CAT Block 2, Eugene Kang

Comparison of the QRS Complex, ST-Segment, and T-Wave among Patients with Left Bundle Branch Block with and without Acute Myocardial Infarction

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Background: EKG's remain the fastest tool for the early diagnosis of AMI. LBBB's obscure the diagnosis of AMI due to discordance of the QRS complex, ST segment and T wave. Modified Sgarbossa criteria have a 91% sensitivity and 90% specificity for diagnosis of acute coronary occlusion in LBBB and has been validated with 80% sensitivity and 99% specificity. This study hypothesized that in pts with LBBB and AMI (STEMI or NSTEMI), patients with STEMI would have lower QRS voltage, concordant ST-elevation or concordant ST-depression of >=0.5 mm would be more sensitive than 1 mm without loss of specificity, non-concave ST-segment morphology would not be a sensitive or specific marker, and exhibit hyperacute T-waves more frequently than NSTEMI pts. Additionally they hypothesized that pts with NSTEMI and LBBB would more frequently have concordant T waves.

Methods: This was a multicenter retrospective study of data collected for derivation of the modified Sgarbossa criteria. The population consisted of pts who presented to the ED with LBBB and had symptoms suspicious for MI and had an EKG recorded at time of symptoms. STEMI group was defined as angiographically proven and peak 24 hour cardiac troponin I of >10. NSTEMI was defined pts with 24 h troponin I > 99% upper reference limit (1-0.6) in which angiogram did not show culprit lesion, a lesion was found without any signs of occlusions and a peak troponin I <10, or a current echo with no wall motion abnormality and a peak troponin I < 10. No MI group consisted of pts presenting to Hennepin County Medical Center ED with chest pain or dyspnea between Sept 2000 and Jun 2003 who had all 24 hour serial troponins below 99% upper reference limit and met inclusion criteria. The first EKG recorded was used for measurements.

Results: Among all the sites, 162 pts were included in the study. 33 pts had acute coronary occlusion. 27 had complete acute coronary occlusion on angiography. 6 had partial acute coronary artery occlusion with culprit lesion and troponin I > 10. There were 105 no-MI pts with negative serial troponins. 24 met criteria for NSTEMI. The sum of maximum deflection of QRS was smaller in pts with ACO than those without (101.5mm vs 132.5m; $p < 0.0001$) with a cutoff of < 99mm being 92% specific but only 33% sensitive. For ACO, any ST concordance >= 1mm was 95% specific and 73% sensitive. Any ST concordance >0.5mm was 70% specific and 94% sensitive. For ACO, non-concave ST-segment morphology was 91% specific and 55% sensitive. For NSTEMI, terminal T wave concordance had 49% specificity and 79% sensitivity.

Conclusion/Discussion: None of the criteria studied for the dx of any MI in LBBB were clinically useful because the prevalence of AMI (both STEMI and NSTEMI) in unselected LBBB patients is only around 7%. With such a low prevalence, a very high specificity is vital to a low positive predictive value. In this study when the terminal T-wave concordance (the most sensitive criterion for this study) was added to the modified Sgarbossa criteria for the diagnosis of MI, the sensitivity increased to 91% however the specificity decreased to 43%. While several criteria were quite specific or sensitive, none either alone or in combination outperformed the modified Sgarbossa criteria. Limitations of this study are that it is a retrospective study with relative small sample sizes. This is difficult to improve upon as AMI in a pt with a LBBB and symptoms suggestive of MI are rare. This is the largest study of its kind on an unselected cohort of proven coronary occlusion with LBBB. Ideally, this will be repeated as a larger multicenter retrospective or prospective in the future.