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## CASE REPORT

# ACUTE MYOCARDIAL INFARCTION WITH LEFT BUNDLE BRANCH BLOCK (LBBB): SIGNIFICANCE OF SGARBOSSA CRITERIA

Ayaz Hussain Shaikh, Bashir Hanif, Faiza Malik, Khursheed Hasan

### ABSTRACT

A middle aged female presented in emergency department with chest discomfort. Her old electrocardiogram (EKG) showed left bundle branch block (LBBB) signs. EKG performed in the emergency room revealed left bundle branch block with 4-6 mm discordant ST segment elevation in leads V1-V3 and 1mm concordant ST segment elevation in lead V4. Diagnosis of acute anterior wall STEMI was made based on Sgarbossa criteria. She underwent angiography which showed total occlusion of proximal left anterior descending artery which was stented. She had uneventful post-stenting course in hospital and was discharged. The case highlights the significance of Sgarbossa criteria which can be applied to diagnose acute myocardial infarction in the presence of LBBB so that prompt thrombolytic or primary angioplasty can be performed.

**Keywords :** Acute myocardial infarction, left bundle branch block, Electrocardiogram, Sgarbossa Criteria.

### INTRODUCTION

Left bundle branch block (LBBB) is the result of conduction block in left bundle of conduction system. Presence of LBBB is frequently associated with underlying organic heart disease including hypertension, coronary artery disease and cardiomyopathy. LBBB is associated with poor prognosis and long-term survival in patients with CAD. The Framingham study found that one half of patients with new LBBB died within 10 years.<sup>1</sup> Presence of LBBB obscures the typical EKG findings of acute myocardial infarction (AMI) which is an obstacle in the management of patients due to difficulty in making decision regarding reperfusion therapy. Various electrocardiographic criteria had been proposed to diagnose acute myocardial infarction in the presence of LBBB, out of which Sgarbossa criteria is the most sensitive and specific.<sup>2</sup> This criteria is not commonly used in clinical practice due to lack of awareness among the emergency physicians. The purpose of reporting this case is to emphasize the importance of applying Sgarbossa criteria to diagnose acute myocardial infarction

in the presence of LBBB.

### CASE REPORT

A female, 55 years of age, diabetic and hypertensive with family history of coronary artery disease presented in the emergency department with two hours history of retrosternal chest discomfort with radiation to jaws and left shoulder. She had history of vaginal hysterectomy for uterine fibroids two weeks back for which she had cardiac workup including echocardiogram and electrocardiogram that had shown left bundle branch block (LBBB) pattern ( Figure 1). On arrival in emergency department, she was haemodynamically stable, maintaining oxygen saturation at room air. She had no added heart sounds and her lungs were clear. Her electrocardiogram showed left bundle branch block with 4- 6 mm discordant ST segment elevation in leads V1-V3 and 1mm concordant ST segment elevation in lead V4 ( Figure 2). Diagnosis of acute anterior wall STEMI was made. She received chewable aspirin, sublingual nitrates, loaded with clopidogril, intravenous

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Department of Cardiology, Tabba Heart Institute, Karachi, Pakistan.

Correspondence: Dr. Faiza Malik, Research Assistant, Department of Cardiology, Tabba Heart Institute, Karachi, Pakistan.

E-mail: [phyzamalik@hotmail.com](mailto:phyzamalik@hotmail.com)

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heparin, beta blockers and was started on tirofiban infusion after double bolus with the intention of primary angioplasty. She responded well to initial treatment and her chest discomfort reduced by about 50%.

She underwent primary angioplasty within 120 minutes of her presentation to emergency department. The pre-procedure angiogram showed 100% occlusion in proximal left anterior descending artery. Successful angioplasty and stenting of proximal left anterior descending artery was performed and TIMIT III flow was achieved. Her post stenting electrocardiogram showed narrow complex morphology with deep symmetrical T wave inversion in precordial leads with reciprocal changes in inferior leads (Figure 3). She had subsequent uneventful course and was discharged.

## DISCUSSION

The evolution of reperfusion therapy in the treatment of acute myocardial infarction (AMI) has highlighted the extraordinary importance of rapid and accurate diagnosis of infarcts due to thrombosis of a major epicardial vessel.<sup>3</sup> The presence of AMI can be established by a wide variety of diagnostic tests, but the narrow temporal window for significant myocardial salvage with reperfusion dictates that the clinical presentation and the 12-lead ECG remain the principal tools available to make the decision about reperfusion therapy.<sup>4</sup>

Classical electrocardiographic changes in transmural infarction include ST segment elevation >1 mm in contiguous leads however development of new left bundle branch block (LBBB) or well described changes in patient with pre-existing LBBB can also establish the diagnosis of transmural myocardial infarction and stratify patients with acute coronary syndrome who can benefit from immediate reperfusion strategies.<sup>5</sup> With LBBB, the course of ventricular activation is altered which secondarily affects ventricular repolarization. The QRS, ST-segment and T wave of the EKG are always affected by LBBB and the early signs of transmural infarction will be obscured by the changes due to the conduction abnormality.

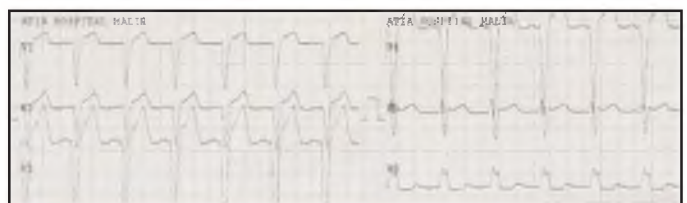
Multiple studies have evaluated the ability to diagnose AMI when LBBB is present.<sup>6</sup> The work of Sgarbossa et al. is instructive in this regard. They developed diagnostic

criteria for transmural infarction when LBBB was present using data from the GUSTO-1 Trial (the derivation or training sample) and from a control population with LBBB and stable ischemic heart disease (the validation sample). Three ECG criteria based on ST segment displacement were found to have independent diagnostic value.<sup>6</sup>

**Table 1:** Scores for independent electrocardiographic criteria

| CRITERION   | Score |
|---|-------|
| ST-segment elevation ≥1 mm and concordant with QRS complex                              | 5     |
| ST-segment depression ≥1 mm in lead V <sub>1</sub> , V <sub>2</sub> , or V <sub>3</sub> | 3     |
| ST-segment elevation ≥5 mm and discordant with QRS complex                              | 2     |

Electrocardiographic score of 3 is used to diagnose acute myocardial infarction and 2 is suspicious for AMI (Table-1). The criteria is highly specific, a total score of 3 or more provide specificity of 96% for diagnosis of acute myocardial infarction in presence of left bundle branch block.<sup>2</sup> A meta analysis of studies on Sgarbossa criteria concluded that interobserver agreement was good-excellent, patients with Sgarbossa score of 3 have a moderate-high positive likelihood ratio (PLR) and likely to have acute myocardial infarction. Sgarbossa score 2 is less specific with less PLR and a score less than 2 does not rule out AMI.<sup>7</sup> In this case Sgarbossa score was 7 providing high specificity for diagnosis of acute myocardial infarction which was confirmed by raised cardiac markers and finding of angiogram. This emphasizes the practical utility of these criteria which can be used to guide management in cases with AMI in the presence of LBBB and high Sgarbossa score.



**Figure 1:** Baseline electrocardiogram of the patient.

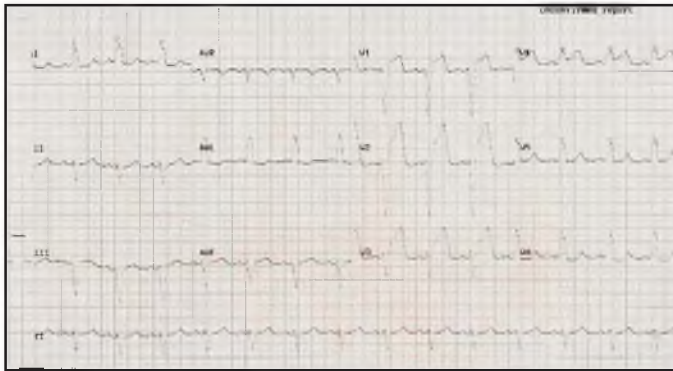


Figure 2: Electrocardiogram on arrival in emergency department



Figure 3: Electrocardiogram post primary angioplasty.

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