229 High Shear Oscillation of Antibiotic Solutions: A Potential Catheter Salvage Strategy for Central-Line Associated Bloodstream Infections

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Background: Central-line associated bloodstream infections (CLABSIs) are associated with significant morbidity and mortality as well as increased healthcare costs. These infections are recalcitrant to standard antibiotic therapy due to bacteria adhering to and forming a biofilm within the catheter. This necessitates the removal of central venous access devices. Here we evaluated the effect of oscillating flow of solutions with and without antibiotics on established biofilms of *Staphylococcus epidermidis*as a potential biofilm debridement and catheter salvage treatment strategy.

Methods: *S. epidermidis* biofilms were established in a parallel plate flow-chamber that simulates a catheter lumen. The biofilms were subjected to 4 treatment protocols: low (8 dyne/cm^2) shear oscillating water, high (32 dyne/cm^2) shear oscillating water, no flow vancomycin (2x MIC), and high shear oscillating vancomycin. This was a paired study design where a control biofilm grown from the same initial bacterial colony was maintained in a water-filled chamber for each sample. After 2 hours of treatment, total biomass from each sample was quantified by crystal violet staining. Our primary outcome was the percent reduction in biomass compared to the paired control for each treatment. ANOVA with Tukey pairwise post-hoc hypothesis testing was used to compare the 4 treatments.

Results: Twenty-six pairs of treatment samples were evaluated (minimum of 5 biological replicates per condition). Increase in the oscillation shear rate significantly improved biomass debridement (low shear = 24.4% ± 14.6% vs high shear = 66.7% ± 11.3%; p=0.001). The reduction in biomass for static vancomycin treatment (34.0% ± 16.3%) was modest and similar to low shear oscillation (p=0.70). However, vancomycin was much more effective in reducing biomass when applied with high shear oscillating flow (65.3% ± 12.9%; p=0.012).

Conclusion: Oscillatory flow disperses bacteria from the biofilm. Antibiotics plus oscillation improved biomass reduction compared to antibiotics alone. However, as much as 35% of the biofilm remains. Longer exposure times and high shear rates may be required for eradication. Other known anti-biofilm strategies (i.e., increased temperature ~50 °C) may also be useful adjuncts. Future work will explore different exposure times, shear rates, and temperatures.

230 Ranolazine and Microvascular Angina by Positron Emission Tomography in the Emergency Department (RAMP-ED): Results From a Pilot Randomized Controlled Trial

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Background: Coronary microvascular dysfunction (CMD) is a common alternate cause of cardiac ischemia. Little is known regarding treatment of CMD that is associated with emergency department (ED) chest pain. Ranolazine, a myocardial late sodium channel blocker, has been shown to improve microvascular circulation.

Objective: To explore the effect of ranolazine on coronary flow reserve (CFR) among ED patients with cardiac microvascular dysfunction.

Methods: This pilot double-blinded randomized controlled trial (RCT) included low-moderate cardiac risk emergency department (ED) patients with chest pain admitted to an observation unit between June 2014 and November 2015. Participants underwent dynamic Rb-82 PET/CT imaging at baseline to diagnose CMD and 30-days post treatment with Ranolazine (1000 mg/ day for a week and 2000 mg/day for 3 weeks). Patients with CMD were identified with impaired CFR, without evidence of obstructive or non-obstructive coronary artery disease (CAD) or calcification. Patients were excluded with infarction, hypertensive urgency, heart failure, or prescribed QTc prolonging drugs. Participants were assigned to ranolazine or placebo in a 2:1 ratio. Primary outcome was change in CFR at 30-days.

Results: We enrolled 31 patients (71% female, mean age 50 years (SD ±6 years) with CMD (mean corrected CFR=1.6 [SD ±0.3]). Ranolazine improved CFR at 30-days by 17% (p=0.005) compared with 0% with placebo (p=0.67). However, there was no significant difference in the primary outcome as measured by mean change in CFR; 0.27 ranolazine compared with 0.06 placebo (95% CI -0.08, 0.62).

Conclusions: The ED offers a unique venue to diagnose CMD. In an proof-of-concept RCT of symptomatic patients with CMD, without evidence of CAD, ranolazine produced promising results in improving CFR at 30-days. Large adequately powered clinical trials are needed to verify improvement of CMD.<

Trial Registration: Ranolazine and Microvascular Angina by PET in the Emergency Department (RAMP-ED) (NCT02052011) ://clinicaltrials.gov/ct2/show/NCT02052011

231 Incidence and Predictors of Thromboprophylaxis Initiation Among High-risk Adults With Atrial Fibrillation and Flutter Discharged Home From the Emergency Department

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Background: Many stroke-prone patients with nonvalvular atrial fibrillation or atrial flutter (AF/FL) do not receive thromboprophylaxis. An ED encounter for dysrhythmia care may represent a prime opportunity for anticoagulation initiation.Objective: We sought to examine anticoagulant prescribing within 30 days of receiving ED care for AF/FL and to evaluate predictors of thromboprophylaxis in an anticoagulation-naive population at high risk for stroke.

Methods: This prospective study included anticoagulation-naive adults at high risk for ischemic stroke who received ED care for symptomatic AF/FL and were discharged home from 7 community EDs between 05/2011 and 08/2012. We used the validated ATRIA Study stroke risk score, which has outperformed the CHA_2DS_2-VASc score, to define high stroke risk (≥7 points). High risk for bleeding was defined by a HAS-BLED score ≥3. We used a multivariate logistic regression model to identify predictors of thromboprophylaxis within 30 days of the index ED visit.

Results: Among 312 eligible patients, the mean age was 80.4 (±6.8) years and 133 patients (42.6%) were high bleed risk. In total, 128 ED patients (41.0%) were prescribed anticoagulation within 30 days: 85 (27.2%) on ED discharge and 43 (13.7%) after discharge. An additional 43 patients (13.8%) were discharged home with continued or new antiplatelet medications only. Independent predictors of anticoagulation were younger age (adjusted odds ratio [aOR] 1.1 per year below mean age, 95% CI 1.0-1.2); new diagnosis of AF/FL (aOR 3.1, 95% CI 1.7-5.6); onset of rhythm-related symptoms >48 hours prior to evaluation (aOR 2.3, 95% CI 1.0-5.2); ED cardiology consultation (aOR 1.9, 95% CI 1.1-3.2); and failure of sinus restoration by time of ED discharge (aOR 2.7, 95% CI 1.3-5.2). High risk for bleeding decreased the odds of anticoagulation (aOR 0.6, 95% CI 0.3-1.0).

Conclusion: Approximately 40% of anticoagulation-naive AF/FL patients at high risk for stroke who presented for emergency dysrhythmia care were prescribed anticoagulation within 30 days. Physicians were more likely to initiate thromboprophylaxis in younger patients, those without ED sinus restoration, and those at lower risk for bleeding. Physicians commonly substitute antiplatelet agents for anticoagulation. Opportunities exist to improve rates of early thromboprophylaxis in this high-risk population.

232 Incidence of Acute Myocardial Infarction in Patients Presenting to the Emergency Department With Symptoms of Acute Coronary Syndrome and a Ventricular Paced Rhythm on 12-Lead Electrocardiography: A Retrospective Cohort Analysis

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Background: Patients with ventricular pacemakers represent a large, but underrepresented population in clinical research. These patients pose a diagnostic challenge when they present to the ED with cardiovascular complaints. Here we report clinical characteristics and the incidence of acute myocardial infarction (AMI) in patients with a ventricular paced rhythm (VPR) on ECG who present to the ED with symptoms concerning for AMI.

Methods: All adult patients presenting between 1/2015 – 12/2015 to our urban ED (95,000 visits in 2015) with VPR and symptoms concerning for AMI (e.g. chest pain or shortness of breath) were identified. An EM physician adjudicated records for type 1 and 2 AMI per the Third Universal Definition of AMI. A blinded cardiologist adjudicated acute coronary occlusion (ACO), defined as thrombolysis in myocardial infarction score 0 or 1 on coronary angiography. Primary results are descriptive.

Results: In 2015, there were 96 visits with VPR and symptoms concerning for AMI. The median age was 69 [IQR 58-79] and 47 (49%) were male. Patients in all 96 (100%) visits had multiple coronary artery disease risk factors. On ED arrival, patients reported chest pain during 60 (63%), shortness of breath during 72 (75%), and both symptoms during 39 (41%) visits. Eighty-eight (92%) visits resulted in hospital admission. Acute heart failure (36 [37%]) was the most common discharge diagnosis. Four (8%) patients died in-hospital. AMI was present on 15 (16%) visits. Of all visits, 2 (2%) represented type 1 AMI (both with ACO), 12 (13%) type 2 AMI, and 1 (1%) patient died without sufficient information for classification. Coronary angiography was performed during 4 (4%) encounters and percutaneous coronary intervention during 2 (2%). Only 1 patient with ACO underwent emergent coronary angiography. For type 1 and type 2 AMI, respectively, median initial cardiac troponin-I values (Abbott Architect, 99% upper reference limit 0.03 mcg/L) were 0.07 [0.04-0.09] and 0.11 [0.04-0.46], and median peak values were 11.2 [0.04-22.4] and 0.2 [0.05-1.6].

Conclusion: In this study of patients with VPR and symptoms concerning for AMI, there was a high prevalence of cardiovascular disease and risk factors. The incidence of AMI is comparable to populations with similar characteristics. This study provides important data that will shape future investigations on this patient population.

233 High-risk Clinical Features for Acute Aortic Syndrome

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Background: Acute aortic syndrome (AAS) is a rare clinical syndrome with a high mortality encompassing acute aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer.

Objectives: The objective of our study was to assess the diagnostic accuracy of high risk historical, examination and basic investigative features for AAS, in confirmed cases of AAS and a low risk control group in order to address the spectrum bias in previous diagnostic accuracy studies.

Methods: We performed a historical matched case-control study: participants were adults >18 years old presenting to two tertiary care emergency departments (ED) or one regional cardiac referral center. Cases: new ED or in-hospital diagnosis of non-traumatic AAS confirmed by computed tomography or echocardiography. Controls: triage diagnosis of truncal pain (< 14 days) and an absence of a clear diagnosis on basic investigation. Cases and controls were matched in a 4:1 ratio by sex and age. A sample size of 165 cases and 660 controls was calculated based on 80% power and confidence interval of 95% to detect an odds ratio of greater than 2.

Results: Data were collected from 2002-2014 yielding 194 cases of AAS and 776 controls (mean age of 65(SD 14.1) and 66.7% male). Of the 194 cases of AAS, 32 (16.5%) were missed on initial assessment. Chest pain unspecified (20.7%), abdominal pain unspecified (9.9%) and acute coronary syndrome (8.7%) were the top diagnoses in the control population. Absence of acute onset pain (Sensitivity 95.9% negative likelihood ratio (LR-) 0.07(0.03-0.14)), and a negative D-dimer (Sensitivity 96.7%, LR- 0.05(0.01-0.18)) can help rule out AAS. Presence of tearing/ripping pain (Specificity 99.7%, LR+42.1 (9.9-177.5), a history of aortic aneurysm (Specificity 97.8%, LR+6.35(3.54-11.42)), hypotension (Specificity 98.7%, LR+ 17.2(8.8-33.6)), pulse deficit (Specificity 99.3, LR+ 31.1(11.2-86.6)), neurological deficits (Specificity 96.9% , LR+ 5.26(2.9-9.3)), and a new murmur (Specificity 97.8%, LR+ 9.4(5.5-16.2)) can help rule in the diagnosis of AAS.

Conclusion: Patients with one or more high-risk feature should be considered high risk, whereas patients with no high risk and multiple low risk features are at low risk for AAS. Further research should focus on a combination of these factors to guide who warrants further investigation thus reducing miss rate, morbidity and mortality.

234 The Duration of Presenting Symptoms Does Not Aid in the Diagnosis of Acute Myocardial Infarction

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Background: In the ED inquiring about the duration of presenting symptoms is commonly done when evaluating patients with suspected acute myocardial infarction (AMI) as it is thought to help distinguish between an AMI and non-AMI diagnosis (long duration thought to be less likely AMI).

Methods: In a single urban center, 569 patients who were clinically evaluated in the ED from May, 2013 to April, 2015 for suspected AM were prospectively studied. Patients were asked by trained research personnel the duration of their predominant presenting symptom. The diagnosis of AMI was adjudicated by two independent physicians (with a third used if there was disagreement) in accordance with the 3rd universal definition of AMI and using the clinically available Siemens Ultra troponin I values (99th% 0.04ng/ml). Patients with ECG findings that led to immediate reperfusion were excluded from the study.