CASE PRESENTATION

A case study of 70 year old male patient with a history of long standing diabetes mellitus (DM), hypertension, dyslipidemia, peripheral vascular disease, severe ischemic cardiomyopathy with LV ejection fraction of 20% and a left bundle branch block. He presented to the ER complaining of retrosternal chest pain for less than 6 hours associated with shortness of breath, orthopnea and diaphoresis. No paroxysmal nocturnal dyspnea or leg swelling.

His medication used at home were aspirin 81 mg, carbidol 12.5 mg twice daily, Lisinopril 5 mg daily, Lasix 60 mg daily, Lipitor 20 mg daily and spironolactone 12.5 mg.

On exam, he was diaphoretic, distressed and in pain; his blood pressure was 93/60 mmHg. His heart rate was 65 pbm – regular; jugular venous pressure was elevated. His cardiovascular examination showed normal S1, reverse splitting of S2 and soft systolic murmur at the apex (grade 2/6) radiating to the axilla. His chest exam revealed crackles that are less than 25% of his lung. The rest of his examination was unremarkable. His immediate electrocardiogram (ECG) is shown below (Figure 1).

The on call doctor arranged another ECG to help him in the diagnosis (Figure 2).

Questions
1) What abnormalities are seen in the first ECG (Figure 1)
2) What’s different about the second ECG and what abnormalities it reveals?
3) What is the diagnosis?

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ANSWERS AND FOLLOW UP OF THE PATIENT

1) Figure 1 showing ECG at presentation with 2 mm concordant ST depression in leads V1-V2 and the 1 mm ST elevation in lead III and aVF in the setting of LBBB.

2) Figure 2 showing right sided ECG with ST elevation in lead V4R suggesting the right ventricular infarction.

3) His immediate electrocardiogram (Fig. 1) demonstrated acute inferior myocardial infarction in the presence of existing LBBB based on Sgarbossa’s criteria\(^3\) (Table 1). Right sided ECG showed ST elevation in V4R suggesting right ventricular extension (Fig. 2).

He was commenced on (t-PA) within 15 min from presentation as this is the mode of reperfusion therapy available in the hospital (non cath-lap based hospital), in addition to plavix loading dose and aspirin. Later he was started on low molecular weight heparin.

IV fluid boluses were given to support his hemodynamics and blood pressure which was deteriorating. He was intubated electively and started on inotropic support.

Bedside echocardiography revealed global hypokinesia. A dilated left ventricle with left ventricular ejection fraction of 10% was revealed. His right ventricle was severely hypokinetic, moderate mitral regurgitation. No mechanical complication noted.

His Troponin-I came back at 177 mg/ml suggesting acute infarction of at least 4-6 hrs.

Patient was considered extremely high risk. He continued to receive full support short of invasive intervention; he however, continued to deteriorate. He later developed asystolic cardiac arrest. All measures to revive him were futile. He died within 4 hrs from presentation.

DISCUSSION

The optimal use of coronary perfusion therapies depends on a rapid diagnosis of evolving myocardial infarction\(^1,2\). Electrocardiogram is a powerful tool in aiding in the quick diagnosis of the cause of chest pain and selecting the appropriate therapy\(^2\).

The pre-existence of left bundle-branch block (LBBB) in the electrocardiogram may conceal the changes of acute myocardial infarction, which can delay both its recognition and treatment\(^3\). The proportion of patients with LBBB and acute chest pain having an acute myocardial infarction in different studies has been as low as 13 to 32 percent, with a lower incidence in community-based studies compared to clinical trials.
The presence of LBBB in patients with acute myocardial infarction is associated with an increased risk of complications and death[4]. When it is new, LBBB is correlated with the occlusion of the proximal left anterior descending artery and a large amount of jeopardized myocardium[5]. On the other hand, a prior LBBB is a powerful marker of depressed left ventricular systolic function[6,7] and any additional loss of myocardium is likely to result in cardiogenic shock.

In clinical practice, the diagnosis of acute MI may be hindered by the presence of bundle-branch block (BBB), particularly LBBB; therefore, patients with BBB may be less likely to receive standard reperfusion therapy. In an attempt to assist the clinician in this challenging presentation, Sgarbossa et al.[3] have developed a clinical prediction rule to assist in the ECG diagnosis of acute myocardial infarction in the setting of LBBB using specific ECG findings. These investigators analyzed numerous abnormalities previously reported to be suggestive of AMI. He also found 3 specific ECG criteria that were independent predictors of AMI superimposed on LBBB. Furthermore, they devised a probability score for the diagnosis of AMI in the patient with LBBB. The ECG criteria suggestive of AMI with probability score.

**Include:**

1. ST elevation of greater than 1 mm in at least 1 lead, concordant with the QRS complex (score of 5).
2. ST-segment depression of greater than 1 mm in leads with predominantly negative QRS, limited to leads V1, V2, or V3 (score of 3).
3. ST elevation of at least 5 mm, discordant with the QRS complex (score of 2).

Minimal score of 3 was required for a specificity of 90 percent. However, the third criteria requires further validation, since a high take-off of the ST segment in leads V1 to V3 has been described with uncomplicated LBBB, particularly if there is underlying left ventricular hypertrophy. In a sub-study from the ASSENT 2 and 3 trials, the third criteria added little under the left ventricular hypertrophy. In a sub-study from the ASSENT 2 and 3 trials, the third criteria added little.

Validations of Sgarbossa’s criteria have had variable results[8-18]. A meta-analysis of these studies (abstract and poster, but unpublished), found that 2 points or more is 42% sensitive and 87% specific for AMI[19]. These studies have generated considerable debate[1,20]. The American Collegeof Cardiology and American Heart Association guideline for the treatment of AMI has previously recommended reperfusion therapy for patients with chest pain and new, or presumably new, LBBB[21]. However, the updated version gives no specific recommendation; rather, it suggests using the Sgarbossa’s criteria.

**CONCLUSION**

Patients with pre-existing LBBB presenting with acute ischemic chest pain may pose a diagnostic challenge which can delay the diagnosis and management. ECG based diagnostic criteria can help in ascertaining the diagnosis in a timely manner.

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