 30-day, and 1 year mortality rates were then obtained and compared. Statistical analysis standardizing for a number of different demographic and previous medical conditions is ongoing.

RESULTS: While general anesthesia was used in all procedures during 2013 and 2014, Conscious sedation was introduced in 2015 but was only used in a limited capacity. By 2017, conscious sedation was used in 62.5% of TAVR procedures. The average age of patients undergoing the TAVR procedure was 73.37 (+/- 8.45 yrs). The in hospital, 30 day, and the 1 year mortality rate for general anesthesia was 2 deaths, 3 deaths, and 12 deaths respectively (n=68). For conscious sedation, the in hospital, 30 day, and 1 year mortality rates were 1 death, 1 death, and 3 deaths respectively (n=60). While the absolute mortality rates have been calculated, analysis accounting for confounding and statistical significance is ongoing.

CONCLUSIONS: While some preliminary data has been collected, statistical analysis to determine significance is ongoing so all results have a low validity at this point in time. Conclusions will be drawn after the statistical analysis is completed. While the TAVR procedure is a considerable improvement in care for patients with moderate to high risk of mortality with a standard Surgical Aortic Valve Replacement, continued research into quality improvement is still needed.

Tibial nerve injury following operatively treated talus fractures

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INTRODUCTION: Talus fractures are associated with high complication rates, including post-traumatic arthritis and avascular necrosis. However, although recognized as a clinical problem, rates of post-traumatic tibial nerve injury are not well described. The aim of this study was to investigate rates and associations of tibial nerve (TN) injury following talus fractures.

METHODS: Retrospective chart review was performed on 90 patients for a total of 91 talus fractures treated with open reduction and internal fixation between 2014 and 2018 at a level-1 trauma center. Patient chart data was reviewed for evidence of TN injury associated with talus fracture. TN injury was defined as hyperesthesia, hypoesthesia, paresthesia, or neuropathic pain affecting the plantar surface of the foot.

RESULTS: Evidence of TN injury was documented in twenty-two (24.2%) of ninety-one cases of talus fractures. There were twenty (30.8%) cases of TN injury out of sixty-five talar neck fractures. TN injury was documented in association with zero (0%) of four Hawkins I fractures, seven (21.9%) of thirty-two Hawkins II fractures, ten (41.7%) of twenty-four Hawkins III fractures, and three (60%) of five Hawkins IV fractures. Only two patients with non-neck fractures reported TN symptoms: one with a body fracture, and one with a lateral process fracture. Both patients had concomitant subtalar dislocation, likely resulting in traction injury to the TN. All cases of TN injury occurred following displaced fractures of the talus.

CONCLUSIONS: The tibial nerve and associated branches are at significant risk of injury in displaced fractures of the talus, and therefore heightened clinical suspicion of TN injury should be maintained in such cases.

Reimbursement incentives to improve adherence to follow-up of cervical cancer cytology screening results in Peru

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INTRODUCTION: Cervical cancer is the third most common cancer affecting women and the second most prevalent cause of cancer-related deaths worldwide. Approximately 80% of cervical cancer deaths occur in developing countries, demonstrating the need to increase early detection screening and improve follow-up adherence to reduce the number of preventable deaths. The purpose of this study was to determine a new plan using economic incentives as a way to increase follow-up adherence to cervical cancer screenings among Peruvian women in Cusco.

METHODS: Women of at least 18 years of age (n=1,000) who speak Spanish and/or Quechua living in Cusco, Peru and the surrounding region were recruited to complete a questionnaire administered at the CerviCusco medical center, as well as mobile clinic campaign sites at Ministry of Health clinics or at tents at local markets. The 34 item questionnaire gathered patient demographics, assessed the participant's willingness to pay for cervical cytology screening services, and evaluated the impact that incentive programs would have on the participant's adherence to cervical screening follow-up.

RESULTS/CONCLUSION: The results and conclusion of this study are pending data analysis.

Hydrogel polymer as an artificial vitreous gel

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BACKGROUND: Several disease processes cause the retina to become ischemic, to which it responds by producing new blood vessels in an effort to restore the flow of nutrients back to the affected area. Unfortunately, these vessels lack the integrity of normal vessels and are thus prone to spontaneous bleeding into the vitreous, resulting in a diminution of vision. A vitrectomy procedure can be performed to remove the hemorrhagic vitreous however a suitable vitreous substitute has not been developed. Such a substitute should provide a permanent retinal tamponade and, ideally, permit the intravitreal injections of anti-vascular endothelial growth factor (VEGF) compounds to treat the aberrant neovascular process.

PURPOSE: The aim of this study is to test a novel hydrogel formulation that is both translucent and allows for maximal drug delivery.

METHODS: An oligo-tetra peg hydrogel was administered after standard vitrectomy procedure to 2 rabbits. Post-operatively, imaging was performed at 6, 14, and 21 days.

RESULTS: On imaging, there were white spots on the retinas of both rabbits which we hypothesize to be either detached retina or precipitate from the hydrogel. The area of these spots declined over the imaging period. Follow up histology will be done to determine the exact origin. Additionally, a drug release curve was created to compare the ability of hydrogel to hold onto Avastin with that of normal vitreous. Upon ELISA analysis, the concentration of Avastin in hydrogen remained constant while the concentration in vitreous began to steadily drop at day 14 and fell to 0 by the end of the 21 days.

CONCLUSION: These results highlight the promise of this vitreous substitute as a potential drug reservoir

Perceived fatigue and muscle mitochondrial function in older adults

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BACKGROUND: Previous studies have shown evidence of decline in muscle mitochondrial function in older adults, but the link between these cellular-level changes and perceived muscle fatigue remains unclear.

Purpose: The purpose of our study was to evaluate muscle mitochondrial function in older adults with and without self-reported fatigue. We were also interested in developing a noninvasive method for evaluating fatigue of respiratory muscles.

METHODS: Older participants were divided into groups based on presence of self-reported fatigue. Muscle mitochondrial function was measured using near-infrared spectroscopy (NIRS). Young adults in their 20s served as a control group. Diaphragm fatigue in young adults was measured using accelerometry during transcutaneous electrical stimulation of the phrenic nerve.

RESULTS: The average rate constant value for the control subjects (n=5) was $2.25 \text{ min}^{-1} + 0.61$, with an average Total Mood Disturbance (TMD) score of $-3.2 + 6.57$. Sufficient calf muscle stimulation and cuff occlusion was achieved in only one older adult subject. The rate constant was calculated to be 1.71 min^{-1} with $\text{TMD} = -7$. We achieved successful transcutaneous stimulation of the phrenic nerve and were able to use accelerometers to visualize and quantify diaphragmatic contractions.

CONCLUSION: We were able to successfully measure muscle mitochondrial function using NIRS in younger subjects. However, due to problems with recruiting older adults from the community as well as the uncomfortable sensation of the blood pressure cuff placed on the inferior thigh, we were able to collect usable data from only one out of five older subjects. Future studies will focus on further development of our endurance test protocol to achieve accurate and reliable measures of diaphragm fatigue. We hope that this approach will prove clinically useful for patients on ventilatory support both as a prognostic and preventative measure.

Amniotic fluid injections for treatment of stenosing tenosynovitis

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BACKGROUND: People living with stenosing tenosynovitis (more commonly known as trigger finger/thumb) have few options for conservative treatment of this painful and debilitating affliction. Corticosteroid injection is the predominant conservative treatment as it is easily accessible and affordable. Although widely used, corticosteroid injections are not a very effective treatment for trigger finger and carry risks associated with their catabolic properties¹. Amniotic fluid injections have been shown to be safe and effective for other clinical issues, and has elicited anabolic effects that are shown to be pain relieving².

OBJECTIVE: The goal of this pilot study was to evaluate the efficacy of amniotic fluid injections as a conservative treatment of trigger finger and thumb.

METHODS: Effectiveness of the injection was assessed by comparing the percentages of successes and fails. Success was defined by patients who did not seek alternative treatment for the digit and believed that the treatment helped with their symptoms. Subjects were considered to be fails if they opted for a steroid injection or surgical release at any point during the study time period for the digit or reported that the injection did not help with their symptoms.

RESULTS: Among our sample size of 114 digits, 54.39% of digits were considered a success. In those considered a success, there was an average decrease in 17.20 points in the Disabilities of Arm, Shoulder, and Hand (DASH) score, and a decrease in 4.39 points on the analogue pain scale. 45.61% of total digits were considered a fail.

CONCLUSION: This data has prompted an ongoing single blinded randomized control trial comparing the effects of corticosteroid injections and amniotic fluid injections. Further study into the direct comparison of the two treatments will hopefully establish a difference between corticosteroid and amnion injections and their effects on the patient.

Modeling post-operative endophthalmitis in porcine eyes with intracameral and intravitreal injection of bacteria

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BACKGROUND: Cataract is a condition that causes decreased transparency and increased cloudiness of the crystalline lens of the eye. The current gold standard for cataract surgery is phacoemulsification, which involves the application of ultrasonic energy to emulsify and aspirate the opacified lens from the patient. A potential complication of this procedure is endophthalmitis, an intraocular infection that may cause permanent blindness in the affected eye.

OBJECTIVE: The aim of the present study was to create an ex-vivo model of post-surgical endophthalmitis with phacoemulsification, and injection of luminescent bacteria.

METHODS: Cataract surgery was performed on cadaveric porcine eyes with a phacoemulsification machine, and injected with 10⁹ colony-forming units of *Escherichia coli* or *Staphylococcus aureus* into the anterior chamber (AC) or vitreous humor (VH). Uninfected VH was also extracted for ex vivo evaluation for bacterial growth or killing.

RESULTS: *E. coli* injected into the AC was unable to invade the VH in untreated eyes, as well as eyes exposed to phacoemulsification. *E. coli* and *S. aureus* increased in luminescence over time when injected into the AC, but were unable to thrive when directly injected into the VH. Both strains experienced significant growth (*E. coli*: $P < 0.0001$, *S. aureus*: $P = 0.0016$) when inoculated in smaller volumes of vitreous humor extracted from eyes.

CONCLUSION: These results suggest that multiple barriers exist for bacterial growth in the VH, which need further investigation.

The impact of race and socioeconomic factors on severity of idiopathic adolescent scoliosis

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PURPOSE: There is a paucity of information on the effects of socioeconomic status on the magnitude of scoliosis on initial evaluation by a spine surgeon. The purpose of this study is to examine the implications of socioeconomic and demographic factors on scoliotic deformity at first presentation in the Baltimore adolescent population.

METHODS: A retrospective chart review was performed on 10-19 year old patients (n=397) who presented for idiopathic adolescent scoliosis evaluation at outpatient clinics over a 10-year period (2007-2016). Using standing radiographs, Cobb angles were measured to quantify scoliosis severity, and patients were grouped into surgical grade ($>45^\circ$) and nonsurgical grade ($<45^\circ$) groups. Demographic data was retrieved from the electronic medical record, and socioeconomic information was inferred using patient's zip code and 2012 US census data. To examine the relationship between race, median income by ZIP code, height, BMI, age, and scoliosis severity, Pearson Chi-squared test and multivariate analysis were performed.

RESULTS: 44 of the 199 black patients had surgical grade Cobb angles compared to 26 of the 198 white patients ($p=0.0189$). Additionally, while black patients had a lower mean income by zip code compared to white patients ($p < 0.0001$), multivariate analysis displayed that race alone was the sole predictor of surgical grade cobb angles ($p=0.00078$). This persisted even controlling for income on multivariate analysis. Age, height, and BMI all did not statistically differ between surgical grade and non-surgical grade groups.

CONCLUSION: In the adolescent Baltimore population, black patients presented with more advanced scoliosis curves compared to white patients, regardless of socioeconomic status. Given this disparity, future prospective studies are needed to reveal any differences in outcomes in these patients who undergo spine surgery.

Emergency Medicine Palliative Care Access (EMPallA): Protocol for a Multi-Center Randomized Controlled Trial Comparing the Effectiveness of Outpatient Clinic versus Nurse-Led Telephonic Palliative Care of Older Adults with Advanced Illness

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INTRODUCTION: Emergency department (ED)-initiated palliative care has been shown to improve patient-centered outcomes in older adults with serious, life-limiting illnesses. However, the optimal modality for providing such interventions is unknown. This study aims to compare nurse-led telephonic case management to specialty outpatient palliative care for older adults with serious, life-limiting illness on: 1) patient quality of life; 2) healthcare utilization; 3) loneliness and symptom burden; and 4) caregiver strain, quality of life, and bereavement.

METHODS AND ANALYSIS: This is a protocol for a pragmatic, multi-center, parallel, two-arm randomized controlled trial in ED patients comparing two established models of palliative care: nurse-led telephonic case management and specialty, outpatient palliative care. We will enroll 1,350 patients aged 50+ years and 675 of their caregivers across nine EDs. Eligible patients: 1) have advanced cancer (metastatic solid tumor) or end-stage organ failure (New York Heart Association Class III or IV heart failure, end stage renal disease with glomerular filtration rate <15ml/min/m², or Global Initiative for Chronic Obstructive Lung Disease Stage III, IV, or oxygen-dependent Chronic Obstructive Pulmonary Disease); 2) speak English; 3) are scheduled for ED discharge or observation status; 4) reside locally; 5) have a working telephone; and 6) are insured. Patients will be excluded if they: 1) have dementia; 2) have received hospice care or two or more palliative care visits in the last 6 months; or 3) reside in a long-term care facility. We will use patient-level block randomization, stratified by ED site and disease. Research staff performing assessments will be blinded. Effectiveness will be compared by measuring the impact of each intervention on the specified outcomes. The primary analysis will be based on intention-to-treat.

Medical Literacy Among Women with Severe Mental Illness

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BACKGROUND: Severe mental illness (SMI), including disorders such as PTSD, schizophrenia, bipolar disorder, schizoaffective disorder, and major depressive disorder, can compound negative health effects when combined with limited health literacy. Factors such as difficulty with cognitive processing and planning ahead, poor judgement, and impulsivity can greatly impact family planning and reproductive choices of women with SMI. While there have been studies of health literacy in women regarding their reproductive health and in people with SMI separately, there is a lack of research concerning the impact of low health literacy on the reproductive health of women with SMI.

OBJECTIVE: This project's specific goal was to provide a better understanding of the barriers women with SMI seeking outpatient psychiatric services face when utilizing contraceptives and family planning services.

METHODS: Women (n=17) between the ages of 18-55 with SMI were recruited from Grady Outpatient Behavioral Health Center and underwent semi-structured in-depth in-person interviews lasting 30-90 minutes that explored family planning experiences such as barriers and facilitators to care, perceived unmet contraceptive needs, and pregnancy decision making. Interviews were transcribed verbatim and coded using MAXQDA software.

RESULTS: Results showed that many women expressed incomplete understanding regarding their reproductive health care experiences suggesting a gap in their medical literacy. Subsequently, several women described traumatic experiences or expressed negative attitudes and feelings towards those events.

CONCLUSION: This study demonstrated that many women may not understand the ramifications of procedures and medical complications, and this lack of understanding can negatively impact their perception of their health care experience. Further research into factors such as health literacy or traumatic life experiences may illuminate why women experienced their health care events in this way.

Gender differences in the predictive value of circulating soluble urokinase plasminogen activator receptor levels for adverse cardiovascular outcomes

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INTRODUCTION: Circulating soluble urokinase plasminogen activator receptor (suPAR) is a novel biomarker for inflammation, thrombogenesis, and immune regulation, that is shown to predict future adverse cardiovascular outcomes. It is also well established that circulating suPAR levels are higher among females than males, but the prognostic significance of the gender difference in suPAR levels has not been assessed.

OBJECTIVES: We plan to examine gender differences in circulating suPAR levels among patients enrolled in the Emory Cardiovascular Biobank (ECB). Additionally, we aim to establish sex-appropriate circulating suPAR cut-point levels for predicting adverse events among these patients.

HYPOTHESIS: Sex-specific circulating suPAR cut-point levels will be higher in females and circulating suPAR levels will have a higher predictive value for adverse cardiovascular outcomes in males.

METHODS: Patients enrolled in the ECB had plasma suPAR levels measured at the time of enrollment. Sex-based differences in the association of circulating suPAR levels with all-cause mortality, cardiovascular death, and major adverse cardiovascular events was assessed using Cox proportional hazard regression models.

RESULTS: Men were found to have higher hazard ratios for all-cause mortality(4.7), cardiovascular death (5.3), and major adverse cardiovascular events (2.1) than women (2.4, 2.3, and 1.5) respectively. The optimal unadjusted cut-point for suPAR level in men was found to be 3050pg/mL, while it was 2850 pg/mL when adjusted for covariates. In females, we found the optimal unadjusted cut-point for suPAR level to be 4300 pg/mL, while it was 5300 pg/mL when adjusted.

CONCLUSIONS: The optimal adjusted cut-point for female suPAR levels is 5300 pg/mL, while it is 2850pg/mL for males, with elevated suPAR levels in males yielding higher hazard ratios for all-cause mortality and cardiovascular death. Larger studies may be required to confirm these cut-points for utilization for cardiovascular disease risk screening.

Parent assessment regarding effectiveness of neonatal antibiotic education in the NICU at Piedmont Athens Regional in 2017 and 2018

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Recent research has revealed increasing knowledge about significant and long-lasting antibiotic side effects in the newborn population. The CDC lists 7 core elements of stewardship, one of which is education. In June 2017, the neonatal antibiotic stewardship team developed and began using a newborn antibiotic education handout. The purpose of this study was to assess the effectiveness of the antibiotic education given to parents of babies in the NICU at PAR. In collaboration with a patient advocate, we developed a phone survey for families of babies in the NICU. A total of 147 families were eligible for the study. 45 families June 2017 – June 2018 completed the survey. The effectiveness of education was measured via the family's knowledge of the 3 education points: antibiotic start, reason and duration. 69% of families knew at least 1 key education point and 47% knew all 3, but only 29% recalled receiving the antibiotic education handout. This points to the benefit of conversations between healthcare providers and families. We have been able to share the results with the nurses emphasizing a goal of increasing handout administration from 41% to 90% of families. Our goal is to shift the NICU culture to include the 3 education points at the start of antibiotics and at every parent update while the infant is on antibiotics. Our project will be highlighted in an international quality improvement webinar through the Vermont Oxford Network in October, 2018. We are thankful for the tremendous support from the NICU staff on this initiative and anticipate benefit from this project both in our NICU and in the Piedmont healthcare system as we intend to spread the new education focus system wide.

10 Years of Experience: A Retrospective Analysis of Suture Button Suspensionplasty in the Treatment of Carpometacarpal Arthritis

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BACKGROUND: Basilar Thumb Arthritis, also known as carpometacarpal (CMC) arthritis, is the second most common arthritis of the hand, affecting 1 in 4 women and 1 in 12 men. It affects the trapeziometacarpal (TMC) joint, which is mobile & vulnerable to arthritic changes. Conservative options for treatment include activity modification, splinting, & injection. Many surgical interventions exist, but little evidence supports any to be superior. The current gold standard is considered to be Trapeziectomy with Ligament Reconstruction & Tendon Interposition (LRTI) using a partial Flexor Carpi Radialis (FCR) tendon graft. An alternative is Trapeziectomy with Suture-Button Suspensionplasty (SBS). SBS has been shown to be a viable alternative to LRTI in several cadaveric studies. Studies evaluating its performance in vivo are few & limited in sample size & study time. Advantages of the SBS procedure include superior post-operative maintenance of trapezoidal space height, well-preserved range of motion, & earlier mobility of the operative digit. This project is a retrospective study of one surgeon's experience performing this procedure.

METHODS: SBS patients were identified using CPT coding, & their charts were reviewed in depth to evaluate average follow-up, surgical outcome, complications, & to identify any revision procedures. DASH questionnaires (Disability of the Arm, Shoulder, & Hand) were completed in person or by phone interview when patient contact was possible.

RESULTS: Chart retrieval identified 218 patients who received 243 SBS procedures. 85.60% of patients completed standard follow-up at 3 months. Out of 13 complications that occurred, 7 Implant-Associated Complications & 6 Non-Implant Associated Complications were identified. Patients who developed abutment between index & thumb metacarpals were offered revision surgery using Palmaris Longus Tendon Interpositional Arthroplasty. DASH Scores were obtained from 57.61% of the sample, & the average postoperative score was 11.26%, between 2.5 months post-op & 9 years post-op.

CONCLUSION: While further study is needed to support SBS as the predominant surgical treatment for basilar thumb arthritis, our study serves as a reference to those interested in this procedure & its associated outcomes.

URBAN Hotspots: Geographic Variation of Cocaine and Opiate Use among Individuals Presenting to an Urban, Safety Net, Emergency Department

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Substance use disorders are rapidly rising in national importance due to the recent classification of the opioid epidemic as a Public Health Emergency. Amidst this fervor, policy makers are at risk of limiting resources to opioid prevention/treatment only. However, national drug use estimates might not paint a full picture of which drugs are most used in some settings. Atlanta, for example, has long been considered a hub for cocaine use and distribution. By analyzing 378,351 Urine Drug Screen (UDS) results from patients presenting to Grady Health System's (GHS) Emergency Care Area over a four-and-a-half-year period, the aim of this study was to examine differences in the results of urine drug screens based on geographic locations within Metropolitan Atlanta. Trends were established using Microsoft Excel, and maps were created using Tableau software. Overall, results showed that, in the population served by GHS, cocaine was detected nearly twice as often as opioid use (21,939 versus 11,833 positive screens) despite similar rates of screening. Cocaine was most likely to be detected among persons who lived in areas with lower average socio-economic status (southern Atlanta), in contrast to more affluent areas, where opioid use was detected more commonly (northern Atlanta and suburb areas). In addition to geographic variance, those using cocaine were more likely to be uninsured or have government insurance than opioid users. These findings suggest that populations who would benefit the most from public health resources (those of lower income brackets) were more likely to be using cocaine products than opioids. Therefore, in this population, we advocate for more funds to be allocated for cocaine use prevention/rehabilitation.

Evaluating Dementia Care Quality Metrics in an Outpatient Setting and Applications Across the State of Georgia

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BACKGROUND: Creating a standard quality of care for dementia patients has been a subject of interest for many years as the population continues to age. In Georgia, the Georgia Alzheimer's Project/Georgia Memory Net (GMN), hosted by Emory Healthcare, aims to provide standard care to dementia patients by establishing memory assessment centers across the state. The purpose of this quality improvement project was to develop the best standardized assessment to be used across these GMN sites by first evaluating how various quality metrics and standardized elements of memory assessments are being captured across patient encounters within the Emory Healthcare system while at the same time creating an improved questionnaire to enhance data capture.

METHODS: Clinic notes from 50 patient encounters performed by 5 different physicians were examined for the percent documentation of quality metrics of dementia care established by the American Medical Association in conjunction with the American Academy of Neurology Institute and American Psychiatric Association, with a focus given on language, memory, executive function, motor, and behavior assessments.

RESULTS: Results using Kruskal-Wallis showed that while there was no difference between physicians in terms of documentation, there was a difference in documentation across the various domains ($p=0.03$). Sleep was the best documented among the metrics assessed. Though not statistically significant, it was also clear that memory was the least well documented among the domains examined. These results were then used to craft the new patient questionnaire to better document these domains in current memory assessment centers and for future centers across the state.

Unexplained Hypoxemia Due To Atrial Septal Defect?

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INTRODUCTION: Atrial septal defects (ASD) are one of the common congenital heart diseases which present in adulthood. However, their subtle clinical presentations can pose a diagnostic challenge.

CASE: A 56-year-old man with intermittent chest pain palpitations and shortness of breath (SOB) presented at the emergency department (ED) with acute worsening SOB. His wife noticed he was choking on a piece of meat and performed a Heimlich maneuver to relieve him. Shortly after that, he started experiencing significant SOB and was brought to the emergency department. Assessment revealed polycythemia, marginally elevated troponin, normal D-Dimer and a normal chest x-ray. Chest CT showed no evidence of pulmonary embolism. EKG showed T-wave inversions concerning for cardiac ischemia. Myocardial perfusion scan was normal. TTE at the time revealed a dilated right ventricle and right atrium with possible pulmonary hypertension. The patient was discharged with an event monitor to follow up with pulmonology. 10 days after discharge, the patient was seen for worsening dyspnea. He developed severe hypoxemia of 69% on ABG. This raised the suspicion of an intracardiac shunt. Cardiac MRI revealed mild intracardiac shunting with a QP/QS ratio of 1.3. Transesophageal echocardiogram with bubble study showed significant secundum type ASD. Cardiothoracic surgery was consulted and the patient subsequently had successfully closure of ASD.

DISCUSSION: Although some patients with ASD are diagnosed in infancy, almost all patients who survive after the age of 60 become symptomatic. Having high index of suspicion ultimately led to the diagnosis of ASD from acute unexplained hypoxemia.

CONCLUSION: ASD should be suspected in the event of severe hypoxemia with no apparent identifiable cause.

Hyponatremia: How low can you go?

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Hyponatremia is defined as a serum sodium level <135 mEq/L. Drug induced hyponatremia is commonly associated with the use of diuretics. In mild cases, removal of the diuretic is usually sufficient to allow for correction. We report severe acute hyponatremia that required resuscitation with hypertonic saline.

A 67-year-old male presented with altered mental status (AMS) and slurred speech. He has had HT treated with Olmesartan -hydrochlorothiazide. Exam showed orientation only to month and year and dysarthria. Tests showed WBCs $39.4 \times 10^3/\mu\text{L}$ with neutrophilic predominance, sodium 97mEq/L, potassium 5.3mEq/L, chloride 69mEq/L, lactic acid 3mmol/L, AST 15 unit/L and alkaline phosphatase 167 unit/L. Head CT was normal. Prior tests showed chronic hyponatremia, with most recent sodium 130 mEq/L one month ago.

Vancomycin and piperacillin-tazobactam were started for sepsis and he was admitted to ICU. 3% hypertonic saline was initiated. DDAVP was given. He was eventually transitioned to free water restriction and sodium chloride tablets. With improving mental status, he gave further history of vomiting twice prior to EMS arrival. On discharge, serum sodium was at baseline 130 mEq/L.

In determining the etiology of his hyponatremia, the common theme appeared to be hypovolemia. This patient was on a combined thiazide diuretic and angiotensin receptor blocker (ARB). Thiazides inhibit the sodium chloride transporter in the distal tubules. ARBs block the effects of angiotensin II in the kidney and block angiotensin II stimulation of aldosterone secretion. The combined natriuretic and diuretic effects of these medications contributed to a hypovolemic state. Worsening hypovolemia was further precipitated by the onset of sepsis and GI losses (vomiting on the day of admission). His low urine sodium and elevated urine osmolality further solidified this diagnosis.

The synergistic effect of his thiazide-ARB combination may have created a lower threshold for exacerbation of chronic to acute severe hyponatremia. Mild cases of drug induced hyponatremia can be treated by removing the offending drug. However, as with this patient, acute severe symptomatic hypovolemic hyponatremia requires additional management. This case highlights the importance of understanding the physiological effects of common medications and how these may become synergistic to cause adverse outcomes.

The large mobile thrombus

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The patient is a 58-year-old male who presented to the emergency room six days after bilateral inguinal hernia repair with complaints of severe abdominal pain, that was minimally relieved with pain medications, worsening dyspnea and pleuritic chest pain. The patient stated that he had decreased activity since the surgery secondary to pain and two days prior to arrival to the emergency room he had sudden onset of substernal chest pain that worsened with exertion and was alleviated with rest. The patient was found to be hypoxemic in the emergency room as well as in renal failure with an elevated BNP. The patient was placed on a non-rebreather and his oxygen saturation improved. A CT scan of his chest was ordered without contrast and showed suspicion for a saddle pulmonary embolism that was difficult to confirm due to lack of IV contrast. A stat echocardiogram was performed and showed severely reduced systolic function of the right ventricle, a moderately dilated right atrium and a highly mobile thrombus in the right atrium. The patient was immediately started on a Heparin drip and Vascular Surgery as well as Cardiothoracic Surgery was consulted. Vascular Surgery felt as though there was nothing they could do. Cardiothoracic Surgery on the other hand recommended tPA if the patient did not agree to surgery since he was at very high risk for further decompensation and death. The benefit from surgery outweighed the risk and this was discussed in detail with the patient and his wife and a thrombectomy/embolectomy was highly recommended. The patient and his family agreed to surgery and the patient was immediately transferred to a nearby hospital and was brought directly to their operating room. The patient underwent a median sternotomy with embolectomy due to the large saddle embolus. An approximately 8cm saddle embolus was removed along with numerous other clots. The patient recovered well and was transferred back to the hospital he initially presented to for inpatient rehabilitation.

When the adrenaline rush hits the pump: An atypical presentation of paraganglioma

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Paraganglioma is a very rare extra adrenal neuro endocrine tumor. It typically presents with symptoms of increased sympathetic activity. Classically patients report palpitations, episodic headaches and diaphoresis. Here we present an atypical case of a patient with a paraganglioma masquerading as acute coronary syndrome.

A 75-year-old, otherwise healthy male presented with a one-day history of substernal chest pain described as pressure-like, non-radiating and 4/10 in intensity at its worst. He described having numerous episodes of pain that day each lasting at least 5 mins. He reported no aggravating or relieving factors and had not taken any nitroglycerin or aspirin at its onset. He also reported severe peri-umbilical pain, achy in character and non-radiating that was aggravated by eating with no relieving factors. He had had 2 episodes of vomiting that day but no diarrhea.

On admission, his BP was elevated at 233/132 mmHg. The remainder of his vital signs were unremarkable. Apart from mild epigastric tenderness physical exam yielded no other positive findings. An EKG was consistent with ST segment depressions in the anterolateral leads. His initial troponin was elevated at 6.59 ng/mL. An echocardiogram was consistent with a reduced ejection fraction of 25%, without wall motion abnormalities or apical ballooning. He was admitted to the critical care unit, given aspirin and started on heparin and labetalol infusions. His initial creatine was elevated at 1.96, once optimized coronary angiography was performed and revealed angiographically normal vessels throughout.

However, the persistence of his abdominal pain was still a cause of concern, his lipase was only mildly elevated at 106. A CT abdomen revealed a large lobular and heterogenous mass measuring 11cm x 7cm x 13 cm. A CT guided biopsy was consistent with a paraganglioma. This was later supported by elevated plasma levels of normetanephrine; 24.5 nmol/L and metanephrine 3.7 nmol/L. His urine metanephrine level was 14 times the upper limit of normal at 6831 Ug/g of Creatinine. After evaluation by the Oncology service, arrangements were made for further evaluation at an outside institution with the view of endocrinological consultation and surgical resection.

This case underscores the fact that paragangliomas, though rare entities can present in numerous ways. It also highlights the importance of avoiding early diagnostic closure and our role as clinicians to dig deeper for answers when a piece of the puzzle does not fit.

Notes

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