55 The Smith-Modified Sgarbossa Criteria Accurately Diagnose Acute Coronary Occlusion in Emergency Department Patients With Ventricular Paced Rhythm

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Background: The Smith-modified Sgarbossa criteria (MSC) are frequently recommended for diagnosing acute coronary occlusion (ACO; STEMI-equivalent) in the setting of ventricular paced rhythm (VPR). The MSC are positive if one of the following criteria are met in at least 1 lead: concordant ST Elevation (STE) ≥ 1 mm, concordant ST depression ≥ 1 mm in V1-V3, or ST/S ratio < -0.25 in leads with ≥ 1 mm STE. We hypothesized that the MSC will have higher sensitivity for diagnosis of ACO in VPR when compared to the original Sgarbossa criteria.

Methods: The PERFECT study (#NCT02765477) is a retrospective, multicenter, international investigation of ED patients from 1/2008 - 12/2016 with VPR on the ECG and symptoms of acute coronary syndrome (ACS). Data from ten sites are presented here. Acute myocardial infarction (AMI) was defined by the Third Universal Definition of AMI. For this analysis, ACO was defined as angiographic evidence of coronary thrombosis with peak cardiac troponin-I (cTn-I) ≥ 10 ug/L or cTn-T ≥ 1 ng/mL. Blinded physicians adjudicated angiogram reports for coronary lesions and thrombolysis in myocardial infarction (TIMI) flow score. Separate, blinded physicians performed ECG measurements. Trained abstractors recorded data on standardized forms. Statistics were by Mann Whitney U, Chi-square, and McNemar's test.

Results: There were 46 encounters in the ACO group (median age 76 [IQR 65-82], 36 (76%) male) and 79 in the No-AMI group (median age 70 [61-75], 48 (61%) male). For ACO, median peak cTn-I was 65 ug/L [IQR 35-239] and cTn-T 3.3 ng/mL [IQR 2.2-8.3]. For No-AMI, median peak cTn-I was 0.015 ug/L [IQR 0-0.09]. For ACO, the sensitivity and specificity of the MSC and the original Sgarbossa criteria were 83% (95%CI 68-91) versus 63% (48-76; p < 0.005) and 99% (92-100) versus 99% (92-100; p = 0.5). In pre-defined subgroup analysis of patients with TIMI 0-1 flow and peak cTnI â‰¥ 10 ug/L or peak cTnT â‰¥ 1 ng/mL (n = 29), the sensitivity was 87% (69-96) for the MSC versus 58% (39-75) for original Sgarbossa criteria (p < 0.05).

Conclusion: This represents the largest study of patients with VPR and angiographically-proven ACO. The MSC were highly sensitive and specific for the diagnosis of ACO in patients presenting to the ED with VPR and symptoms of acute coronary syndrome.

56 T-Wave Changes in Patients With Ventricular-Paced Rhythm and Acute Coronary Occlusion

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Background: Changes in T-wave amplitude (TWA) and ST-morphology are well-described in patients with intrinsic cardiac conduction and acute coronary occlusion (ACO). In patients with left bundle branch block, which has a similar ECG morphology to right ventricular paced rhythm (VPR), these changes may manifest as T-wave concordance, non-concave (i.e. convex or straight) ST-segment morphology, or increased TWA and TWA:QRS ratio. We hypothesized that patients with VPR and ACO would more frequently have non-concave ST morphology and T-wave concordance, as well as increased TWA and TWA:QRS ratio.

Methods: The PERFECT study (NCT0276547) is a retrospective, international study of patients presenting from 1/2008 - 12/2016 with VPR on ECG and symptoms of ACS. A secondary analysis of data from six sites is reported here. ACO was defined as pre-PCI TIMI 0 or 1 flow. A blinded physician measured baseline and ACO ECGs. To assess ST morphology, a straight line was drawn from the J-point to the inflection of the T-wave in all leads with positive T-waves. T-waves were concordant if most of the T-wave area was in the same direction as most of the QRS area on the ECG.

Results: There were 17 patients with both baseline and ACO ECGs. The median age was 78 [IQR 64-82], 14 (82%) were male, 10 (59%) presented within 6 hours of symptom onset, and median door-to-balloon time was 164 minutes [IQR 33-736]. For ACO, non-concave ST-morphology had sensitivity 76% (95%CI 50-92) and specificity 83% (51-97) while T-wave concordance had sensitivity 47% (95%CI 23-67) and specificity 83% (51-97). For ACO versus baseline, median maximum TWA was 0.80 [IQR 0.55-1.3] vs. 0.7 [IQR 0.55-0.98] and median maximum TWA:QRS ratio was 1.0 [IQR 0.53-1.4] vs. 0.5 [IQR 0.46-0.76]. TWA:QRS ratio > 1.25 had 100% specificity.

Conclusion: In this group of patients with VPR and ACO, there was a high incidence of non-concave ST-morphology and a TWA:QRS ratio > 1.25 was 100% specific for ACO. Criteria such as these should be investigated in larger studies and in combination with known diagnostic rules, such as the modified Sgarbossa criteria.

57 Screening for and Treatment of Submassive Pulmonary Embolism in Community Emergency Departments in the United States

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Background: Professional guidelines advise against routine testing of patients with normotensive pulmonary embolism (PE) for right ventricular (RV) strain (submassive PE). However, they do suggest hospitalization for submassive PE, and recommended against thrombolysis absent hemodynamic deterioration. Rates of screening for and treatment of submassive PE in U.S. community EDs are not well described.

Methods: This retrospective cohort study included all adults with acute non-massive PE (ie, those lacking sustained sBP <90 mmHg) in 21 community EDs from 01/2013 through 04/2015. We combined electronic health record extraction with manual chart abstraction. We defined submassive PE by an elevated troponin I (TnI), B-type natriuretic peptide (BNP) or RV strain on echocardiogram (echo). We compared groups using chi-square or t-tests.

Results: Among 2,969 patients with non-massive PE, 2,369 patients (79.8%) underwent screening for submassive PE: 2,213 (74.5%) had TnI and 1,384 (46.6%) had BNP tests (1,264 [42.6%] had both); 296 (10.0%) had an echo. Most biomarkers (92.3%) were ordered prior to PE imaging and most echos (70.9%) after. Compared with non-tested patients, those screened for submassive PE were older (median 67 vs 62y) and had a higher prevalence of heart failure, coronary artery disease, and higher-risk classes (IV-V) on the PE Severity Index (all p<0.0001). Overall, 928 patients (31.2%) were diagnosed with submassive PE: 900 (30.3%) had an elevated biomarker and 101 (3.4%) an abnormal echo. Compared with unscreened and test-negative patients, submassive PE patients were more commonly treated in the ED with IV heparin (30.9% vs 16.6%), ventilatory support, including non-rebreather mask (9.9% vs 2.7%), and thrombolytics in

the ED or <2h of admission (3.2% vs 0.05%) (all p<0.0001). Catheter-directed alteplase was given to 5 submassive PE patients and IV alteplase to 25, 24 of whom received 100 mg and 1 received 50 mg IV. ICU admission was higher (11.2% vs 2.5%) and home treatment less common (1.3% vs 11.3%; both p<0.0001); 30d all-cause mortality was higher (5.2% vs 3.5%; p=0.03) among submassive PE patients.

Conclusion: Nearly 80% of ED patients were at least partially screened for submassive PE. Those with evidence of submassive PE had higher mortality, despite more aggressive care. Further studies should investigate the impact of routine screening for submassive PE.

58 Prevalence and Prognostic Value of Proximal Clot Location in Emergency Department Patients With Acute Pulmonary Embolism Presenting With Presyncope or Syncope

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Background: In patients with acute pulmonary embolism (PE), it is assumed that a more proximal clot is required to cause obstruction or dysrhythmia sufficient to impede cerebral perfusion resulting in presyncope or syncope (combined as (pre)syncope). We characterized clot location in PE patients with (pre)syncope and evaluated associations with mortality.

Methods: This retrospective cohort study included adults with PE diagnosed by CT pulmonary angiography in 21 community EDs from 01/2013 through 04/2015. We combined electronic health record extraction with structured manual chart abstraction. Syncope was defined as an abrupt, transient, complete loss of consciousness with loss of postural tone, with rapid, spontaneous recovery, and presyncope as an abrupt, transient feeling of nearly fainting or losing consciousness as documented by the EM or consultant physician. Non-specific dizziness and light-headedness were not included. Categorization was confirmed by two abstractors and arbitrated, if needed, by a third. Proximal clots involved lobar or main pulmonary arteries. We defined PE Severity Index (PESI) Classes IV-V as higher risk. Massive PE had sustained sBP <90 mmHg over 15 minutes, received vasopressors or required CPR. Submassive PE were non-massive with elevated troponin, B-type natriuretic peptide, or right ventricular strain on echocardiogram. We estimated adjusted odds ratios (aORs) with 95%CIs for candidate predictors of 30d all-cause mortality, including (pre)syncope, proximal location, higher-risk PESI classes, and submassive or massive PE.

Results: Among 2,716 PE patients, 172 (6.3%) presented with (pre)syncope. Compared with their non-(pre)syncope counterparts, (pre)syncope patients more commonly had proximal emboli (68.6% vs 53.0%; p<0.0001), higher-risk PESI scores (52.9% vs 40.1%; p<0.001), massive PE (5.2% vs 0.6%; p<0.0001), submassive PE (51.7% vs 29.6%; p<0.0001), and 30d mortality (8.1% vs 3.8%; p<0.01). Only a higher-risk PESI class was an independent predictor of 30d mortality: aOR 9.5 (95%CI 5.4-16.6). Interaction terms between (pre)syncope and PESI, clot location and (sub)massive physiology were non-significant.

Conclusion: Two-thirds of PE patients with (pre)syncope had proximal clots. Neither (pre)syncope nor location were independent predictors of 30d mortality when adjusting for high-risk PESI classes.

59 Prevalence of Metabolic Syndrome in Patients With Venous Thromboembolism

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Background: Emergency physicians increasingly play a role in the diagnosis and treatment of venous thromboembolism (VTE). While emergency care providers are well aware that VTE accompanies chronic disease, fewer may be aware that metabolic syndrome (MetSyn) is associated with a hypofibrinolytic state, leading to increased treatment failure and VTE recurrence rate. Moreover, emergency-care initiated efforts (e.g., exercise, diet and drug treatments) can reduce this impact. Current data linking VTE with MetSyn are limited to retrospective analyses of small databases. The purpose of this study was to measure the prevalence of formal diagnosis of MetSyn and its defining components in VTE, utilizing a large statewide database.

Methods: We used the statewide Indiana Network for Patient Care (INPC) database. All patients with a diagnosis of VTE (based on ICD-9 or ICD-10 coding of either pulmonary embolism [PE] or deep vein thrombosis [DVT]) from 2005 to present were included in this query. We determined the frequency with which patients with the diagnosis of VTE also carried either a formal diagnosis of MetSyn (based on ICD coding) or the individual components of MetSyn, with a MetSyn diagnosis requiring at least 3 of the following criteria: hypertension, hyperlipidemia, glucose intolerance and obesity.

Results: Analysis included a total of 194,486 patients with VTE. Of the 68,331 patients with PE, 1,464 (2%) had a formal diagnosis of MetSyn based on ICD coding, while 19,188 (28%) met the criteria for MetSyn based on its individual components. Hypertension was the most common component of metabolic syndrome found concurrently in patients with PE, present in 66%, followed by hyperlipidemia (44%), glucose intolerance (30%) and obesity (27%). Comparatively, of the 155,225 patients with DVT, 2,629 (2%) had a formal diagnosis of MetSyn, while 36,543 (24%) met the criteria for MetSyn. Again, hypertension was the most common co-existing diagnosis in patients with DVT, occurring in 63%, followed by hyperlipidemia (39%), glucose intolerance (27%) and obesity (22%).

Conclusion: MetSyn is common with VTE, occurring in 28% of patients with PE and 24% with DVT, but is seldom diagnosed. These data support the need to recognize MetSyn in patients with VTE and proactively initiate appropriate therapies to reduce treatment failure and recurrence.

60 D-Dimer in Pediatric Pulmonary Embolism

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Background: In adults, D-dimer is used to aid clinicians in the diagnosis of pulmonary emboli (PE). D-dimer has not validated in pediatric patients and the role of D-dimer in evaluating pediatric patients for a PE is unknown. Avoidance of unnecessary radiation in pediatric patients is desirable in order to decrease the lifetime risk of malignancy. Clinicians must balance the risk of radiation with the desire not to miss a PE. D-dimer may be useful in this context. This study evaluates D-dimer assay in pediatric PE patients.