1005-191 Vascular Acoustic Emission Parameters Better Identify and Characterize Angioplasty-Induced Injury
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Background: We have previously demonstrated that atherosclerotic (ATH) arterial tissue emits sound (vascular acoustic emissions, VAE) as it undergoes mechanical disruption and that VAE can be used to distinguish plaque fracture from deleterious (dissection) events during balloon angioplasty (DA).

Purpose: To determine if time-domain analysis of VAE can be used to more accurately characterize BA events.

Methods: A ceramic piezoelectric transducer was mounted inside a test fixture. Porcine-human iliofemoral arteries (n=20) exhibiting varying degrees of ATH (normal, fatty streaks to diffuse fibrous plaques) were also mounted on the fixture and subjected to pressurization with saline to simulate BA. Simultaneous recordings of the pressure and VAE signal (amplified 150x) were digitized. Based on the pressure waveform, events in the VAE signal were classified as being due to an intimal tear (IT) or due to a dissection (DS) (sharp pressure drop) and confirmed pathologically. Each VAE signal was decomposed into its constituent events. Two time-domain parameters for each event were calculated - the rise time (T_r) and the event duration (T_d).

Results: Both T_r and T_d were able to distinguish dissections from intimal tears.

Conclusions: We have demonstrated that an acoustic emission sensor with time-domain signal analysis can be used to separate types of vascular injury and provides a convenient method for real-time monitoring and optimization of balloon angioplasty and stent placement.

1005-192 Cerebrovascular Accidents After Percutaneous Coronary Interventions: Incidence, Predictors, and Outcomes
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Background: Cerebrovascular accidents (CVA) following percutaneous coronary intervention (PCI) are rare but often devastating. We sought to identify the incidence, predictors, and clinical implications of in-hospital CVA in this setting.

Methods: We reviewed the data on 1,211,970 PCIs that occurred between May 1993 and May 2002 at William Beaumont Hospital. CVA was defined as a transient ischemic attack (TIA), ischemic stroke, or hemorrhagic stroke, or hemorrhagic stroke. The 336 patients that also underwent carotid endarterectomy were excluded. None of the excluded patients suffered a CVA prior to CABG. The remaining 31,059 PCIs comprised the study group. Clinical and angiographic characteristics, and in-hospital outcomes of patients who suffered a CVA were compared to those who did not.

Results: CVA occurred in 90 patients (0.3%). There were 59 (66%) ischemic strokes, 19 (21%) hemorrhagic strokes, and 12 (13%) TIA’s. Patients with CVA were older (70±12 versus 68±12 years, P=0.0001) and more likely to undergo PCI for urgent or emergent indications (88% versus 53%, P=0.0001). The strongest independent predictors of CVA were thrombectomy prior to PCI (OR 4.5, 95%CI 2.2-9.4, P=0.0001), heparin use before PCI (OR 3.9, CI 1.4-10.8, P=0.0005) or after PCI (OR 3.3, CI 1.1-10.5, P=0.001), low creatinine clearance (OR 1.14 per 10 ml/min decrease, CI 1.04-1.23, P=0.0082), and diabetes (OR 1.9, CI 1.2-3.1, P=0.006). Patients that suffered a CVA had a significantly higher rate of hospital mortality (28% versus 15.7%, P=0.001) and longer length of hospital stay (13±5 versus 3.3±2.5 days, P=0.0001). In a multivariate analysis, CVA was a strong independent predictor of in-hospital death (OR 8.06, CI 4.8-1.7, P=0.0001).

Conclusions: Rapid performance of Primary PCI in High Risk STEMI patients, although recommended by current AHA/ACC guidelines, has not been achieved in a majority of patients. Even within the High Risk group, times to treatment did not vary markedly among subsets of patients. Most disturbing was the minimal improvement over the past four years.

1005-210 Effect of Diabetes Mellitus on the Predictive Value of Myocardial Fractional Flow Reserve
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Background: Fractional flow reserve (FFR) < 0.75 correlates with positive stress tests. Diabetes (DM) is associated with microvascular dysfunction that can potentially create falsely high FFR.

Method: All patients undergoing FFR evaluation between 6/00 and 6/02 were included. Demographic and clinical data were collected by chart review. Quantitative angiographic analysis was performed independently. Clinical events were defined as death, MI, or target vessel revascularization (TVR).

Results: 156 patients were eligible for analysis. 30% had DM. Baseline demographic data were comparable between DM and non-DM patients except: more female patients in the DM than the non-DM group (48.9% vs. 31.9%; p=0.05) and increased hyperlipidemia in the DM group (75.6% vs. 60.9%; p=0.06). Percutaneous coronary intervention (PCI) was performed in close accordance with FFR. 97% of patients with FFR < 0.75 received PCI. 91% of patients with FFR > 0.75 UHU PCI. When FFR was < 0.75 and PCI performed accordingly, the follow up event rate was low in both groups (16.7% vs. 15.7%; p=NS). When FFR > 0.75 and PCI was not performed, DM patients had more minimal events (all TVR) than the non-DM patients (20% vs. 3.6%; p=0.005).

Conclusions: FFR > 0.75 in DM patients with moderate stenoses did not ensure good outcomes after conservative therapy to the same extent as in non-DM patients. This may reflect increased plaque instability or falsely elevated FFR in DM. A higher FFR threshold value for DM patients may be warranted.

1005-211 Trends in Door to Balloon Times Among High-Risk Patients Undergoing Primary Angioplasty
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Background: Long delays in performing Primary PCI (PPCI) in STEMI patients are associated with an increase in mortality. Current AHA/ACC guidelines define an optimal 'door to balloon' time of < 90 minutes for these patients.

Method: This study was designed to assess rate differences among STEMI patients who underwent PPCI within the 'early' or recommended time of <= 90 minutes and those 'late' patients treated > 120 minutes in interventional hospitals with cardiac surgery capability. Data from NRMI 4 was analyzed in 30,763 patients. High risk was defined as Systolic BP < 100 mmHg, Pulse > 100 bpm, Age > 75 years, anterior/septal location, Killip Class IV, TIMI or NRMI high risk score.

Results: Overall, less than one-third (32.2%) of high risk patients had a 'door-to-balloon' time within the recommended <=90 minutes. Moreover, just over half of patients (55.9%) had door to balloon times of <= 120 minutes.

Conclusions: Door to balloon times among high risk patients undergoing primary PCI varied from an average of 30.9 minutes to 120 minutes. This is consistent with current AHA/ACC guidelines and may reflect an increase in mortality in these patients. Treatment times should be further improved to reduce door to balloon times among high risk patients.