



**NEW JERSEY CHAPTER  
AMERICAN COLLEGE OF  
PHYSICIANS  
SCIENTIFIC MEETING**

**RESIDENT/FELLOWS  
AND STUDENT  
ABSTRACT COMPETITION**

**MARCH 2021**

## **PARTICIPATING INSTITUTIONS**

Thank you to all the programs who submitted abstracts for this year's abstract competition.

Abstracts were received from the following programs:

AtlantiCare Regional Medical Center (Aileen Hocbo, MD)

Atlantic Health-Morristown (Jacqueline Darcey, MD)

Capital Health Regional Medical Center (Saba Hasan, MD, FACP)

Cooper University Hospital (Brian Gable, MD, FACP)

HM Mountainside (Bijal, Mehta, MD)

HM Raritan Bay Medical Center-Perth Amboy (Mayer Ezer, MD)

HM University Medical Center (Marygrace Zetkulic, MD)

Hoboken University Medical Center (John Dedousis, MD)

Jersey Shore University Medical Center Program (Christian Kaunzinger, MD)

Monmouth Medical Center (Margaret Eng, MD, FACP)

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Newark Beth Israel Jersey City Medical Center (Joseph DePasquale, MD)

NY Medical College St Michael's Medical Center (Theodore DaCosta, MD)

Overlook Hospital (Karlene Williams, MD)

Rutgers New Jersey Medical School Program (Mirela Feurdean, MD)

Rutgers Robert Wood Johnson Medical School Program (Ranita Sharma, MD, FACP)

Seaton Hall/Saint Francis Medical Center (Sara Wallach, MD, MACP)

Saint Barnabas Medical Center (Sunil Sapru, MD, FACP)

St Joseph's Regional Medical Center (Patrick Michael, MD)

Saint Peter's University Hospital (Nayan Kothari, MD, MACP)

Trinitas Medical Center (William Farrer, MD, FACP)

Cooper Medical School of Rowan University

Rowan University School of Osteopathic Medicine

UMDNJ-RWJ Medical School-New Brunswick

## **ABSTRACT COMMITTEE MEMBERS AND JUDGES**

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### **DISCLAIMER**

It is assumed that all participants adhered to the rules as stated in the original abstract submission form. It is also assumed that the abstracts submitted were original works, represented by the true authors. Judging was performed in a manner to minimize bias. Judges were unaware of the authors unless they were directly involved with the associate. Although there were many excellent abstracts submitted, those selected to be presented as posters or oral presentations were chosen on the basis of content and quality. This content was felt to be intriguing from a clinical education standpoint, thought provoking, or could stimulate debate regarding our current practice of medicine.

### **Thank You to Our Oral Abstract Presentation Judges**

Saba Hasan, MD, FACP

Mirela Feurdean, MD, FACP

Tamie Proscia-Lieto, MD, MBA, FACP

Jon Shammash, MD, FACP

Theresa J. Barrett, PhD – Staff Liaison

# **Oral Abstracts**

## Improving Vaccination Rates in an Inner-City Patient Population

### *Quality Improvement/Patient Safety*

Yiting Li, MD

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S.Kola, MD; M.Malak, MD; Sara .L. Wallach, MD

*Seaton Hall-St Francis (Sara Wallach, MD, MACP)*

**Background and Aim:** The adult national influenza vaccination rates in the year of 2018 were 34.2%, 46.8%, and 68.7% for age groups of 18-49, 50-64, and > 65, respectively. Pneumococcal vaccination coverage among adults aged 19-64 years and >65 years, were 24.5% and 69.0%. The influenza and pneumococcal vaccination rates at our institution, Saint Francis Medical Center (SFMC), were noted to be below the national average. This prompted the commencement of a quality improvement project aimed to systematically improving adult vaccination rates at SFMC.

**Methods:** The St Francis Medical Clinic Team worked with the American College of Physicians "I Raise the Rates Vaccination Project from 2016-2019. In Sept 2019 members of the New Jersey Immunization Network (NJIN) asked us to join a New Jersey Project Echo vaccination effort. We did this with the approval of the American College of Physicians Center for Quality Staff. Our team included faculty members, medical residents, clinic staff, and data analysts at our institution as well as at NJIN. Several different approaches were implemented to improve vaccination rates in our hospital. Standardized orders were reviewed and reincorporated into our clinic system. We employed on-site Spanish translators to improve communication with our predominantly Hispanic patient population. Dedicated data analysts reviewed our data weekly and gave us feedback on our progress. In October, 2019, Robert H. Hopkins Jr, MD, MACP, a nationally known authority on vaccination delivered a Grand Rounds which disseminated practical information on vaccination to a multidisciplinary team. In November of 2019, we hosted the Families Fighting Flu event sponsored by several stakeholders under the umbrella of the NJIN. This event was also joined by the Capital Health, the Henry J. Austin Community Health Centre, the Bellevue pediatric practice, and Trenton Health Care officials. Approximately 220 individuals were vaccinated during this event.

**Results:** Influenza Vaccination rates at SFMC prior to the mentioned initiatives were 31.8% in 2017, and 46.5% in 2018 for adult patients of all age groups. The baseline pneumococcal vaccination rate for indicated adults was 55.13% prior to the project. The rates of both vaccinations at SFMC have markedly improved with addition of these initiatives. The adult influenza vaccination rate improved to 73.5% and the pneumococcal vaccination rates improved to 100% for indicated patients in the analysis in Feb 2020.

**Challenges and Lessons:** Despite aggressive motivational counseling, patients still refuse to get vaccinated. Potential reasons for this may be lack of awareness and education amongst lower socioeconomic groups, scarcity of resources, religious/cultural beliefs, and costs related to vaccination. Our quality improvement project emphasized the importance of educating all medical personnel on improving vaccination rates, listening to patient concerns, and providing counselling regarding their concerns.



**By the Resident for the Resident - Tackling Medical Errors:  
Resident-Lead Performance Improvement Committee**  
*Quality Improvement/Patient Safety*  
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*St. Peter's University Hospital (Nayan Kothari, MD, MACP)*

**Introduction:** Medical errors are one of the leading causes of in-hospital morbidity in the United States. Medical errors can occur at every level within the healthcare system and actions to prevent them should involve all healthcare members. Medical residents are on the front lines of healthcare provision and understand the system in which they work best. Therefore, they are key players in identifying system deficiencies that contribute to medical errors. In mid-2018 the residency program leadership created a peer-review Resident Performance Improvement (PI) committee to evaluate near-miss events involving residents within our hospital system using Plan-Do-Study-Act methodologies to identify contributing factors and implement preventive measures. Residents rotate within this committee quarterly, and members of the committee are required to complete training modules from the Institute for Healthcare Improvement.

**Methodology:** We analyzed the events reviewed by the committee over the last two years, including the improvements and lessons derived from these efforts.

**Results:** 38 near-miss events involving residents were reviewed by the committee in the last two years. 37% were due to Inadequate medication dosing of antibiotics, anticoagulants, or electrolytes. 26% were due to deficiency in the patient-handoff, including outdated or inappropriate sign-outs. 24% were due to break in communication (such as updating nursing staff promptly and repetition in already completed orders). 13% were due to medication reconciliation deficiencies during patient admission or discharge. The resident PI team identified the factors that resulted in errors were because of the patient (comorbidities, confusion, polypharmacy), provider (burnout, provider:patient ratio, call, and task fatigue), staff (resident, healthcare provider), and policy (non-standardized protocols) issues through their analysis using the fish-bone method.

Based on these findings multiple changes have been implemented within our program and institution such as the introduction of swing resident rotation to reduce patient:provider ratio during peak hours, restructure of on-call schedule, initiate standardized medication protocols within the EMR for antibiotics, anticoagulants, and electrolytes, adopting consistent patient hand-offs, development of a nursing communication tab within the EMR, and create a discharge assist team for safer patient discharges and medication reconciliation. The reports and recommendations generated are disseminated to other residents and physicians contributing to lesser errors. As these changes come from the constructive input from the residents, we have seen a significant increase in support from the trainees and the institution as a whole. Future steps include the adoption of qualitative improvement methodologies to assess the impact of the committee's initiatives.

**Conclusion:** Medical errors are common and efforts to prevent them are important to ensure patient safety and improve healthcare outcomes. In our experience, a resident PI initiative has been pivotal in identifying areas of improvement and bringing about positive changes at our institution.

## The Prognostic Significance of Neutrophil-Lymphocyte Ratio (NLR) in Patients with COVID19

*Research*

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*St. Barnabas (Sunil Sapru, MD)*

**Introduction:** Neutrophil lymphocyte ratio (NLR) is elevated in response to stressful stimuli and has been shown to be associated with poor prognosis in both benign and malignant disorders. Literature regarding NLR as a prognostic marker in COVID19 are limited. Our study was aimed to investigate the relationship between NLR and survival outcomes in patients hospitalized with Coronavirus disease 2019 (COVID19).

**Methods:** Ours was a single center, retrospective observational study, which included 472 nasopharyngeal swab SARS-CoV-2 RT-PCR positive patients. NLR was derived from the admission complete blood count and was divided into 5 sub-groups as (0-0.99, 1-2.99, 3-9.99, 10-19.99, >20). Demographics, comorbid conditions, and outcomes such as need for mechanical ventilation, length of stay and inpatient mortality were assessed. Statistics were performed using STATA. Significance was assigned at  $p < 0.05$ .

**Results:** The mean age was 71.16 years in NLR >10 group as compared to 60.3 years in patients with normal NLR 1-2.99. Male patients were found to have much higher NLR than females (65.12% vs 34.88% in NLR 10-19.99, 64.86% vs 35.14% in NLR >20;  $p$ -value: 0.05). Among comorbidities, COPD patients were found to have higher NLR (18.92% of NLR >20 vs 10.71% of NLR 1-2.99;  $p$ -value: 0.02). Rate of endotracheal intubation and need for mechanical ventilation was significantly higher with increasing NLR (0% vs 7% vs 14% vs 17% vs 32%;  $p$ -value: 0.03). Inpatient mortality was significantly higher in patients who had NLR >20 (70.27% of NLR >20 vs 16.07% of NLR 1-3  $p$ -value < 0.0001). On multivariate regression, patients with NLR >20 had 4 times higher odds of mortality; however, the  $p$ -value was not significant ( $4.07 \pm 2.78$   $p$ -value: 0.175).

**Conclusion:** Increasing NLR in COVID19 patients is associated with increased ICU admission, intubation and inpatient mortality. Further studies are warranted to establish NLR, which is readily available and inexpensive, as a potential prognostic indicator in COVID19 patients.

# Sweet Dreams: Is There an Association Between Obstructive Sleep Apnea and Alzheimer's Dementia? A Nationwide Population Analysis

*Research*

Andrew Okpe, MD

Oluwatoba Moninuola, MD, MPH; Paris Charilaou, MD; K Dixon, MD, FACP  
*St. Peter's University Hospital (Nayan Kothari, MD, MACP)*

**Introduction:** The Center for Disease Control (CDC) projects that the prevalence of Alzheimer's Dementia (AD) in the US will double by the year 2060 from 1.6% of the US population in 2014 to 3.3% in 2060. Recent studies have shown that sleep is an important factor in the production and clearance of brain metabolic byproduct and most relevant includes those involved in AD pathologic process. Obstructive sleep apnea (OSA) causes sleep fragmentation and intermittent hypoxia which has been demonstrated in studies to affect both brain structure and function leading to decreased cognitive function, changes in brain white and gray matter, changes in cerebral networks, and abnormal levels of Alzheimer's dementia biomarkers, which can all be involved in abnormal cognitive decline and dementia. We investigate the relationship between AD and OSA using a large population-based data set as the reference.

**Methods:** We conducted a database review of hospitalizations in the United States during the year 2017 with a diagnosis of dementia and OSA. Hospitalizations were selected from the National Inpatient Sample (NIS). International Classification of Diseases, 10th Revision, Clinical Modification codes were used to identify OSA, Dementia and other variables. A multivariate logistic regression analysis was used to calculate odds ratios (OR) for the association of OSA and AD.

**Results:** There were 435,164 hospital discharges aged 65 and above with a principal diagnosis of AD included in the 2017 NIS database. Relative to the studied population, AD patients were more likely to be female (54% vs 46%,  $p < 0.001$ ). Multivariate logistic regression revealed multiple independent associations with Alzheimer's dementia. The associations include Hypertension (OR 2.01,  $p < 0.001$ , 95% CI 1.98-2.04), Type 2 diabetes (OR 1.16,  $p < 0.001$ , 95% CI 1.13-1.18), Down syndrome (OR 4.56,  $p < 0.001$ , 95% CI 0.37-0.40), Homocystinemia (OR 1.67  $p < 0.027$ , 95% CI 1.06-2.64), Obesity (OR 0.38,  $p < 0.001$ , 95% CI 0.499-0.54), Atrial fibrillation (OR 1.95,  $p < 0.001$ , 95% CI 1.90-1.99), Congestive Heart Failure (OR 2.40  $p < 0.001$ , 95% CI 2.33-2.46), Hyperlipidemia (OR 1.48,  $p < 0.001$ , 95% CI 1.44-1.52) and OSA (OR 0.52,  $p < 0.001$ , 95% CI 0.499-0.54).

**Conclusion:** This analysis represents the largest hospital sample to date that examined the association of OSA to Alzheimer's dementia hospitalizations. The results are consistent with previous studies and literature in the association of AD with Down's syndrome, HTN, CHF, T2DM, Atrial fibrillation and Homocystinemia, but contrary to general belief, we found a statistically significant negative association of OSA with Alzheimer dementia. We believe that the improved statistical power of this study has added to the body of knowledge on this topic. Our work reiterates the need for further studies possibly using time-trend analysis to better understand the relationship between Alzheimer dementia and OSA as this association may be more complex than generally thought.

# Posters

## Real-World Biktarvy Use and Weight Change: A Single Center Retrospective Cohort Analysis Research

Kok Hoe Chan, MD

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*NY Medical College – St. Michael's Medical Center (Theodore DaCosta, MD)*

**Background:** Second generation integrase inhibitors (INI) and Tenofovir Alafenamide (TAF) have been linked to increased weight gain. Herein, we are interested in reviewing this relationship with Biktarvy use.

**Methodology:** A retrospective cohort analysis was conducted on all person living with HIV (PLWH) at our outpatient clinic who received a prescription for Biktarvy. PLWH that continued the therapy for a minimum of 6 months and maintained a low viral load (VL) during the therapy was stratified into 2 groups: those that gained  $\geq 10\%$  weight, and  $< 10\%$  weight from their baseline weights since the initiation of therapy. Data was expressed as counts and percentages or mean. The chi-square ( $\chi$ ) test was used to identify the associations between categorical variables. PRISM statistical software was used for all data analysis.

**Results:** From February 2018 to October 2020, there were 608 PLWH received a prescription for Biktarvy. Out of the 608, 50 PLWH discontinued therapy within the first 6 months, while 35 PLWH discontinued therapy after 6 months for various reasons (such as side effects, non-compliance and change of insurance, detailed reasons are listed in Table 1). Of the 523 PLWH with active prescriptions for Biktarvy, 280 PLWH were excluded from the study due to high viral loads indicating poor Biktarvy compliance, and insufficient therapy duration of less than 6 months. Of the remaining 243 PLWH who met this inclusion criteria, 69 (28.4%) PLWH gained  $\geq 10\%$  weight, while 174 (71.6%) PLWH gained  $< 10\%$  weight. Of those 69 PLWH who gained  $\geq 10\%$  weight, the average time on therapy was 88.9 weeks and average age was 51.7 years old. There were 44 (64%) males and 25 (36%) females. Majority are blacks (64%), followed by latinx (22%) and Whites (14%). The only statistically significant between those that gained  $> 10\%$  and  $< 10\%$  weight were CD4 counts and transition from other HIV medications to Biktarvy. The switch from other HIV medications to Biktarvy and low CD4 counts ( $< 350$ ) were associated with risk of weight gain (p-value were 0.0123 and  $< 0.0001$  respectively).

**Conclusion:** Low CD4 count ( $< 350$ ) and the switch from other HIV medications to Biktarvy predicted 10% weight gain in our retrospective cohort analysis

## Do Differences in Complications of Hospital Stays Exist for Patients that Undergo Different Biopsy Methods?

*Research*

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*Rutgers-New Jersey Medical School (Mirela Feurdean, MD)*

**Introduction:** The advent of imaging modalities to aid in the diagnosis of pancreatic cancer has greatly reduced the need for routine invasive diagnostic procedures, however, a biopsy remains the confirmatory test for diagnosis of pancreatic cancer. We hypothesize that between endoscopic (EB), percutaneous (PB), and surgical biopsies (SB) - endoscopic and percutaneous biopsies carry reduced risks of complications compared to surgical biopsies due to their less invasive nature.

**Methods:** The National Inpatient Sample 2001-2013 database was queried for patients with a diagnosis of pancreatic cancer using International Classification of Diseases, Ninth Revision (ICD-9) codes. Endoscopic ultrasound biopsy, closed percutaneous, and open surgical biopsies were identified with their respective ICD-9 codes. A chi-square analysis was performed on the categorical variables in the multivariable analysis. A multivariable logistic regression analysis was used to examine medical complications (myocardial infarction, pancreatitis, pneumonia, urinary tract infection, and acute renal failure) and demographic variables, with a significance level of  $p < 0.01$ .

**Results:** 824,162 patients were identified with pancreatic cancer, of which 50,194 (6.1%) were PB, 3817 (0.5%) EB, and 11,668 (1.4%) SB. Patients were less likely to have an MI with a PB compared to a SB (OR .67 and 1.49 respectively). Patients were more like to have acute renal failure (ARF) with an EB compared to a SB (OR 1.41 and .80 respectively). Patients were more likely to have a urinary tract infection (UTI) with an EB or a PB compared to a SB (OR 1.39, 1.11, and .79 respectively). All biopsy types were less likely to have pneumonia during their hospital stay. Patients were most likely to have pancreatitis with an EB compared to a PB and a SB (OR 4.13, 3.03, 1.98 respectively).

**Discussion:** Patients with endoscopic biopsies were more likely to develop ARF, UTI, and pancreatitis than surgical biopsies. This may be due to the closed and operant-dependent nature of the EUS requiring technique and ability to accurately gauge anatomy on ultrasound. Traversing the pancreatic tissue via a needle certainly predisposes patients to develop pancreatitis. It is worth exploring further the relationship between the biopsy type and other factors that may predispose the patient to these complications.

## **ACE-I and ARBs in COVID-19, Good, Bad, or Indifferent? A Meta-Analysis and Systematic Review**

*Research*

Mohab Hassib, MD

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*Seaton Hall-St Francis (Sara Wallach, MD, MACP)*

**Background:** Increased virulence, severity of illness, and mortality have all been hypothesized with respect to ACEi/ARB use in Covid-19 infection. Our study aims to assess whether ACEi/ARB use in patients with COVID-19 conferred worsened severity of illness or increased mortality. Additionally, we explore the possibility of an unearthed protective benefit due to their interruption of the RAS signaling pathway as observed in cardiovascular diseases.

**Methods:** The Cochrane Library, MEDLINE, and EMBASE were searched for studies relevant to Covid-19 severity, mortality and inflammation in the context of ACEi/ARB use. Eight studies were included with a total of 17,943 patients, 4,292 (23.9%) of which were taking an ACEi or an ARB. The study population was 47.9% female and the average age across all studies was 65. The studies chosen had a sample size of at least 100 patients.

**Results:** Mortality outcomes were assessed in six studies and showed no significant difference in mortality among ACEi/ARB and control groups (odds ratio [OR]: 0.99, 95%CI: 0.48-2.04). Seven studies assessed the severity of COVID-19 and showed no statistically significant difference in disease severity when comparing the ACEi/ARB group to the control group (odds ratio [OR]: 1.30, 95% CI 0.87-1.94). Four studies reported the length of stay with no significant difference between ACEi/ARB groups compared to non-users. Four studies included inflammatory markers CRP and D-Dimer which were noted to be consistently lower in ACEi/ARB groups when compared to control groups, however, this was not statistically significant.

**Conclusion:** Our study found no significant difference in mortality, severity of illness, or length of stay between ACEi/ARB users and non-users with Covid-19 infection. These results support the continuation of ACEi and ARBs in the setting of Covid-19 as advised by the ACC/AHA. The decrease in CRP and D-dimer suggest a possible protective effect related to ACEi/ARB use in Covid-19, however, more studies with larger sample sizes are needed to establish this effect.

## Association of Hematological and Clinical Characteristics on Covid-19 Patient Outcomes: A Pilot Study Research



Marcos Almonte Sencion, MD

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**Background:** Based on the Centers for Disease Control and Prevention (CDC)'s data, from January 20 to September 5, 2020, there were a total of 6,181,474 cases and 187,159 deaths in the United States attributed to coronavirus disease 2019 (COVID-19). We aimed to explore the association between the patient characteristics and outcomes, at our inner-city community hospital in patients who tested positive for SARS-COV-2.

**Methods:** This study is a retrospective chart review including hospitalized patients at Saint Francis Medical Center from January 2020 to September 2020 who were SARS-COV-2 positive by RT-PCR. This pilot study included 50 randomized patients out of the 275 Hospitalized patients with confirmed SARS-COV-2 infection. Data collection from patient's chart included age, sex, comorbidities, admission complete blood cell count, and the use of specific therapeutics. Primary outcome was all-cause in-hospital mortality. Secondary outcomes included need for mechanical ventilation, sepsis, and ICU admission.

**Results:** The all cause in-hospital mortality rate was 32%. The mean age for patients in the mortality group was  $74 \pm 9$  years versus  $53 \pm 18$  years for survivors ( $p=0.001$ ). Charlson Comorbidity Index (CCI) above 3 points was present in 87.5% of the patients in the mortality group versus 41.1% in survivors ( $p=0.0021$ ). Admission white blood cell count ( $p=0.0039$ ) and platelets ( $p=0.0005$ ) in the mortality group were lower than the survivor's group. No statistically significant difference in mortality between males and females after adjusting for other variables with an odds ratio (OR) of 0.19 (95% CI 0.02-1.80,  $p=0.09$ ). There were no statistically significant differences in mortality between self-identified race ( $p=0.466$ ), admission Hemoglobin ( $p=0.94$ ), Neutrophils ( $p=0.15$ ), lymphocytes ( $p=0.19$ ), Eosinophils ( $p=0.32$ ), CRP ( $p=0.93$ ) and D-dimer ( $p=0.54$ ). However, an elevated CRP level at admission was associated with higher likelihood of ICU admission ( $p=0.03$ ). Observed Eosinophil count in our study population was consistent with general population average at 4% (95% CI -1.6 to 9.6%).

**Conclusion:** Older age and higher CCI were associated with higher mortality in our study. While our pilot study did not specifically evaluate for thrombocytopenia or leukopenia, our results did reveal that patients who died had lower presenting white blood cells and platelets on admission than patients who survived, which is consistent with current knowledge of risk factors that portend a more severe disease course. Overall, our small population limits the generalization of the results and future studies that focus on community hospitals would be helpful in generalizing current knowledge and directing patient care of this new disease to smaller, urban health care centers such as ours.

## **A Retrospective Review of COVID-19 Related Predisposition to Diabetic Ketoacidosis (DKA)**

### *Research*

Aadhithyaraman Vaithiya Santharaman, MD

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A. Khan, MD; H. Luo, MD; H. Redel, MD;

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**Background:** The knowledge behind COVID-19 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is currently evolving. It has been reported that SARS-CoV-2 infection could deteriorate hyperglycemia and cause life threatening DKA in patients with diabetes mellitus (DM), both type 1 (DM1) and type 2 (DM2). This might be induced by sepsis, inflammatory storm, direct pancreas injury resulting in release of glucocorticoids and catecholamines. Several studies have established DM to be an independent risk factor for disease progression, leading to increased mortality. The **Objective** of this study is to determine the incidence of DKA among patients with COVID-19 and DM, the contributing factors for their predisposition to DKA and mortality.

**Methods:** Following our institutional IRB approval, a list of subjects was obtained from our electronic medical record system based on the diagnosis of COVID-19 and the concurrent presence of DM using the ICD-10 codes. A retrospective analysis was performed for a total of 331 patients with COVID-19 and DM who presented to our hospital between March and June 2020. ADA diagnostic criteria was used to determine the patients with DKA, hyperosmolar hyperglycemic state (HHS) and euglycemic DKA patients were also included in the analysis. Contributing factors including home medications, compliance, co-morbidities, severity of COVID-19 infection, concurrent presence of sepsis or hypoxic respiratory failure, use of steroids during hospitalization and mortality were compared between the patients with and without glycemic crisis.

**Results:** Based on our preliminary analysis, out of the 331 patients with COVID-19 and DM, 29 patients (8.7%) had DKA and one patient had HHS. Out of these 30 patients with glycemic crisis, 5 patients (16.7%) were new onset DM (type undetermined during hospitalization), 5 patients (16.7%) were DM1 and 20 patients (66.7%) were DM2. Of note, there were around 33% of these patients with glycemic crisis who did not have sepsis upon presentation, including 7 out of 20 (35%) of patients with DM2. The estimated mortality rate was 30% among patients with glycemic crisis.

**Conclusion:** Our preliminary analysis showed that COVID19 infection caused DKA in both DM1 and DM2, but majority were DM2 patients (16.7% vs. 66.7%). Further results on most significant contributing factors and statistical significance of difference in mortality are pending as the final analysis is currently ongoing. While DM2 patients usually present as HHS instead of DKA in the setting of infection or stress, our data showed that COVID-19 infection can result in DKA even without sepsis. This might indicate a direct inhibition of insulin secretion in DM2 with SARS-CoV-2 infections. More research is needed to investigate this inhibition mechanism and to develop the novel therapy to reverse this inhibition and decrease the mortality.

## **Length of Stay and Observation Patients: An Institutional Approach**

*Quality Improvement/Patient Safety*

Steven Douedi, MD

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*Jersey Shore University Medical Center (Christian Kaunzinger, MD)*

**Background:** Average length of stay for patients placed on observation status is approximately 24 hours, and 48 hours at maximum. Before 48 hours of being placed on observation, the admitting provider must decide whether to admit the patient to inpatient service or discharge. Observation status often creates a dilemma for patient, provider and institution. Because of observation status being considered “outpatient” treatment, patients' hospital expenses may not be covered by Medicare Part A, but by Medicare Part B. Patients are often stuck with costly bills due to Medicare Part B having high deductibles, additional copays, and lack of inpatient pharmacy coverage. Additionally, patients placed under observation care may end up costing the institution money due to low reimbursement from insurance companies. The number of patients placed on observation status has increased over the years. Observation hours may affect the length of stay of patients during their hospitalization. Many institutions have created clinical decision units dedicated to the time effective management patients placed on observation status. Our institution aimed to reduce the length of stay on observation patients with the utilization of a multidisciplinary approach and daily rounds on observation patients. Here we report the results of our multidisciplinary approach. Using prior data collected by the hospital, the six most common diagnosis were identified. The six most common admission diagnosis were identified as chest pain, cardiac arrhythmia, syncope/dizziness, TIA, Congestive Heart Failure and COPD/Asthma. After identification of most common diagnosis, evidence-based treatment pathways were used to identify likely diagnostic and treatment pathways. 18-year-old and older adults admitted to our medical center under observation status were included in the study. Data was collected in a prospective manner. Length of stay of patients admitted under observation was measured from January 2020 to July 2020. The main intervention was the implementation of a “Observation Huddle” or daily multidisciplinary rounds focused on coordinating care with patient admitted to observation status. In these daily rounds, each patient placed under observation status was discussed and care plan was coordinated between physician, nursing and ancillary staff. Follow ups were conducted by a physician leader after completion of rounds during working hours. From January 2020 to June 2020, the overall average number of hours of patient remained under observation status decreased from 27.3 hours to 18.3 hours. The number of hours patient with the most common six diagnosis decreased from 29.2 hours to 19.8 hours.

**Conclusion:** This study demonstrated that the implementation of a daily observation huddle can significantly reduce the length of stay of patient admitted under observation status. The utilization of the huddle can not only reduce patient length of stay but led to improved financial benefits for patient and institution.

## **Osteoporosis Screening: Are we Screening Enough?**

*Quality Improvement/Patient Safety*

Marlene Marte Furment, MD

Keshav Bhandari, MD; Rajesh Desai, MD

*St. Peter's University Hospital (Nayan Kothari, MD, MACP)*

**Background:** As per the National Osteoporosis Foundation approximately 2 million fragility fractures are due to Osteoporosis. Glucocorticoid-induced osteoporosis (GIOP) is the most frequent and severe form of secondary osteoporosis. Highest rate of bone loss occurs within first 3-6 months of glucocorticoid treatment, and slower decline continues with persistent use with both high daily and high cumulative glucocorticoid doses. Glucocorticoid use is considered low when prednisone dose is  $\leq 7.5$ /day and high when  $> 7.5$ mg/day. The American College of Rheumatology (ACR) Guidelines recommend Bone Mineral Density (BMD) for adults  $\geq 40$  years old within 6 months of starting Glucocorticoid treatment. BMD is also recommended in those  $< 40$  years old with history of osteoporotic fracture or with other significant osteoporosis risk factors. Moreover, several studies have demonstrated that Rheumatoid Arthritis by itself predisposes to Osteoporosis. Despite these recommendations, screening rate remains suboptimal.

**Method:** Retrospective chart review was performed on patients with history of sero-positive Rheumatoid Arthritis that visited How Lane Adult Health Clinic in New Jersey between January 1st 2019 to December 31st 2019. Data was extracted from the electronic medical record (EMR) system. A total of 161 charts were reviewed and 42 patients were analyzed as patients who followed with private Rheumatologists whose records have not been obtained were excluded. Osteoporosis screening rate was determined using DEXA scan.

**Results:** Out of 42 patients with sero-positive Rheumatoid Arthritis, 22 patients (52.4%) met ACR criteria for Osteoporosis screening and 20 did not (47.6%). Osteoporosis Screening was done in 40.9% (n=9) of qualified patients, however, 59.1% have not been screened. None of these patients have ever had a documented fragility fracture.

**Conclusion:** Osteoporosis screening remains suboptimal in our resident-driven continuity clinic. Awareness should be raised on this matter on both residents and patients to improve rate of screening. For improvement in screening a pamphlet is being distributed to all residents and nurses have been educated.

## **Dissecting a Case of Chest Pain: What did We Learn?**

*Quality Improvement/Patient Safety*

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**Introduction:** Aortic dissection is a serious condition yet a diagnosis easy to miss. In an autopsy study, 63% of patients were not diagnosed to have aortic dissection before death. We encountered a patient who presented with chest pain in whom the diagnosis of aortic dissection was delayed, ultimately resulting in death.

**Objective:** The objective of our quality improvement study was to prevent missing a diagnosis of aortic dissection in the future. To achieve that, we measured the incidence of aortic dissection, assessed the baseline knowledge of residents regarding a diagnosis of aortic dissection, and educated residents to increase sensitization about this diagnosis.

**Methodology:** A three-month chart review of patients admitted with chest pain was conducted to identify the incidence of Aortic dissection. A survey was conducted among residents about their medical knowledge. Education of residents was provided using a grand round. The survey was done using SurveyMonkey and the data was entered in Microsoft Excel for analysis.

**Results:** 63 patients with a diagnosis of chest pain were admitted over 3 months in our hospital. The median age of patients was 53 years, 39.7% were male. The most common discharge diagnoses were Acute Coronary Syndrome (30%), GERD/GI-related (15.9%), Musculoskeletal (15.9%), no specific diagnosis/atypical chest pain (23.8%), and miscellaneous (14.4%). Incidence of Aortic Dissection was 0%. None of the patients underwent a TEE. 40 residents responded to the survey. 42.5% of residents had never seen a case of aortic dissection in their residency. 37.5% of residents considered aortic dissection as a diagnosis only 'sometimes' or 'rarely' in cases of chest pain. Although 92.5% thought of aortic dissection when seeing a patient with chest pain radiating to the back, only 50% thought of ruling it out in patients with anterior chest pain. 67.5% of residents believed that D-dimers have no relevance in ruling out aortic dissection (D-dimer < 500ng/ml has 96% negative predictive value). 95% of residents believed CTA to be the most appropriate single imaging study to diagnose dissection while only 37.5% knew TEE would be most appropriate when giving IV contrast is not an option due to kidney failure. To improve the diagnosis, a Grand Round was conducted to discuss symptomatology and diagnostic techniques for aortic dissection.

**Conclusion:** Internal medicine residents are taught to always exclude the serious six causes of chest pain including aortic dissection, but because of rarity of aortic dissection, their thought of the diagnosis wanes. A significant number of patients were admitted to rule out ACS while aortic dissection was not considered in the differential and TEE was never done during the study period. Internal Medicine residency programs should educate residents not to miss this life-threatening disease.

**An Institutional Quality Improvement Project on Preventive Measures for  
Rapid Correction of Hyponatremia**  
*Quality Improvement/Patient Safety*  
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**Introduction:** Hyponatremia is one of the most common electrolyte abnormalities seen in hospitalized patients. Patients with chronic and severe hyponatremia (serum sodium <120 mEq/L) are at risk for rapid correction due to renal autocorrection via water diuresis. They are thereby at risk for developing serious complications including osmotic demyelination syndrome.

**Objective:** The objective of our quality improvement project is to determine the causes for rapid correction and to implement preventive measures for the same.

**Methodology:** A team was formed with residents from the Resident Performance Improvement (PI) committee, the academic nephrologist, the department safety & quality officer and the program director. A Plan-Do-Study-Act (PDSA) worksheet was created, the contributing factors were identified and all the residents were initially surveyed to risk stratify them. The most significant contributing factors determined were, a) defective sign-outs between residents during change of shifts, b) delay/difficulties in communication between the residents, primary attending and nephrologist, c) delay in timely blood draws, d) lack of standardized protocols, and e) lack of use of DDAVP for patients at risk for water diuresis. Sodium correction was standardized for 4 to 6 mEq/L per day and residents were recommended to make detailed sign-out sheets with goals sodium ranges and plans for the same. Difficulties in contacting the nephrologist were addressed and residents/attendings were recommended to contact the nephrologist on a timely manner. These changes were tested for two months and residents were surveyed again.

**Results:** Of the 36 residents who answered, 91% of them felt that the recommendations were helpful. Around 80% of the residents noted that the sign-outs were detailed and 80% of them were able to contact nephrologist on a timely manner. Despite this, around 39% of them encountered rapid correction of hyponatremia (> 6mEq/L in 24hrs) while 30% did not encounter rapid correction and 30% did not encounter any case of hyponatremia over a duration of two months.

**Conclusion:** While the changes in sign-outs and timely communication were helpful, based on the first PDSA cycle residents were still encountering rapid correction of hyponatremia. Feasibility of making a standardized protocol is restricted due to challenging presentation at many times with complex medical history and difficulties in evaluating the volume status. Our plan now is to adapt the possible use of DDAVP for patients at risk for water diuresis, adopt the previous changes and to test them for a longer duration since many residents did not encounter a case of hyponatremia. Once the success of the changes is determined, they would be implemented on a broader scale.

## Angioimmunoblastic Lymphoma presenting as Inflammatory Polyarticular Arthritis

### *Clinical Vignette*

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**Introduction:** Inflammatory arthritis is a common presentation in many auto-immune, infectious, crystalloid, and malignant diseases. While lymphoma is a known cause of symmetric polyarthritis, it is uncommonly the presenting symptom. We present a case of angioimmunoblastic lymphoma (AIBL) where the patient's presenting complaint was symmetric polyarthritis.

**Case:** A 58-year-old male with obesity presented to the rheumatology clinic with a 10-month history of bilateral joint pain and morning stiffness of all MCPs, PIPs, wrists, and knees. Of note, he had been prescribed Semaglutide as a weight reduction aid which resulted in an overly robust response of 40-pound loss over nine months. On physical exam, the patient had synovitis of the specified joints, no rashes or lymphadenopathy were appreciated. His initial laboratory studies revealed a mildly elevated ESR and CRP. ANA, cANCA, pANCA, Hepatitis B/C, HIV, Lyme, HLA-B27 were negative. Joint x-ray failed to demonstrate specific findings to support a certain inflammatory arthritis etiology. The patient was started on Prednisone 15mg daily and Semaglutide was discontinued. At his follow-up visit, he complained of persistent weight loss, development of a rash, and a new lump in his left groin. Physical exam revealed left inguinal lymphadenopathy and a maculopapular skin rash. These new findings prompted referrals to dermatology and hematology-oncology. Further workup including a PET scan and biopsy demonstrated findings suggestive of angioimmunoblastic T-cell lymphoma. The patient completed six rounds of triple-agent chemotherapy (Brentuximab, Cytoxan, Doxorubicin) with a near-complete resolution of his lymphadenopathy on a repeat PET scan. The patient's rash and polyarthritis symptoms also improved. Given the patient's positive response to treatment, a bone marrow transplant was considered; however he contracted the SARS-CoV-2 virus and succumbed to the illness. In the United States, the projected number of new cases of Non-Hodgkin's Lymphoma (NHL) this year is approximately 77,240. AIBL, a subset making up 15% of NHL cases, is an aggressive peripheral T-cell lymphoma with a poor prognosis and long-term survival of approximately 2 years. Common presenting symptoms include fever, malaise, generalized lymphadenopathy, pruritic rash, and anemia. The incidence of polyarthritis in AIBL is reported to be 16-18%. Of those cases in which polyarthritis was present, 35% occurred before diagnosis.

**Conclusion:** A literature review demonstrates that most of the work published on this subject are largely from the 1980s, with few more recent reviews. In these twelve case reports of AIBL, eight are described demonstrating polyarthritis as a prodrome 2-18 months before the development of systemic features. These cases were largely seronegative, symmetric, non-erosive, and peripheral with the eventual development of anemia, skin lesions, and finally lymphadenopathy. Given that prognosis and treatment are greatly impacted in patients with early detection of this aggressive disease, it is important to keep a broad differential diagnosis in mind.

## **You're in the Chest? A Rare Case of Urinothorax**

*Clinical Vignette*

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**Introduction:** Urinothorax is the presence of urine in pleural space. It is a rare complication of obstructive uropathy and an under-recognized cause of transudative pleural effusion.

**Case:** A 79-year-old male presented with complaints of abdominal pain, distension and urinary incontinence after recent surgery. Upon admission, the patient had acute renal failure with serum creatinine of 5.57 mg/dl. Chest x-ray revealed a large left-sided pleural effusion. A subsequent CT scan of the abdomen and pelvis, showed a large left pleural effusion with adjacent atelectasis, left hydronephrosis with perinephric fluid collection and thickening of the proximal left ureter and prostatic enlargement. A bladder ultrasound showed a post void residual of approximately 1000 mL of urine. A Foley catheter was placed and immediately drained about 2 L of urine. Thoracentesis of the left pleural effusion was performed. On pleural fluid analysis, the fluid was yellow in color, with 0.8 g/dl protein, 128 mg/dl glucose, 60 U/l LDH and creatinine of 2.57mg/dl. The fluid was transudative in nature by Light's criteria. Pleural fluid creatinine to serum creatinine ratio of 1.73 was suggestive of urinothorax. Repeat imaging reported resolution of left pleural effusion. This was followed by normalization of creatinine over the course of 48 hours.

**Discussion:** Urinothorax is described as a clear yellow, paucicellular, transudative pleural effusion with total fluid protein <1.0 mg/dl. A comprehensive review done by Austin et al in 2017, reported 57 cases between the years of 1960 and 2016. This makes it a rare entity, making the diagnosis challenging and often requiring a multidisciplinary approach. Detailed history can be helpful. Our patient did not present with classical respiratory symptoms rather with urinary symptoms. The presence of urinary symptoms along with findings of acute renal failure, unilateral pleural effusion with evidence of hydronephrosis prompted us to pursue urinothorax as a differential diagnosis. Thoracentesis is diagnostic, additionally providing therapeutic benefits. Diagnosis is made when pleural fluid creatinine to serum creatinine ratio is greater than 1.0. Imaging studies guide in identifying underlying pathology. Most cases of urinothorax are a result of obstructive uropathy and typically occur in the ipsilateral obstructive kidney.

**Conclusion:** As detailed above, diagnosis requires a high degree of clinical suspicion and should be considered in the differential diagnosis of pleural effusion associated with urinary obstruction, recent GU manipulation or renal trauma.

**Massive Biventricular Thrombi Complicating New-Onset Heart Failure in a Patient  
with Suspected COVID-19**

*Clinical Vignette*

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**Introduction:** Recent clinical data showed that the coronavirus disease 2019 (COVID-19) is associated with a hypercoagulable state and predisposes to thrombotic complications. Notably, distinct coagulation activation is correlated with cardiac injury and increases mortality.

**Case:** The patient is a 58-year-old African-American male with no known past medical history. He presented to the emergency room complaining of shortness of breath. He had been at home taking care of his parents, who were both COVID-19 positive, for the past four weeks. He reported that he has been feeling unwell since then. The initial vital signs revealed; blood pressure 108/64 mmHg, respiratory rate 32/min, heart rate 122 beats/min, fever 98.1 F, oxygen saturation 60% on room air. Lung examination revealed bilaterally diminished breath sounds. Significant swelling and tenderness in the right lower extremity were found. The rest of the physical examination was unremarkable. Complete blood count showed lymphopenia. The D-dimer level was > 20 ug/mL. A chest X-ray showed extensive patchy bilateral alveolar findings compatible with viral pneumonia. The BNP level was 34824 pg/mL. Due to acute hypoxic respiratory failure, the patient was intubated and admitted to the critical care unit. Initial SARS-CoV-2 PCR testing was negative in nasopharyngeal swab; however, given the strong suspicion of COVID-19 pneumonia, a repeat test was sent, and the patient remained isolated. He was found to have extensive right leg deep vein thrombosis in the right common femoral vein, right popliteal vein, right posterior tibial vein, right peroneal vein, right gastrocnemius, and right small saphenous vein. The CT Angiography of the chest showed bilateral pneumonia with large right pleural effusion, and biventricular thrombi but negative for actual pulmonary embolism. The transthoracic echocardiography showed an ejection fraction of 10% to 15% with biventricular failure and severe global hypokinesis. There was an extensive mural thrombus seen along all walls of the left ventricle. Also, there was a mobile worm-like thrombus in the right atrium with an extension across the tricuspid valve into the right ventricle. The hypercoagulability panel was within normal limits. Anticoagulative treatment was initiated. Unfortunately, he had a cardiac arrest due to persistent ventricular fibrillation and was unable to be resuscitated. He expired within 24 hours of admission.

**Discussion:** COVID-19 is an emerging threat due to the risk of microvascular, venous, and arterial thrombosis, thereby exacerbating organ injury and mortality. Although the exact mechanism of extensive thromboembolism and myocardial injury caused by SARS-CoV-2 is not illuminated, it is clear that COVID-19 related hypercoagulation increasing the fatality of the disease.

**Conclusion:** Based on the current data, we urge awareness of severe and potentially fatal extensive thrombosis and cardiac failure as the initial clinical presentation of possible SARS CoV 2.

## **Tuberculous Lymphadenitis in a Patient Receiving Anti-PD-1 Inhibitor For Melanoma**

### *Clinical Vignette*

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**Introduction:** Melanoma is a malignancy that primarily derives from melanocytic cells. Tuberculosis (TB) is a worldwide public health problem with being a significant cause of morbidity and mortality. Nivolumab is a well-defined immune checkpoint inhibitor (ICI), which is a fully-humanized IgG4 monoclonal antibody that blocks PD-1 and mainly increases reactivation of anti-tumor immunity. Although opportunistic infections are not expected side effects of ICI, the diagnosis of ICI-related TB has been recently increasing. The current report represents the second tuberculous lymphadenitis case in the literature related to anti-PD-1 based monoclonal antibody therapy.

**Case:** The patient is a 38-year-old Caucasian female who was diagnosed with Stage IIIb malignant melanoma. The excision of the left scapular lesion and axillary dissection was performed. Baseline 18F-FDG PET scan showed no evidence of metastatic disease. After the 5th cycle of Nivolumab treatment, the patient developed 38 °C fever and grade 2 fatigue. Physical exams, including skin and the respiratory system, were unremarkable. Thyroid function tests, liver function tests, complete blood count, and basic metabolic panel were within normal limits. Respiratory virus panel, EBV, HIV, and Brucella test results were negative. Sarcoidosis is ruled out clinically and radiologically. The patient didn't get any cytotoxic chemotherapy or steroids. Upon completing the 6th cycle, a control 18F-FDG PET scan detected a significant metabolic progression in the left cervical region level 2 lymph nodes. The patient didn't have any clinically palpable lymphadenopathy. Left cervical modified radical type 3 dissection was performed. Meanwhile, the patient's fever was continued. The histopathological evaluation of the eight lymph nodes revealed caseous granulomatous lymphadenitis. High resolution computed tomography of the lungs didn't show pulmonary tuberculosis or opportunistic infections. A purified protein derivative (PPD) skin test and Interferon Gamma Release Assay (IGRA) was not performed due to recent immunotherapy. Given persistent fever and caseous granulomatous lymphadenitis, anti-TB treatment was initiated. Subsequently, fever was controlled, and fatigue improved. We continued Nivolumab treatment along with the anti-TB regimen. After six months of anti-TB therapy, the control 18F-FDG PET scan didn't show any recurrence. Anti-TB therapy was discontinued after 12 months. The patient is currently under medical surveillance every three months.

**Discussion:** Increasing evidence from current data suggests that TB reactivation can occur as a complication of ICI therapy. Triggering of excessive inflammatory responses with ICI therapy is a potential cause. This phenomenon is similar to the immune reconstitution inflammatory syndrome (IRIS) associated with antiretroviral treatment in AIDS patients. To date, screening for latent tuberculosis before ICIs therapy is not routine yet.

**Conclusion:** Considering increased utilization of ICI based immunotherapies, this issue can cause significant mortality and morbidity, especially in the population with high TB prevalence. TB screening should be carefully considered before starting PD-1 inhibitor therapy.

## Human Metapneumovirus Presenting As Cardiac Tamponade In A 47-Year-Old Immunocompetent Male

*Clinical Vignette*

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**Introduction:** Human metapneumovirus (hMPV) is a novel, ubiquitous, enveloped, negative-sense RNA virus and a member of the Pneumoviridae family. Transmission occurs via close or direct contact with respiratory secretions from an infected individual. Typical manifestations include upper and lower respiratory tract infections in patients of all ages. However, severe infections occur more commonly in young children, immunocompromised adults, and the elderly. Extrapulmonary manifestations secondary to hMPV such as pericarditis and cardiac tamponade are rarely reported in medical literature. We report a case of cardiac tamponade secondary to human metapneumovirus in an immunocompetent, healthy, middle-aged man.

**Case:** A 47-year-old man presented to the hospital with a five-day history of abdominal pain, nausea, and vomiting. His vital signs were normal aside from a heart rate of 112 beats per minute. An ECG demonstrated sinus tachycardia and electrical alternans. His chest x-ray demonstrated an enlarged cardiac silhouette with bilateral pleural effusions. Bedside transthoracic echocardiogram exhibited a large circumferential pericardial effusion with clear evidence of diastolic collapse consistent with tamponade physiology. There was also evidence of a dilated IVC and elevated right atrial pressures. Using the criteria and scoring system from the European Society of Cardiology the decision was made to take the patient for an emergent pericardiocentesis. This procedure drained approximately 1,250 mL of hemorrhagic fluid. The pericardial fluid analysis showed >800,000 RBCs with >2,000 nucleated cells with a lymphocytic predominance. A viral respiratory panel PCR performed on a nasopharyngeal swab was positive for human metapneumovirus (hMPV). In contrast, other respiratory viruses, including adenovirus, rhinovirus/enterovirus, influenza A, Influenza A subtype H1, Influenza A subtype H3, Influenza B, Human RSV A, Human RSV B, and Human parainfluenza virus 1, 2, 3 were not detected. The patient was started on ibuprofen and colchicine 0.6mg twice daily for one month. He recovered well without any sequelae of infection and a repeat transthoracic echocardiogram two months after discharge demonstrated no evidence of pericardial effusion.

**Conclusion:** The complete spectrum of clinical manifestations of human metapneumovirus are still under investigation. There is a reported association between cardiovascular manifestations and hMPV in the elderly. This is one of the few cases of hMPV-induced pericardial effusion in a young, healthy, immunocompetent patient. This case report aims to increase the awareness of hMPV as an under recognized etiology of viral pericarditis and cardiac tamponade. Due to the relative modernity of the virus, the pathogenesis of hMPV and cardiovascular disease is unknown. It is unclear whether hMPV has a predisposition for cardiac myocytes or pericardial cells, or if existing cardiovascular disease predisposes to a more severe clinical syndrome when infected with hMPV. The knowledge of this possible association can assist clinicians in deciding whether to test patients with any pericardial disease for hMPV in the future.

## **It's Blurry - A Rare Case Of Optic Neuropathy**

### *Clinical Vignette*

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**Introduction:** There is a well established link between malnutrition and peripheral neuropathies. Optic neuropathy is an interesting subset of nutritional neuropathies and are rare to encounter in a developed country.

**Case:** A 34-year-old female with no significant past medical history presented with blurry vision, weakness and dehydration after fasting for 7 weeks during which she lost about 20 pounds. On physical examination, patient was hypertensive and tachycardic. Her BMI was 21. She was noted to have vertical and horizontal nystagmus bilaterally as well as decreased visual acuity of 20/70. No other focal neurological deficits were identified. Laboratory data was remarkable for anion gap metabolic acidosis with elevated lactate, hypophosphatemia, and mild transaminitis. Given the visual disturbance, MRI brain was done, which was unremarkable. Additional work up revealed low B1 and folate levels. B12 levels were increased. A neurologist and an ophthalmologist evaluated the patient. Her visual disturbance was attributed to nutritional optic neuropathy. She was started on folate and vitamin B12 replacement in addition to high-dose IV thiamine supplementation and eventually transitioned to an oral regimen upon discharge. Patient was tolerating oral intake. She was monitored closely for refeeding syndrome and electrolytes were repleted as needed. Patient's visual acuity improved throughout her hospital stay, up to 20/40 bilaterally on discharge. Her nystagmus improved as well. A psychiatrist was consulted and the patient was not found to have any underlying psychiatric or eating disorders. The patient was counseled on dietary and eating habits and was discharged home with significant improvement in her symptoms.

**Discussion:** Acquired optic neuropathy results from damage to the anterior visual pathway from toxins or nutritional deficiency. It is characterized by papillomacular bundle damage within the optic nerves, central or cecocentral scotoma, and reduction of color vision. It is more prevalent in regions of famine, such as in Africa and some parts of Central America. In these areas, the main cause is malnutrition associated deficiency of certain vitamins, such as vitamin B complex and folic acid, essential for the functioning of nerve fibers. In developed countries, it is more common among tobacco and alcohol abusers, as well as post-bariatric surgery patients.

**Conclusion:** Although uncommon in the US, acquired optic neuropathy can still be encountered in certain patient populations who are subject to undernourishment. In this patient who denied tobacco and alcohol use, and had no history of bariatric surgeries, it was caused by vitamin deficiencies secondary to prolonged fasting. The cornerstone in the treatment of this condition is improved nutrition and vitamin supplementation. In patients compliant with the treatment regimen, and unless the loss of vision is already far advanced, the prospect for recovery or at least improvement is excellent.

## Negative Pressure Pulmonary Edema: Role of Fluctuating Hormones

*Clinical Vignette*

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**Introduction:** Negative pressure pulmonary edema (NPPE) or post-obstructive pulmonary edema is a rare but potentially fatal cause of acute respiratory failure that occurs due to intense inspiratory effort against an obstructed upper airway. This inspiratory effort leads to very negative pressure in the airways and causes fluid to extravasate in interstitial and alveolar spaces. Patients are usually treated conservatively with diuresis, supplemental oxygen, non-invasive positive pressure ventilation, or mechanical ventilation. Resolution is usually rapid and most patients have complete resolution of edema within 24-48 hours. Common causes include tumors, infections of upper airway, or laryngospasm. NPPE is also described in the immediate post-operative period following extubation and is caused by laryngeal edema, iatrogenic vocal cord paralysis, laryngospasm, or airway obstruction caused by tongue or soft tissues. We are presenting an unusual case of NPPE in a young female.

**Case Presentation:** This is a case of a 33-year-old female who was admitted for elective total thyroidectomy for Graves' disease. She was taking methimazole. Her pre-op TSH was  $<0.005$  uIU/mL and free T4 was elevated (1.89 ng/dL). Surgery was successful and she was extubated but shortly after extubation, she started having difficulty breathing. Vocal cords were visualized using flexible fiberoptic bronchoscope and bilateral vocal cords were open that excluded injury to recurrent laryngeal nerve. Her oxygen saturation dropped to as low as 54%. Immediate bag and mask ventilation was started that improved oxygen saturation to 90%. She was started on supplemental oxygen via non-rebreather mask and chest x-ray was done that revealed bilateral infiltrates consistent with pulmonary edema. She was given a dose of intravenous furosemide and NIPPV ordered but she stayed on non-rebreather oxygen. A follow up chest x-ray the next day confirmed resolution of pulmonary edema and she was discharged home the next evening.

**Discussion:** NPPE is caused by intense inspiratory effort against an obstructed upper airway. In adults, most cases of NPPE is reported in the context of post-extubation laryngospasm following surgery. The incidence of NPPE is higher in young healthy adults who can generate higher negative intrathoracic pressure with highest incidence in healthy adult males. There are also reported cases that relate hormonal fluctuations in the perioperative period with NPPE. These hormonal fluctuations can make the patient vulnerable to laryngospasm and may lead to pulmonary edema in the postoperative period. In the case we discussed above, the patient's thyroid hormones were not within normal limits with TSH being very low that might have caused transient laryngospasm and subsequent pulmonary edema. Pre-operative hormone stabilization is as important as post-operative care in vulnerable population.

**Conclusion:** Limited case studies are available relating hormonal fluctuations with NPPE and further case reports may be helpful in understanding these effects more clearly.

## **Refractory Postural Orthostatic Tachycardia Syndrome: A Difficult Clinical Scenario**

*Clinical Vignette*

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**Introduction:** Postural orthostatic tachycardia syndrome (POTS) describes a chronic, debilitating condition most commonly affecting young females in which the individual experiences orthostatic tachycardia without orthostatic hypotension. The diagnosis requires exclusion of predisposing conditions (such as anxiety, hyperthyroidism, anemia) and medication side-effects. Current recommended treatment strategies include increasing fluid and salt intake, exercise programs, compression stockings, and medications such as propranolol, alpha methyldopa and midodrine. We report a case of POTS refractory to most recommended treatment modalities and a patient centered treatment approach.

**Case Report:** A 21-year-old female with a longstanding history of refractory POTS managed on metoprolol and clonidine at home presented with complaints of ongoing palpitations and feeling like she may faint. She stated that she ingested 150 mg of metoprolol prior to presentation without relief. In the emergency department she was found to be tachycardic with heart rate of 166 beats per minute, normotensive, with no tachypnea while saturating 98% on room air. Physical exam exhibited a distressed female without any pertinent positive physical findings. Laboratory findings were negative for any electrolyte abnormalities and urinary drug screen was negative for substances of abuse. Electrocardiogram was performed which showed sinus tachycardia with heart rate of 166 without any ST or T wave changes. Chest x-ray was also performed in the emergency department which was negative for any cardiopulmonary abnormalities. Patient was admitted to the intensive care unit for acute exacerbation of POTS and observation for possible metoprolol toxicity. A comprehensive chart review performed indicated the patient had been at multiple large tertiary care centers prior to visiting us where control of her autonomic dysfunction was not achieved. To cater her regimen, multiple therapies were attempted during her hospitalization. Her treatment regimen was changed to ivabradine and verapamil and on hospitalization day 5 she achieved alleviation of symptoms. Upon 12 hours of initiation of therapy, the patient's heart rate decreased to 80-90 beats per minute that persisted throughout her hospital course. Her associated symptoms of palpitations and sensation of fainting also subsided following which she was discharged to outpatient follow up.

**Conclusion:** Our unique clinical case demonstrates appropriate resolution of autonomic dysfunction when utilizing ivabradine and verapamil for the management of POTS refractory to multiple treatment strategies. This case provides an innovative and alternative management of a particularly difficult clinical scenario which proved to be successful. Unfortunately, a significant proportion of individuals who have refractory disease sometimes never experience substantial relief of their symptoms proving to be very difficult to manage. Further research on successful treatment strategies are needed for management of this cohort of patients.

## Acquired Hemophilia Type A Precipitated by Surgery: A Case Report

*Clinical Vignette*

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**Introduction:** Acquired hemophilia A (AHA), or acquired Factor VIII deficiency, is the most common cause of acquired coagulopathies in which Factor VIII antibodies are produced against Factor VIII, interfering, and decreasing its activity. Acquired causes of AHA include AHA autoimmune diseases, malignancies, pregnancy, and postpartum period, but no cause can be identified in 50% of cases.

**Case:** A 69-year-old woman with a left knee replacement surgery was admitted for right hip pain and was found to have a hematoma in the right thigh by computed tomography (CT) scan. Postoperatively, she developed multiple ecchymosis in the extremities and left knee hemarthrosis that was drained in an outpatient setting. Laboratory workup showed normal complete blood count (CBC) apart from hemoglobin levels of 6.9 g/dL, hematocrit of 21.8%, a prolonged activated partial thromboplastin time (aPTT) of 76 seconds, and international normalized ratio (INR) of 1.18. Mixing study did not show correction of the aPTT, and von Willebrand factor (vWF) ristocetin cofactor level was normal. The diagnosis of acquired hemophilia A (AHA) was suspected, so she was started on empiric methylprednisolone sodium succinate 1 mg/kg. Further workup showed factor VIII activity as less than 1% and Bethesda assay showed factor VIII inhibitor levels of 470 BU. Serological evaluation showed Antinuclear antibodies (ANA) of 0.34 U (Predicted Index =  $\leq 0.9$ U: negative), cardiolipin IgG antibodies of 10.0 GPL (<20GPL: normal), cardiolipin IgM antibodies of 17.0 MPL (<20MPL: normal), cardiolipin IgA of 4 APL (0 – 11APL: negative) and negative lupus inhibitor. At that point, she was started on factor VIII replacement (Porcine) with close aPTT monitoring. After 7 days, her aPTT level was 33 seconds, and factor VIII activity was 90% (Reference range: 56 – 191%). Factor VIII replacement was tapered, and 100 mg of cyclophosphamide was initiated. Finally, she was stabilized and discharged on 100 mg of cyclophosphamide and 60 mg of prednisolone daily. Patient's further follow up appointment showed normal aPTT and normal factor VIII levels with no complications. Given her lack of coagulopathy history, normal workup prior to surgery, and her response to treatment, the diagnosis of acquired hemophilia A (AHA) was confirmed.

**Conclusion:** This case addresses the association of acquired hemophilia A with surgery. AHA should be suspected in patients with unexplained bleeding and isolated prolonged aPTT after surgery. After excluding other possible causes of bleeding, assessment of factor VIII activity and factor VIII inhibitor levels are required to make the diagnosis. High index of suspicion is needed to allow for appropriate intervention in a timely manner.

## **Minocycline and Black Thyroid: Should Patients with Acne Be Screened for Cancer?**

*Clinical Vignette*

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**Introduction:** Black thyroid is a rare condition associated with minocycline use and remains a challenge to diagnose. This dark pigmentation of the thyroid is not revealed via fine-needle aspiration and cytology (FNAC) but is only discovered on gross examination post-thyroidectomy. There has been a reported association between black thyroid and thyroid cancer.

**Case:** A young male with a past medical history of acne and hypertension was found to have an incidental thyroid nodule discovered during an ultrasound demonstration for a healthcare class. TSH level was 2.0 uIU/mL, and dedicated thyroid ultrasound showed multiple bilateral nodules and a cystic nodule in the right mid jugular chain lymph node. He denied a history of radiation, family or personal history of thyroid cancer, infections, dysphagia, or hoarseness. Physical examination was negative for proptosis, lid lag, periorbital edema, thyromegaly, palpable nodules, bruits, tremors, or hyperreflexia. The patient underwent FNAC and was found to have a classic variant subtype of papillary thyroid carcinoma with metastases to the lateral neck lymph node. Due to coincidental hypertension, pheochromocytoma was ruled out. He underwent total thyroidectomy with bilateral central neck lymph node dissection as well as right modified radical neck dissection. On gross examination, dark brown pigmentation was diffusely present within the thyroid parenchyma. A similar pigment was seen on dissected metastatic lymph nodes. On microscopic examination, there was prominent dark brown pigment deposition in follicular cells, colloids, and macrophages. Further history revealed chronic minocycline use for acne treatment. Based on the history of minocycline therapy along with gross and microscopic findings of hyperpigmentation seen on the thyroid, a diagnosis of black thyroid was made. Minocycline, a member of the tetracycline antibiotic family, is commonly used as a treatment for severe acne. Minocycline induced black thyroid was first discovered in 1976. While the exact mechanism is not well understood, the most precise explanation thus far is related to the oxidation interaction between thyroid peroxidase and minocycline. Case series suggest an association between nodules in those with black thyroid and thyroid carcinoma with cancer rates of 66% in a series of 63 nodules and 0% in a series of 7. Of 925 patients who underwent thyroidectomy, a higher incidence of malignancy was found to be in patients with black thyroid glands (55.4%) as compared to non-black thyroid glands (32.8%) ( $p < 0.0001$ ).

**Conclusion:** As demonstrated in our case and with supporting data towards an association between thyroid cancer and minocycline use, clinicians should remain wary when patients are treated with minocycline.

## **Late Onset Warfarin Induced Skin Necrosis**

### *Clinical Vignette*

Ritu Chakrabarti, MD

Ritu Chakrabarti, MD; Mohammed Abdulaaïma, MD; Simon Badin, MD  
*Newark Beth Israel Jersey City Medical Center (Joseph DePasquale, MD)*

**Introduction:** Warfarin induced skin necrosis (WISN) is a complication of warfarin therapy that results in hemorrhagic bullae and ultimately full-thickness skin injury. The exact etiology and pathophysiology remains unknown, however it is associated with initiation or high loading doses of warfarin in treatment of venous thromboembolism. Herein we present the case of a patient on chronic warfarin therapy for metallic aortic valve who developed late-onset WISN.

**Case Presentation:** A 77-year-old female with past medical history of metallic aortic valve replacement presented to the ER with right breast skin irritation and burning for one day; the day prior her skin “bubbled” with clear liquid, turned black, and peeled off. She noted similar areas of skin irritation on her right arm and forearm. She denied paresthesia, numbness, itchiness, or other symptoms. She reported compliance with all of her medications, and that approximately ten days before symptom onset her warfarin regimen was changed from 5mg to 6mg daily. Review of her other medications did not reveal any potential dermatological side effects.

Examination revealed sloughed off and necrotic skin in a well-demarcated six centimeter radius surrounding the right breast nipple with areas of black eschar, sparing of the nipple, as well as two smaller areas with similar skin changes on the anteromedial forearm and arm; these areas were inconsistent with any dermatomal pattern. The remainder of the exam was unremarkable. Labs were significant for INR of 4.9, severely decreased levels of Protein C and Protein S activity (7% and <10% activity respectively), as well as positive lupus anticoagulant. Ultrasound of the breast was unremarkable. Skin punch biopsy showed skin necrosis and mild dermal inflammation as well as hemorrhage. Subsequently warfarin was discontinued and the patient received IV vitamin K, Lovenox 1mg/kg twice a day, Clindamycin, and the lesions were treated topically with silver sulfadiazine. Over the next ten days, the patient’s affected areas on the skin and arm began to clinically improve with appropriate granulation tissue, and she reported improving and ultimately resolving pain. The patient was discharged on warfarin 7.5mg daily with Lovenox to bridge.

**Discussion:** In rare cases, WISN can be encountered months to years after warfarin initiation. Fluctuations in serum levels or non-compliance with warfarin have been considered as risk factors. The exact pathophysiology is unknown, however is postulated to be associated with Protein C, S, and antithrombin deficiency as well as direct toxicity to microvasculature. Treatment involves discontinuation of warfarin, careful monitoring, and bridging with alternative anticoagulation if warfarin is resumed; complications may require surgical debridement.

**Conclusion:** Though rare, it is important for clinicians to consider WISN in the differential diagnosis for patients presenting with skin necrosis as it has high morbidity if untreated.

## COVID-19 Mortality Difference between Blacks and Latinx in Newark, New Jersey

*Research*

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**Background:** According to CDC, Blacks (B) have 4.7x higher risk of hospitalization and 2.6x higher risk of mortality, whereas Latinx (L) have 4.6x higher risk of hospitalization and 1.1x risk of mortality. Herein, we aimed to look at demographic and outcomes between those 2 groups in our inner-city hospital.

**Methods:** We conducted a retrospective hospital cohort study on patients  $\geq 18$  years old with confirmed COVID-19, who were admitted to our hospital between 03/15/2020 and 05/25/2020. Demographic, clinical and laboratory data were reviewed and retrieved. Data was expressed as counts and percentages or mean. The chi-square ( $\chi$ ) test was used to identify the associations between categorical variables. IBM SPSS Statistical software v25 was used for all data analysis.

**Results:** Out of the 490 confirmed COVID-19 hospitalized patients during the study period, 199 (40.6%) were B and 211 (43.1%) were L. The average age was 64 and 57 years old for B and L respectively. As for gender, there were 104 (52.2%) male and 95 (47.8%) female in the B subgroup. Whereas, there were 127 (60.2%) male and 84 (39.8%) female in the L subgroup. Hypertension, chronic kidney disease and end-stage renal disease were more common in B. Mechanical ventilation was required for 21 (10.6%) of B patients and 42 (19.9%) of L patients. Forty-four (22.1%) B and 53 (25.1%) L patients expired. There was no statistical difference in terms of need for mechanical ventilation and clinical outcomes between the 2 groups.

One striking statistical difference between the two groups was insurance status. There was more insured B as compared to L [179 (89.9%) patients was insured in B subgroup as compared to only 139 (65.9%) in L subgroup;  $p < 0.0001$ ]. Nonetheless, there was no difference in terms of mortality. When comparing the mortality between the 2 groups in respective to their comorbidities, only age  $>65$  years old seems to play a role in increasing the risk of mortality in the B subgroup (z-score 3.231,  $p=0.0012$ ; odds ratio [OR], 0.3196; 95% confidence interval [CI], 0.1531-0.6313)

**Conclusions:** This retrospective cohort study of hospitalized patients with COVID-19 did not show a difference in terms of risk for mechanical ventilation or death between B and L in Newark, New Jersey. Interestingly only age over 65 years old was accompanied by a substantial increase in mortality in B compared to L. This fact will need to be corroborated with larger studies.

# **Bleeding Diathesis in Multiple Myeloma: A Rare Presentation of a Dreadful Emergency with Management Nightmare**

*Clinical Vignette*

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**Introduction:** Multiple myeloma which was first described in 1848, represents 1% of all malignancies worldwide and is the 14th most common cause of cancer deaths in the United States. Abnormal coagulation profile though commonly seen in multiple myeloma, can rarely manifest life-threatening hemorrhagic complications. Herein, we report a 61-year-old female who presented with signs and symptoms of hemorrhagic shock. She remained refractory to massive transfusion protocol with packed RBC, platelets, coagulation factor replacement, vitamin K, folic acid therapy and DDAVP. Her condition stabilized when she was started on dexamethasone and antifibrinolytic infusion. Later she was diagnosed with multiple myeloma and remarkably responded to the treatment of multiple myeloma. Hemorrhagic shock secondary to dysfibrinogenemia is an unusual phenomenon in multiple myeloma.

**Case:** A 61-year-old female with past medical history of hypertension, coronary artery disease status post percutaneous coronary intervention presented to the emergency room with generalized weakness and dizziness for a day. On initial encounter, her temperature was 99.8 Fahrenheit, respiratory rate 18 breaths/min, heart rate 115 bpm, blood pressure 77/33 mmHg. Her initial laboratory data revealed Hemoglobin of 5.5 which dropped to 3.6 in 6 hours, platelets of 142 k. Coagulation studies revealed Fibrin degradation products- <5, low haptoglobin (13.7), low fibrinogen (156), prolonged prothrombin time (22.1s), INR-1.82, prolonged partial thromboplastin time (58.7s). Direct Coombs test was negative, and reduced activity of coagulation factor 2, 7, and 10 activity. Septic work up was negative. Computed tomography of the chest revealed a large hematoma in right breast which was initially thought to be a likely source of bleeding. She remained refractory to the immediate fluid resuscitation, followed by massive transfusion protocol. She received vitamin K, B12 therapy, folic acid therapy, DDAVP to address uremic platelet dysfunction, antifibrinolytic (Amicar) infusion and intravenous dexamethasone to address acquired dysfibrinogenemia. She was found to have M-spike on protein electrophoresis, hypercalcemia, and lytic lesions on the skeletal survey. Further immunohistochemical analysis of bone marrow biopsy showed 60-70% of CD138 positive and lambda light chain expressing plasma cells confirming the diagnosis of multiple myeloma. The coagulopathy was controlled when she was started on chemotherapy for multiple myeloma. On follow up her fibrinogen was markedly improved to 244.

**Discussion:** Bleeding tendencies in multiple myeloma can be explained by variety of mechanisms like dysfibrinogenemia secondary to inhibition of fibrin monomers by the FAB portion of paraprotein molecules, Paraprotein induced platelet dysfunction, shortened platelet survival, damage to vascular endothelium, and acquired von-Willebrand syndrome. Diverse hemostatic abnormalities associated with multiple myeloma is a diagnostic challenge.

**Conclusion:** Though symptomatic treatment can improve the patient condition temporarily, the mainstay of treatment is always treating the underlying disease. Thus, it is paramount to have high index of suspicions of multiple myeloma in patient with acquired bleeding disorders who refractory to treatment.

## **A Needle in the Haystack: Kounis Syndrome in a Young Female Tattoo Enthusiast**

### *Clinical Vignette*

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**Introduction:** In the United States, 38% of those between the ages 18-29 years have at least 1 tattoo and of those, 70% have more than 2. Given the increasing popularity of tattoos, more allergic reactions have been reported in patients with tattoos, though none have been reported in the setting of myocardial infarction. Kounis syndrome (KS), described otherwise as allergic angina is sparsely diagnosed and easily overlooked. Three reported variants are vasospastic allergic angina, allergic myocardial infarction, and stent thrombosis. Herein, we present a case of KS in a tattooed patient with allergic myocardial infarction.

**Case Presentation:** A 35-year-old female with hypertension presented to the emergency department with substernal chest pain. The history dated back to 2 weeks ago, when she acquired a new tattoo on her left forearm which developed into a rash. The rash spread diffusely with itching throughout her entire body. She endorsed a burning sensation, mild dyspnea, dizziness, nausea, and one episode of emesis, all of which subsided at the hospital. She then developed substernal chest tightness radiating to her left arm, characterized as 9/10 in intensity, sharp, non-positional, non-pleuritic, and non-reproducible. It was not associated with dyspnea, nausea, diaphoresis, or jaw claudication. Physical exam was remarkable for a petechial rash scattered diffusely across her back and extremities. Her left forearm tattoo was warm, pruritic and raised at sites where tattoo dye was injected. She was tachycardic with rate of 102, hypertensive 150/86, and tachypneic with rate of 20. Initial EKG showed minor nonspecific ST abnormalities. A repeat EKG showed minor ST elevations in lead III and aVF with T-wave inversions. The first troponin was non-detectable but subsequently reached a zenith of 16.2ng/mL over 24 hours. Due to persistent chest pain and elevated troponin, she was started on acute coronary syndrome protocol with aspirin, clopidogrel, high intensity statin and heparin. She subsequently underwent cardiac catheterization which showed spontaneous dissection with a 50% intimal proximal flap lesion of the left anterior descending coronary artery. She received aspirin, statin, and metoprolol with complete resolution of her symptoms.

**Discussion:** KS was first described by Nicholas Kounis in 1991 and referred to as “allergic myocardial infarction”. The pathophysiology involves mast cell mediated release of inflammatory cytokines, causing coronary artery vasospasm. We believe our patient developed a Type I variant of KS with coronary artery spasm progressing into acute non-ST elevation myocardial infarction. It is likely that her reaction to the tattoo ink led her to develop the Type 1, vasospastic variant of KS, whereby she developed a spontaneous coronary artery dissection (SCAD) with troponinemia.

**Conclusion:** KS should be considered in the differential diagnosis for patients with systemic allergic symptoms and chest pain in the setting of exposure to a new allergen.

## **Pituitary Metastasis Manifesting as Diabetes Insipidus**

*Clinical Vignette*

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**Introduction:** The development of endocrinopathies such as central diabetes insipidus or central hypothyroidism because of pituitary metastasis is an exceedingly rare phenomenon. Better understanding of this manifestation can lead to faster diagnosis and treatment to maximize patient comfort.

**Case:** Patient is a 56 y/o F with 20 pack year smoking history and stage IV small cell lung cancer with metastasis to the brain and spinal cord. She presented for total brain radiation when she developed fatigue, headache, polydipsia, and polyuria (5- 8 liters daily). On examination patient was ill appearing, hypovolemic and tachycardia to the 120s. Labs were significant for hypernatremia of 156 and UA showed a decreased specific gravity of 1.003. Serum osmolality was >300 while the urine osmolality was 153 concerning for developing diabetes insipidus. Prior to admission patient was seen for chronic back pain and received MRI of the spine which showed a sacral mass causing spinal cord compression. She received IR guided biopsy that was positive for small cell carcinoma. CT chest confirmed presence of right upper lobe mass. MRI of the brain demonstrated multiple small enhancing lesions including a 9x7x 6 mm lesion in the posterior pituitary stalk with thickening of superior stalk. Patient received two doses DDAVP, repeat sodium improved to 135 and urine osmolality improved to 572 confirming central diabetes insipidus. Given metastasis to the posterior pituitary stalk patient was pan screened for other forms of hypopituitarism. She was found to have TSH 0.067 with free T4 of 0.54, T3 was <0.50 and rT3 was 8.1 consistent with central hypothyroidism. At presentation was on a steroid taper for cerebral edema and we were unable to determine if she developed adrenal insufficiency. Treatment regimen included thyroid hormone replacement and low dose DDAVP and fluids restriction. Patient completed 10 sessions of total brain radiation to reduce cerebral edema and possible mass effect on the anterior portion of the gland.

**Discussion:** Most of the pituitary malignancies are primary in origin and are rarely due to metastatic cancer. In addition, the majority of these metastases result in an asymptomatic presentation. The appearance of endocrinopathies is rare, with the most common being the development of primary diabetes insipidus as the posterior stalk being the most common site of metastasis. Other forms of endocrinopathies such as central hypothyroidism, as seen in this patient, are even more uncommon and can be due to mass effects and or infiltration of the anterior pituitary.

**Conclusion:** While treatment for these patients are palliative in nature, early detection of pituitary metastasis, followed by adequate local treatment, may improve survival and the quality of life.

## A Shocking Diagnosis of Thromboangiitis Obliterans After Electrical Injury

### *Clinical Vignette*

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**Introduction:** Electrical injuries usually arise from contacting faulty electrical appliances and is a relatively common cause of occupational injury. Electrical injuries are commonly divided into low-voltage (<1000 volts) and high voltage (>1000 volts). In the United States, electrical injury leads to approximately 1,000 deaths per year and 30,000 nonfatal shock incidents occur yearly. Although occurrence of symptomatic arterial complications is well documented after high-voltage electrical injuries, they are only a few published cases associating arterial complications with low-voltage electrical injuries. The following case highlights how thromboangiitis obliterans was revealed in a patient's left hand after it was affected by electrical shock injury while his non-shocked hand exhibited only subclinical disease.

**Case:** Patient is a 71-year-old smoker with COPD and a 55-pack year history who presented for the clinic one day after experiencing a low-voltage electrical shock with new onset duskiness of his left third and fifth fingertips. He reported accidentally drilling a long screw through dry rock into wiring while holding an electric drill with his left hand. Although pain from the initial shock was brief, he progressively developed a pins-and-needles sensation, a cold sensation, and discoloration of said fingertips over 24-hours. Symptoms were not worsened by exertion and discoloration did not extend beyond the distal interphalangeal joints. Right hand was completely asymptomatic with no discoloration. He underwent same-day upper extremity arterial dopplers bilaterally that showed positive digital ischemia of the right 4th fingertip and the left 3rd and 5th fingertips. In coordination with vascular surgery, patient was diagnosed with thromboangiitis obliterans and conservatively treated with tobacco cessation resulting in resolution of symptoms. Patient has remained asymptomatic 6-months since resolution. Electrical injuries result from tissue damage related to thermal injury and are affected by factors such as tissue resistance and contact duration. Nerves and blood vessels have very low tissue resistance thus are highly conductive and more prone to injury. Vascular injuries will often lead to coagulation necrosis, which in turn causes ischemia of the tissue surrounding the vessel. 0.9% of patients who undergo a high-voltage electrical injury will develop a venous thromboembolism, whereas 0.2% will develop a pulmonary embolism. Increased risk of coagulability has not been reported in low-voltage injuries. As the patient had evidence of subacute disease in his uninjured hand but developed clinically visible disease in his shocked hand within 24-hours of injury, it is our conjecture that the electrical shock exacerbated a subclinical case of thromboangiitis obliterans.

**Conclusion:** Although non-confirmatory, this case strongly suggests low-voltage electrical injuries may be prothrombotic in the setting of preexisting vascular disease. If proven in a laboratory model, the finding would help elucidate the reason why a hypercoagulable state is seen with the utilization of medical devices that deliver electricity.

## **A Rare Diagnosis: Primary Gastric Choriocarcinoma**

*Clinical Vignette*

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**Introduction:** Primary gastric choriocarcinoma (PGC) is a highly aggressive cancer with early metastatic potential that arises from trophoblastic or totipotent germ cells. It can occur unrelated to gestation in the gastrointestinal tract as a pure PGC or as a PGC with mixed adenocarcinoma features. Given the rarity of this condition, it can often pose as a diagnostic challenge.

**Case:** A 33-year-old woman with no medical history presented with acute onset melena for one day in the setting of fevers, lower back pain, progressive weakness, and decreased appetite for two weeks. Her physical exam was only notable for hepatomegaly. She was found to have a positive urine pregnancy test, but denied recent pregnancy, history of miscarriage, ectopic pregnancy or hydatidiform mole. Labs demonstrated a microcytic iron deficiency anemia, electrolyte abnormalities, an elevated lactate dehydrogenase, and a rapidly increasing beta human chorionic gonadotropin (hCG) up to 246,659 mIU/mL. Her alpha fetoprotein, carcinoembryonic antigen, carbohydrate antigen (CA)-125, and CA 19-9 were all within normal limits. Imaging did not reveal an intrauterine pregnancy or evidence of gynecologic abnormalities, but showed multiple space occupying liver lesions, a 1 centimeter left lower lobe pulmonary lesion, and a sclerotic L5 vertebral lesion which was suggestive of metastatic disease. Her liver biopsy showed a high-grade epithelial neoplasm expressing HCG, CK7, PLAP, CDX2, and P63 antigens, favoring a high-grade germ cell tumor with choriocarcinoma differentiation. Upper endoscopy identified a large fungating, hypervascular, non-obstructing mass at the gastroesophageal junction that extended into the gastric cardia. Pathology demonstrated gastric type mucosa with poorly differentiated adenocarcinoma, along with areas of malignant cytotrophoblasts and focal syncytiotrophoblast cells consistent with a gastric adenocarcinoma associated with choriocarcinomatous differentiation. Tumor staining was concordant with liver stains noted above. The patient was diagnosed with PGC with mixed adenocarcinoma features after an extensive work up to rule out other sites of the primary malignancy. Beta hCG levels decreased after she was started on cisplatin and etoposide chemotherapy. She was discharged and shortly after developed cardiac arrest and subsequent multisystem organ failure and expired 2 months after her initial diagnosis.

**Conclusion:** Although the diagnosis of PGC is rare, it is essential to keep it in the differential diagnosis for young patients that present with an aggressive gastric mass. Supportive findings of this diagnosis include an elevated beta hCG, evidence of metastatic disease, and immunohistopathology demonstrating cytotrophoblastic and syncytiotrophoblastic cells that stain positive for hCG. PGC is commonly diagnosed after surgical resection, but it can be also diagnosed after upper endoscopy as long as sufficient tissue samples are obtained to prevent the misdiagnosis of a pure gastric adenocarcinoma. Recognition of this diagnosis can allow for early treatment and improved outcomes for our patients.

## **Clozapine-Induced Early Cardiotoxicity**

### *Clinical Vignette*

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**Introduction:** Schizoaffective disorder, bipolar type is a chronic, severe, mental health disorder. Clozapine has shown efficacy in treating acute mania and in overall mood stabilisation. However, on rare occasions, the use of Clozapine has been associated with cardiotoxicity.

**Case:** A 31-year-old man who at baseline is known to have schizoaffective disorder, bipolar type and cannabis dependence was brought to our hospital by law enforcement because of delusional thoughts and aggressive behavior. He admitted to regular cannabis use. He was admitted to our Psychiatry floor due to psychotic relapse. He was initially started on Aripiprazole 15mg orally once daily but was switched to Clozapine 12.5mg orally twice daily on Day 2 of admission which was uptitrated by 12.5mg per dose every two days up to a maximum of 100mg twice daily on Day 10, which was maintained thereafter. On Day 14 of admission, he was noted to have a temperature of 37.8C which achieved a maximum temperature of 39.3 on Day 16, associated with malaise, generalised myalgia and pleuritic-type chest pain. BP 106/50 mmHg, heart rate 113 beats per minute. Physical exam revealed a regular and rapid pulse, S1 and S2, without rubs, murmurs or gallops. No jugular venous distension. His lungs were clear to auscultation. Laboratory studies revealed troponin 0.19, CK 74, CRP 10.5, WBC 10.5, PLT 126. A 12-lead EKG revealed Sinus tachycardia, rate at 111 beats per minute, without ischemic changes. Blood culture was no growth. Influenza A and B antigens were negative. Streptococcus Group A Antigen was negative. SARS CoV-2 was negative. HIV antibody and antigen were nonreactive. CXR revealed no acute disease findings. He was seen by the Cardiologist who made a presumptive diagnosis of Clozapine-related cardiotoxicity with possible cardiomyopathy or myocarditis. Due to the absence of EKG abnormalities and the troponin elevation being less than would be expected in the setting of myocarditis, a transthoracic echocardiogram was ordered which revealed decreased left ventricular systolic function and an ejection fraction of ~ 50% without regional wall motion abnormalities. Considering the high suspicion for Clozapine-induced cardiotoxicity the last dose of Clozapine 100mg was administered on Day 15 and he was switched to Lithium Carbonate 600mg orally twice daily. Additionally, he was started on the cardioselective Metoprolol tartrate 12.5mg orally twice daily on Day 16 and monitored via continuous telemetry. The patient subsequently became afebrile 36-48 hours after discontinuation of the Clozapine. There was resolution of the chest pain, malaise and myalgia, without development of shortness of breath or lower leg swelling. He remained cardiovascularly stable and was transferred to the Psychiatry Floor for the remainder of his hospitalization.

**Conclusion:** Clozapine uncommonly causes cardiotoxicity, awareness of this possibility and recognizing early features helps in reducing associated cardiovascular morbidity and mortality.

## Newly Diagnosed EGPA Presenting as Epiglottic Ulceration and Severe Acute Renal Failure

### *Clinical Vignette*

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**Introduction:** Eosinophilic granulomatosis with polyangiitis (EGPA) is a vasculitis of the small and medium-sized arteries characterized by chronic rhinosinusitis, asthma, and prominent peripheral blood eosinophilia. We report a patient with newly diagnosed EGPA presenting with severe acute renal failure and epiglottic ulceration.

**Case:** A 67-year-old male with a history of obesity, asthma, chronic back pain, and radiculopathy came to the hospital due to worsening swelling of his hands and legs for 1 week which is associated with productive cough, weight loss, poor oral intake due to throat pain, chronic nasal congestion, shortness of breath and acute worsening of chronic right-sided hearing loss since the last few months. He was found to be hypoxic on room air and tachypneic. On examination, wheezes were heard on auscultation, a shallow ulcer was seen in the left buccal mucosa with a few purpuric lesions in the upper lip and moderate-sized purpuric lesions were seen across both his legs from knees to toes. His laboratory results showed elevated creatinine at 5.69mg/dl and leukocytosis of 15,000 cells/mm<sup>3</sup> with 36% eosinophils. Further workup showed elevated ESR, CRP, positive MPO-ANCA, negative Pr3-ANCA, and lower extremity DVT on a duplex study. The patient was also found to have pansinusitis with possible nasal polyposis and a 2.3cm x 1.6cm oval focal area of pneumonitis on CT scan. Flexible laryngoscopy showed mildly erythematous epiglottis with ulceration of proximal lingual surface. He was initiated on hemodialysis for worsening kidney injury. Kidney biopsy revealed acute tubulointerstitial inflammation with eosinophils, acute tubular necrosis, and sclerosed glomerulus. The patient was positive for 6 of the 6 ACR diagnostic criteria for EGPA. He was started on cyclophosphamide and corticosteroids as his five-factor score was 2. Renal function and odynophagia improved and he was taken off dialysis. His lesions began to dry up and heal with no new lesions. He was discharged on corticosteroids.

**Discussion:** EGPA, a rare disease with a prevalence of 5-17 per million adults, is characterized by blood/tissue eosinophilia, asthma, extravascular granuloma formation, and vasculitis of multiple organ systems. The mean age of diagnosis of EGPA is 50 years and it is uncommon in people aged over 65 years. Allergic rhinitis, nasal polyposis, chronic rhinosinusitis, otitis media, and sensorineural hearing loss are common manifestations. While laryngeal pathologies such as vocal cord paresis and glottic masses have been reported, our patient interestingly had epiglottic ulceration which, to our knowledge, has so far not been documented. Renal abnormalities are present in about one-quarter of patients with EGPA. However severe acute renal failure is relatively uncommon with an incidence of only about 4.3% and it rarely is the initial presentation.

**Conclusion:** This case report serves to increase awareness among physicians about the wide spectrum of presentation of EGPA.

## **Crazy Vaping and Crazy-Paving: A Case of Vaping-Associated Organizing Pneumonia with Chest CT Showing Crazy-Paving Pattern**

*Clinical Vignette*

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**Introduction:** E-cigarettes are commonly used tobacco products, particularly among young smokers. They are marketed as safer alternatives to traditional cigarettes; however, several studies reported various lung disorders associated with their use. Here, we report a case of bronchiolitis obliterans organizing pneumonia (BOOP) in a patient with a history of vaping.

**Case Presentation:** A 31-year-old male with a past medical history of paroxysmal atrial fibrillation, hypertrophic obstructive cardiomyopathy presented with fevers, cough, and shortness of breath with chest tightness for 3 days. The patient endorsed that he quit smoking cigarettes, but he reported using a vaping device to smoke cannabis oils. Moreover, he was recently admitted to the hospital with a similar presentation for vaping associated lung injury requiring intubation. On arrival, he was tachypneic and hypoxic at 85% on room air; yet, he was not febrile or tachycardic. The patient was placed on BIPAP with improved oxygenation, and laboratory analysis revealed a leukocytosis of 17,500, and work up for infection was negative. A plain chest radiograph demonstrated bilateral generalized infiltrates, and his chest computerized tomogram CT revealed extensive bilateral alveolar infiltrates with peripheral sparing and septal thickening with a paving pattern. Given the history of recurrent admissions for pneumonia and a long history of smoking and vaping, the patient underwent lung biopsy, which showed histologic findings consistent with BOOP. The patient's symptoms significantly improved with steroid treatment. He was discharged home 2 weeks after admission and recommended to quit using vaping products.

**Discussion:** E-cigarette/Vaping-associated lung injury (EVALI) is a relatively new term introduced by the CDC in 2019 to describe the pulmonary illness related to vaping. Our clinical case presentation meets the criteria of diagnosis of EVALI since the patient reported vaping in the 90 days before the onset of his symptoms, had pulmonary changes on imaging consistent with the disease, and less likelihood of other etiologies at this given point. Chest CT of the patient showed a crazy-paving pattern, which is a non-specific finding that can be seen in many conditions, including but not limited to organizing pneumonia; however, his lung biopsy's histologic findings revealed BOOP, suggesting a potential relationship between vaping and organizing pneumonia development. Further studies are still needed to recognize the process of the disease.

**Conclusion:** In light of the significant prevalence of e-cigarettes use and EVALI cases, Physicians should be familiar with the diagnosis of this disease and consider BOOP in their differential diagnosis in patients presenting with respiratory symptoms and a history of e-cigarettes use. Additionally, it is essential to raise public awareness of the health risks associated with vaping.

## **The Body of Evidence: Bilateral Carotid Body Paragangliomas**

*Clinical Vignette*

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**Introduction:** Paragangliomas are sporadic, hypervascular, and typically benign neuroendocrine neoplasms arising from extra-adrenal neural crest cells. Carotid body tumors (CBT) arise from chemoreceptor cells of the carotid bulb, with an incidence of 0.6/100,000 person-years. They commonly present as slow-growing, asymptomatic unilateral neck masses between the third and sixth decades of life, or as incidental findings on imaging studies. Common symptoms are pain, dysphagia, odynophagia, hoarseness, and stridor, and functional CBTs may cause palpitations, flushing, and headaches, related to catecholamine production. Earlier and bilateral presentations are associated with familial forms.

**Case:** An 18-year-old female patient presented with four days of odynophagia associated with malaise, fever, and chills. Drooling and trismus along with right submandibular swelling was noted. On exam, the oropharynx was erythematous, the right tonsil was swollen and displaced towards the midline, and the right submandibular and anterior cervical lymph nodes were enlarged and tender to palpation. Contrast-enhanced Computed Tomography (CT) of the neck showed two separate abscesses in the right tonsil and bilateral tonsillar edema with narrowing of the airway. Additionally, bilateral avidly enhancing lesions (left: 14 mm, right: 10 mm) were noted within the carotid space adjacent to the carotid bulbs, suspicious for CBTs.

Right peritonsillar abscess incision and drainage was performed. Intravenous steroids and antibiotics were initiated and the patient was monitored for airway patency. Within 24 hours, oral symptoms significantly improved and she was able to swallow with minimal discomfort. Referral to ENT and Vascular surgery for evaluation and possible staged CBT excision was made.

**Discussion:** Carotid body tumors are a rare occurrence, and infrequently bilateral. Contrast-enhanced CT or magnetic resonance imaging (MRI) are key to characterizing the extent of disease and invasiveness. In a retrospective study involving 204 patients, 14 patients (6.9%) had bilateral CBTs, their mean age was 49 + 11.9 years, 57.1% were females, and all of the tumors were non-secreting and benign. Although <4% of CBTs are biochemically active, plasma catecholamines and metanephrines should be obtained to detect a functional CBT or a concomitant pheochromocytoma.

**Conclusion:** Surgical excision is the gold standard treatment for CBTs. Preoperative  $\alpha$ -Adrenergic blockade can prevent or block the effects of acute catecholamine release during anesthesia and surgery and prevent intraoperative hypertensive crises for functional and non-functional CBTs. Radiotherapy is an alternative treatment for patients with extensive involvement, multiple tumors, or high anesthetic or operative risk. Patients with bilateral CBTs should undergo staged excision, removing the largest tumor first, and the second tumor later, as simultaneous removal can cause labile blood pressure postoperatively. One third of patients may have persistent or recurrent tumors, therefore annual follow-up for at least 10 years with metanephrine levels for surgically treated functional CBTs, and periodic imaging for surgically treated silent CBTs is recommended.



## Hypervirulent *Klebsiella Pneumoniae* Sepsis Masked by COVID-19

*Clinical Vignette*

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**Introduction:** Hypervirulent *Klebsiella Pneumoniae* (hvKp) is a more virulent strain of *Klebsiella*. Once reported mostly in Asia-Pacific regions, it is increasingly seen in the US due to immigration and travel. In the COVID-19 era, where multifocal pneumonia is presumed to be due to COVID-19, serious infections like hvKP can be masked by COVID-19, resulting in serious consequences. This case encourages clinicians to consider other possibilities when treating patients who have positive COVID-19 tests.

**Case:** A 35-year-old male with no significant past medical history presents with cough, shortness of breath, burning urination, burning, and itchiness in his eyes for three days. On exam, he was tachycardic and tachypneic. Complete blood count (CBC) showed neutrophilic leukocytosis, thrombocytopenia, bandemia, and anemia. Labs showed acute kidney injury (AKI), severe hyponatremia, mixed hyperbilirubinemia, and transaminitis. D-Dimer, CRP, and LDH were elevated. Urinalysis showed moderate Leukocyte esterase, Large blood, 50-100 WBC. SARS COV 2 was positive. Imaging showed multiple pulmonary nodules and prostatitis. He was diagnosed with COVID multifocal pneumonia with a superimposed Urinary tract infection (UTI), and he was started on therapeutic enoxaparin, ceftriaxone, and azithromycin. Foley was placed, which drained hematuria with clots. However, he did not improve, and a few days into admission, he developed sudden onset bilateral visual loss. MRI orbit was negative. Repeat CT chest showed increasing pulmonary nodules, with some nodules showing cavitations. Urine culture grew *Klebsiella pneumoniae*. He was diagnosed with Hypervirulent *Klebsiella pneumoniae* (hvKP) sepsis complicated by endophthalmitis. Antibiotic was changed to piperacillin-tazobactam. Repeat MRI orbits showed bilateral endophthalmitis. Eye cultures were positive for *klebsiella pneumoniae*. Vitrectomy was done for source control. Cystoscopy showed a Necrotic prostrate and urethra with multiple cavitations and false passage. Transesophageal Echo was negative. He was started on a heparin drip, which had to be discontinued later due to recurrent GI bleeding. The upper endoscopy did not show a source of the bleed. Repeat imaging showed bilateral iliac vein thrombosis. IVC filter was placed, and anticoagulation was held. He clinically improved, and he was discharged on a total of eight weeks of ceftazidime-tazobactam. On discharge, he was legally blind in both eyes. Six months into follow up, his only long term complication was bilateral blindness.

**Conclusion:** Clinicians in North America usually recognize *Klebsiella pneumoniae* as an organism that causes localized infections in compromised older adults in a health care setting. However, hvKp causes multiple infections in young, healthy adults, especially of Asian or Hispanic descent, in a community setting. Increased reporting of this serious infection will close this knowledge gap and improve outcomes for these young but otherwise healthy patients. In contrast to common *Klebsiella pneumoniae* (cKp), hvKp needs proper source control. Hence complete screening for an occult abscess is essential.

## **Bilateral Painless Loss of Vision in a Patient with Covid-19 Infection**

### *Clinical Vignette*

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**Introduction:** COVID-19 can cause neurological symptoms in 36.4% cases with hyposmia and hypogeusia being most common. We present a patient with Covid-19 infection and bilateral vision loss.

**Case:** A 42-year-old gentleman with diabetes presented with symmetric, bilateral, painless loss of vision for three days. No redness, flashers/floaters, diplopia, jaw claudication, headache, fevers, dyspnea, weakness, facial deformity, slurred speech, or palpitations were reported. The patient had an occasional non-productive cough. No new medications or drug intake was noted, except minimal alcohol intake. Vital signs were stable. Visual acuity was limited to the perception of hand movements at one foot. Ocular examination and fundoscopy were normal bilaterally. Laboratory parameters showed mild elevation of inflammatory markers (CRP, LDH, D-dimer, ferritin) and hemoglobin-A1c was 8%. Thiamine, cyanocobalamin and folate were normal. A toxicological workup was negative. COVID-19 was positive with RT-PCR testing but was not treated in the absence of respiratory symptoms. Brain CT and MRI/MRA did not reveal any pathology. CSF studies were unremarkable. Three days of pulsed methylprednisolone intravenously led to visual improvement to finger counting at three feet by day#3. The patient was discharged on an oral prednisone taper and the vision improved to baseline after three weeks. COVID-19 associated transient visual loss with suspected optic neuritis, PRES-like syndrome and posterior ischemic optic neuropathy (PION) have been reported. SARS-CoV-2 may invade host cells via the ACE-2 receptor, also expressed in the endothelium and central nervous system (CNS). It has been isolated from the endotheliocytes, frontal lobe neurons, and CSF. The inflammation results in endothelial dysfunction, complement activation, and cytokine recruitment leading to a prothrombotic state. The inflammation, coagulopathy, and microvascular dysfunction lead to vasculitis, cerebrovascular disease, and blood-brain barrier damage. Direct viral infection may lead to encephalitis and neuritis. The virus invades via the cribriform plate and gains access to olfactory neurons and may disseminate trans-synaptically.

**Discussion:** Acute painless vision loss is a medical emergency. Etiologies may include amaurosis fugax, central retinal artery occlusion (CRAO), central retinal vein occlusion (CRVO), vitreous hemorrhage, ischemic optic neuropathies (ION), optic neuritis, toxic optic neuropathy (TON), Leber's hereditary optic neuropathy (LHON), retinal detachment, posterior cerebrovascular accidents (CVA) or transient ischemic attack (TIA) [8–10]. CRAO, CRVO, vitreous hemorrhage, retinal detachment, TON, LHON, CVA, and TIA were unlikely given the presentation and investigations. ION may either be anterior or posterior. Arteritic or non-arteritic anterior ION were both unlikely. PION was possible due to COVID-19 associated microvasculopathy. Optic neuritis was also probable, with suspected SARS-CoV-2 neuroinvasion leading to neuritis. The elevated inflammatory markers and the prompt response to the corticosteroids support our hypothesis.

**Conclusion:** Since the etiology remained indeterminate, vigilance and more research into such cases associated with COVID-19 are suggested.

## **A Burning Question**

*Clinical Vignette*

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**Introduction:** “My mouth feels like all I’ve eaten is hot chili pepper!”, a 54 y/o woman worriedly commented during a routine visit. The dysesthesia affected her lips, bilateral oral commissure, tip and borders of the tongue, and soft palate. It had been present for 3 weeks.

**Case:** Associated with xerostomia without changes in appearance of her eyes, lacrimation, itchiness, numbness, or dysgeusia. Strong psychological stress preceded her symptom. Her medical history was significant for well-controlled T2DM. On physical examination, her mouth and oral cavity were normal. A complete blood count and chemistry panel were normal. SARS-Cov-2 RNA PCR was negative. Ferritin, vitamin B12, B9, and B6, Zinc, ESR, HCV ab, HBsAg, HIV, RPR, Antinuclear Antibody, and Sjogren’s antibodies were normal. Brain MRI didn’t show any intracranial pathology. Part of the charm of being an internist is that, from time to time, people with surprising symptoms will consult you. The burning mouth sensation is commonly seen in aphthous/contact stomatitis. Other differential diagnoses include herpes/post-herpetic neuralgia, candidiasis, Sjogren’s syndrome, anemia, nutritional deficiencies, and intracranial processes (multiple sclerosis, infection, neoplasia). Our patient didn’t have any of the above and, even more puzzling, her symptom didn’t dissipate after a few weeks but persisted for 6 months. Now the burning question is, what is the diagnosis? Initially, she was treated with topical Lidocaine and Benzocaine mucosal gel without improvement. After establishing the diagnosis, Gabapentin and psychotherapy were started. At her 6-month follow-up her symptoms were improved but not completely resolved.

**Discussion:** Burning mouth syndrome (BMS) is a chronic burning sensation in a clinically normal oral mucosa. Its prevalence is 0.11%<sup>1</sup> and higher amongst middle-aged females. Three clinical subtypes have been identified: Type 1 associated with T2DM; Type 2 with psychological disorders; and type 3 with allergic reactions. The following diagnostic criteria for BMS has been developed: Fundamental criteria: 1. Daily and deep burning sensation of the oral mucosa; 2. Duration 4-6 months; 3. Constant or increasing intensity; 4. Not worsened by oral intake; 5. Not interfering with sleep. Additional criteria include dysgeusia, xerostomia, chemosensory alterations, and psychopathologic alterations<sup>2</sup>. Our patient met all the fundamental and additional criteria. Therapeutic options include benzodiazepines, tricyclic antidepressants, anticonvulsants (gabapentin), and selective serotonin reuptake inhibitors. If found to be deficient, vitamins, zinc or iron should be supplemented. Psychotherapy is necessary if related to psychiatric disorders. In a retrospective study, only 3% of patients with BMS had remission after 5 years, and 49% had no improvement after 18 months.

**Conclusion:** BMS is challenging to diagnose and treat. The internist should be aware of this entity and get work up accordingly including vitamin and minerals levels and rule out infectious and neurologic conditions. With the appropriate intervention it can significantly improve however, remission is rare.

## Neurosyphilis in Times of COVID-19, Confounding a Complicated Diagnosis

*Clinical Vignette*

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**Introduction:** Syphilis is known as the "great masquerader," due to its variable clinical presentation. Neurosyphilis was common in the pre-antibiotic era. However in the current era, Neurosyphilis, particularly the early forms, is most frequently seen in persons with HIV. We describe the case of an immunosuppressed patient amidst the COVID-19 surge presenting with headache. During the pandemic there is diagnostic, radiographic and interventional limitation because of which full diagnostic work-up was unavailable, thereby confounding the diagnosis.

**Case Description:** A 40-year-old-male with AIDS (on antiretroviral), prior cytomegalovirus colitis, presented with a four-week history of intractable, sharp, constant bi-ocular headache during the peak of COVID-19 surge at our institution. Sexual History significant for men who have sex with men (MSM), monogamous. He reported no trauma, provoking events, neck stiffness, photophobia, phonophobia, diarrhea, nausea, or changes in smell or taste. On physical examination, vital signs were stable, ocular and cranial exam was normal. His neck was supple with full range of motion and no tenderness, meningeal signs were absent. Motor, sensory examination and cerebellar function was intact. No skin or genital lesions were present. Blood work CBC with WBC, hepatic, renal function were normal with CD4+T 227/mm<sup>3</sup>, Viral load 23copies/ml. Inflammatory markers were elevated, COVID-19 nasal PCR was positive, non-contrast CT head was negative for acute process. MRI was unobtainable due to COVID-19 restrictions at that time, and lumbar puncture (LP) was declined by the patient. During the hospital course headache was improved and he was discharged with a diagnosis of headache associated with COVID-19 pneumonia. During the outpatient follow up, he remained headache free with normal neurological examination. Serum Rapid plasma regain (RPR) was reactive 1:128, Fluorescent Treponemal Antibody Absorption (FTA-ABS) was reactive and out of clinical suspicion, LP was obtained which showed lymphocytic pleocytosis with white cells 20/mm<sup>3</sup>, Protein 81mg/dl, a reactive VDRL in the cerebrospinal fluid, thereby confirming Early symptomatic Neurosyphilis. He was treated with IV Penicillin G for 10 days. Post-treatment follow-up titers are awaited.

**Discussion:** Headache is a nonspecific symptom encountered in both inpatient and outpatient settings, but the current medical landscape can create barriers to accurate diagnosis. COVID-19 tends to have neuroinvasive potential manifesting as Meningoencephalitis, Encephalomyelitis, and Acute Myelitis which may overlap with other disease processes, including Neurosyphilis.

**Conclusion:** This case highlights the importance of including Neurosyphilis high on the differentials during this time and climate, particularly in those with high risk behavior, including HIV, MSM. Clinical suspicion and CSF analysis are keys to the diagnosis. Studies recommend LP for all patients with concomitant HIV infection and syphilis, regardless of stage, particularly those with serum RPR  $\geq 1:32$ , CD4+ T  $\leq 350$ /mm<sup>3</sup>, detectable plasma HIV RNA, or those not on antiretroviral. This can facilitate earlier identification and management strategies and improves the prognosis.

## **Hyperglycemia Induced Hemiballismus - A Well-Documented But Not Well-Known Entity**

*Clinical Vignette*

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**Introduction:** Hemiballismus is a hyperkinetic movement disorder defined as involuntary movements of a limb or multiple limbs and is believed to be due to ischemia of the basal ganglia. Hyperglycemia is believed to be the second most common cause of acquired hemiballismus. Although it being so common, a lot of physicians are unfamiliar with this correlation. This case report describes a case of a 61 years old male with a long-standing poorly controlled Diabetes Mellitus presenting with an episode of involuntary uncontrollable jerking movement of his left arm, and blood glucose level on presentation was extremely high, and the neurological deficits resolved with good control of his glucose levels. Treating physicians need to have a high index of suspicion while managing similar conditions.

**Case:** A 61 years old Male was presented to the hospital with the chief complaint of an episode of involuntary uncontrollable jerking movement of his left arm lasting for 1 hour. His past medical history included Diabetes Mellitus Type II and Hypertension. No history of parkinsonism or other neurological disorders was reported. On neurological exam, the patient was fully awake and oriented; tone, sensation, reflexes, coordination was intact, strength was decreased in Left Upper Extremity with drifting of Left Upper Extremity. No choreiform movements were noted during the exam. Laboratory testing revealed a blood glucose level of 750 and an HbA1C level of 14.2. Urinalysis did not show any ketones, the anion gap was normal. CT scan of the head, MRI along with MR Angiography of the head and neck was unremarkable. The patient's blood sugar was controlled with insulin, which led to a steady correction of glucose levels and also the resolution of neurological symptoms.

**Discussion:** Hemiballismus-hemichorea is characterized by continuous involuntary movements of an entire limb or of multiple limbs on one side of the body which are irregular, of variable amplitude, and poorly patterned. The most common cause of acquired hemiballismus is a stroke. Non-ketotic hyperglycemia is the second most common cause of this condition. This entity is termed as Diabetic Striatopathy (DS). Although this is a well-documented etiology, the prevalence of it being 1 in 100,000, is believed to be underestimated because most physicians are not familiar with the condition. Extreme hyperglycemia causes hyperviscosity of the blood that eventually leads to some degree of ischemia at the basal ganglia level, leading to decreased production of GABA (gamma-aminobutyric acid) and acetylcholine at the basal ganglia, further causing disruption of normal neuronal impulse transmission and circuit.

**Conclusion:** Most cases show a resolution of abnormal movements with control of blood glucose levels. Thus, clinicians must bear in mind that patients with long-standing poorly-controlled blood glucose levels can present with this abnormal movement.

**Direct Carotid Cavernous Fistula Following Mechanical Thrombectomy - Rare But Potential  
Complication : A Case Report**

*Clinical Vignette*

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**Introduction:** Direct carotid cavernous fistula (DCCF) occurs mostly due to trauma or aneurysmal rupture. Iatrogenic DCCF formation after endovascular thrombectomy is very rare.

**Case:** A 61 year old right handed Caucasian lady with history of recent embolic stroke (one and a half months ago) status post left middle cerebral artery and terminal internal carotid artery mechanical thrombectomy, paroxysmal atrial fibrillation presented with redness, swelling and watering of both eyes for ten days, without improvement with topical antibiotics. This was accompanied by visual blurriness, pressure like sensation, and swelling of both eyes. There was no history of itching, pain, fever, upper respiratory tract infection symptoms. Eye examination showed bilateral conjunctival erythema, chemosis and proptosis of left eye. Light reflex, accommodation reflex, extra-ocular movements, visual fields were preserved bilaterally. Visual acuity was 20/30 in left and 20/50 in right eye. Fundoscopy showed dilated retinal veins. Intra-ocular pressure was high normal (20 mm Hg). Neurological examination showed right sided hemiparesis with right facial nerve palsy. Deep tendon reflexes were 2/4 on the left side and brisk on the right side. Preliminary investigations showed normal complete blood count and basic metabolic panel, TSH- 0.197 and fT4- 1.04. CT scan of the orbits showed dilated superior ophthalmic veins (left greater than right) with prominent vascularity at the level of cavernous sinuses. This raised a suspicion of carotid cavernous fistula (CCF). A diagnostic cerebral angiogram was done which showed a DCCF extending from the posterior aspect of the left cavernous internal carotid artery into a dilated left cavernous sinus. Varix formation was noted between the cortical venous system and cavernous sinuses. The fistula was then completely embolized and the left anterior and middle cerebral artery filling through the anterior communicating artery was confirmed. There were no post-procedural complications. A ten week follow up angiogram confirmed occlusion of the fistula.

**Discussion:** Development of CCF after mechanical thrombectomy for large vessel stroke is rare and its exact incidence has not been reported yet to the best of our knowledge. One study showed an incidence of 0.8% of direct carotid cavernous fistulas after common neurosurgical interventions. There has been few case reports of intra-procedural and early post-procedural fistulas (after 2-3 weeks). However, presentation after one and a half month of the procedure has not been reported yet. Stent retrievers deployed during mechanical thrombectomy and its subsequent withdrawal can cause vessel injury like stretching of arteries and accompanying veins, avulsion of branched vessels. These have been the proposed mechanisms for development of DCCF.

**Conclusion:** Recognition and awareness of the clinical presentation of a high flow CCF is important as prompt intervention is required to prevent permanent visual loss and decrease mortality due to intracerebral hemorrhages and infarcts.

# **MEDICAL STUDENTS**

## **Metastatic Colorectal Adenocarcinoma at Twenty Six**

*Clinical Vignette*

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**Introduction:** Colorectal cancer before the age of 50, otherwise known as early-onset colorectal cancer (EO-CRC), has an increasing incidence. Its nonspecific symptoms in an unsuspecting population make EO-CRC difficult to diagnose.

**Case:** A 26-year-old healthy Caucasian man developed diffuse abdominal pain, mild hematochezia, constipation, nausea and vomiting for 3 days. Five months prior to this, he noticed intermittent bloody stools. He denied family history of colorectal cancer, travel, fever, substance use, cigarette smoking, alcohol intake, or weight loss. He was hemodynamically stable and had mild diffuse abdominal tenderness. His hemoglobin/hematocrit were 10.5/31.8 g/dL and stool occult blood test was positive. The remainder of the complete blood count, complete metabolic panel, urinalysis, amylase, and lipase levels were normal. Contrast-CAT-scan of abdomen-pelvis showed colonic stricture with 7 hypodense, solid hepatic nodules. MRI confirmed an apple-core-type mass in the sigmoid colon, 10 cm from the anus with multiple perirectal lymph nodes. Colonoscopy and detailed histopathological analysis concluded as colonic obstruction due to metastatic colorectal adenocarcinoma (CRC) stage IV; ypT3 ypN1a ypTM1a; NRAS mutation+, pMMR; immunohistochemical stains further confirmed the tumor cells reactive for CDX2, villin, and SATB2; CK20 shows patchy positivity while CK7 was negative. He underwent colonic stenting, low anterior resection, diverting loop ileostomy, and received RFA ablation to four hepatic metastases, followed by 12-cycles of FOLFOX, Bevacizumab and maintenance 5-FU. He maintained an excellent performance status. Considering absence of family history of cancers and young age of onset he was advised for genetic counseling, which revealed no reportable genetic variants.

**Discussion:** Around 5% of all CRCs occur in patients under age 45 years. The incidence of EO-CRC has been increasing 1-2%/year while the overall CRC frequency has been decreasing. Approximately 30% of cases are associated with known hereditary cancer syndromes, and 20% have familial CRC. EO-CRCs are molecularly distinct from CRCs found in older patients, and have unique signaling aberrations particularly among patients aged 18-29 years. EO-CRCs have lower occurrence of BRAF V600 mutations and KRAS mutations, and the combined MAPK pathway mutations happen to be lowest among patients aged 18-29 years. EO-CRCs often present with advanced stage at the time of diagnosis, have poorly differentiated tumors, and occur predominantly left-sided and rectal. EO-CRCs are diagnosed approximately six months later than symptom onset due to low level of suspicion in the young adult population. This case demonstrates the difficulty in early diagnosis of EO-CRC due to the patient's absence of significant family history, medical history, and risk factors (obesity). A high index of clinical suspicion and additional work-up is critical for diagnosis.

**Conclusion:** The rising incidence of EO-CRCs, commonly diagnosed months after symptom onset and at an advanced stage, necessitates earlier age surveillance. Treatment is based on staging and molecular characteristics.

## The Use of Acetaminophen to Treat Zinc Deficiency Dermatitis Leading to Acute Toxic Hepatitis

*Clinical Vignette*

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**Introduction:** Many nutritional deficiencies have systemic manifestations, including gastrointestinal complications, neurodysfunction, cardiac failure, alopecia, and other dermatological manifestations such as cheilosis, stomatitis, and dermatitis.

**Case Description:** A 60-year-old female with excessive daily alcohol use presented to the emergency department with lower extremity edema and pain, as well as abdominal discomfort. She reported a painful rash associated with swelling all over her body, especially her lower extremities. She stated that the rash was getting progressively worse and that she took Tylenol 500 mcg QID to help with the pain. She consumes about 50 ounces of beer daily and her oral intake is minimal during the day. On physical exam, she had angular cheilitis and a tender, erythrodermic, desquamating rash on her upper and lower extremities, as well as her shoulders and buttocks. She did not have any mucosal lesions. Her labs showed severely elevated liver function tests (LFTs), notable for an AST of 5252, ALT of 954, and ALP of 393. Her viral hepatitis panel was negative. Acetaminophen levels in the patient were found to be elevated at 31 mcg/mL. Punch biopsy of her right thigh was indicative of psoriasiform and spongiotic dermatitis with neutrophils in parakeratotic scales, consistent with nutritional deficiency, psoriasis, or a fungal infection. Further workup showed a decreased zinc level at 35 (normal: 60-100 µg/dL). The patient was treated for her acute toxic hepatitis, likely due to the acetaminophen toxicity, with n-acetylcysteine. After the patient was treated with thiamine, folic acid, and zinc, her dermatitis significantly improved prior to discharge.

**Discussion:** It is important to keep nutritional deficiencies on the list of differential diagnoses, especially if there are multiple systemic manifestations, in addition to a history of malnutrition. It is also crucial to evaluate whether or not all presenting symptoms are related to one disease process or due to multiple distinct conditions. While it was not difficult to determine the underlying cause of the patient's abnormal LFTs and abdominal pain after a thorough history and grossly negative hepatic workup, the challenge was to determine whether the cutaneous manifestations were also related to the gastrointestinal manifestations. The patient's extensive dermatitis and cheilosis were due to chronic nutritional deficiencies that worsened over time due to a lack of stable diet and nutrition.

**Conclusion:** The acetaminophen she was taking to alleviate her dermatological manifestations actually worsened her liver function and lead to abdominal pain. Therefore, what one might have thought was a rare diagnosis actually turned out to be two separate entities that worsened the patient's condition simultaneously through a compound effect.

## Uncontrolled Fasting Blood Glucose with Inconceivable Glycosylated Hemoglobin

*Clinical Vignette*

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Third  
Place

**Introduction:** While the glycosylated hemoglobin (HbA1c) is considered a useful tool to diagnose Type-II diabetes mellitus (T2DM), it must be clinically correlated to patient-specific characteristics.

**Case:** A 42-year-old Bangladeshi woman with family history of T2DM in her parents, presented with high recordings of fasting blood glucose (FBG) levels checked casually by her at home using her husband's glucometer. She was asymptomatic and had no medical problems and was not on any medications. Her 4 week FBG readings ranged between 160 and 196 mg/dL. Her body-mass-index was 31.25 Kg/M<sup>2</sup> and the rest of the vital signs and physical examination were within normal limits. Diagnostic test **Results** were remarkable for FBG 180 mg/dL, HbA1c 6.3%, and normal TSH, lipids, renal enzymes, liver enzymes, and complete blood count. Noticing the inconsistency in her HbA1c compared to the FBS, HbA1c test was repeated after a month and it remained at 6.3% with FBS of 180 mg/dL. Hemoglobin variant analysis showed HbA low (72.4%), HbF normal (<1.0%), HbA2 normal (3.3%), and HbE high (24.3%) confirming a diagnosis of hemoglobin E trait. Considering the limitation of HbA1c in patients with hemoglobinopathies, serum fructosamine level was assessed which was elevated at 325  $\mu$ mol/L. She was diagnosed as T2DM with HbE trait and managed with calorie restricted low-carbohydrate diet, 30 minutes of daily exercise and metformin.

**Discussion:** HbA is nonenzymatically and irreversibly glycosylated with a hexose. HbA1c is the most common form and a level of >6.5% is considered diagnostic of DM. However, despite its usefulness in determining average blood glucose over time, HbA1c is not always accurate, especially in the case of anemia and hemoglobin variants. There are over 700 Hb variants. Hemoglobin E occurs when glutamic acid is substituted by lysine at codon 26 of the B-globin. It is a common mutation in parts of Asia with the frequency reaching 60% in some areas of Thailand, Cambodia and Laos. HbE trait has little clinical significance and may cause microcytosis without anemia, while HbEE presents with anemia, microcytosis, peripheral blood smears with target cells and sometimes splenomegaly. There is significant variance among different hemoglobinopathies and their effect on HbA1c. HbE usually leads to falsely low or normal HbA1c depending on the laboratory technique used. In patients where HbA1c does not correlate well with diabetic control, fructosamine, a result of glycosylation of amino groups of serum proteins, can be used to measure average blood glucose over the past 2-3 weeks.

**Conclusion:** When HbA1c fails to correlate with FBS, presence of hemoglobin variant or anemia should be considered. HbE is a common variant among Asian populations that is usually asymptomatic but may present with challenges including assessment and long term management of DM.