

## Yasser's Criterion of Inferior ST-Segment Discrepancy Deviations in AF with Aberrancy and Sgarbosa Criteria-A New Cardiovascular Discovery and Management

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### Abstract

**Rationale:** Diagnosis of ST-segment elevation myocardial infarction in the presence of left bundle branch block (LBBB) is a challengeable and infarction equivalent. Therefore, the intravenous infusion of thrombolytic may be a crucial step. Emergent Sgarbosa criteria and their modification are guided advantageous guide keys. Atrial fibrillation represents the risk of arrhythmia in the presence of a left bundle branch block. Interestingly, the presentation of myocardial infarction with atrial fibrillation and left bundle branch block has a risk impact on both morbidity and mortality of patients.

**Patient Concerns:** A middle-aged married Painter heavy smoker Egyptian male patient was admitted to the intensive care unit with acute chest pain with rapid atrial fibrillation and left bundle branch block.

**Diagnosis:** Left bundle branch block with atrial fibrillation and inferior Yasser's criterion (Discrepancy criteria) ST-segment deviations as a new description in suspected acute myocardial infarction.

**Interventions:** Electrocardiography, oxygenation, streptokinase IV infusion, and echocardiography.

**Outcomes:** Gradual dramatic clinical and electrocardiographic improvement but still atrial fibrillation and left bundle branch block had happened.

**Lessons:** Yasser's criterion (Discrepancy criterion) is a new descriptive criterion for atrial fibrillation with aberrancy (atrial fibrillation and left bundle branch block). It is characterized by discrepant inferior ST-segment deviations with ST-elevation in III and aVR leads with ST-depression in II and aVF leads. It is an unknown mechanism. Both inferior infarctions of a single lead and pulmonary embolization are possible associations. It may be interpreted as accompanied by severe specific ischemic myocardial insult. Future wide-research studies for Yasser's criterion (Discrepancy criterion) for sensitivity and specificity will be recommended.

**Keywords:** Yasser's criterion, Discrepancy criterion, Aberrancy, Left bundle branch block, Atrial fibrillation, Arrhythmia, Sgarbosa criteria, Myocardial infarction.

### Introduction

Diagnosis of ST-segment elevation myocardial infarction in the presence of left bundle branch block (LBBB) is a challengeable and infarction equivalent. Sgarbosa's criteria were initially very feeble. With time, these criteria became strongly indicating acute ST-segment elevation myocardial infarction (STEMI) (Elsayed, 2021). Sgarbosa et al. suggested a score of > 3 points in the next criteria for the diagnosis of acute myocardial infarction (AMI) in the existence of LBBB: (1) concordant ST-segment elevation of 1 mm (0.1 mV) in at least 1 lead (5 points), (2) concordant ST-segment depression of at least 1 mm in leads V1 to V3 (3 points), or

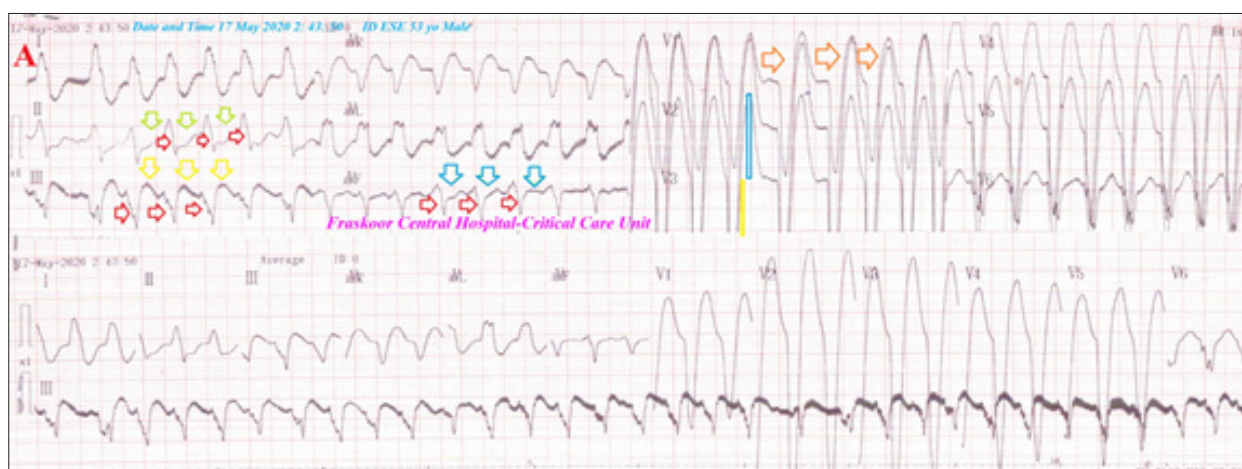
(3) excessively discordant ST-segment elevation, defined as greater than or equal to 5 mm of ST-segment elevation when the QRS result is negative (2 points) (Sgarbosa et al., 1996). A modified Sgarbosa rule (Meyers et al., 2015) has been proposed for the diagnosis of AMI in the presence of LBBB. An interesting point regarding this rule is the substitution of the third Sgarbosa element (excessively discordant ST-segment elevation as defined by 5 mm of ST-segment elevation in the setting of a negative QRS) with one defined proportionally by ST-segment elevation to S-wave depth (ST/S ratio) was proposed to have better diagnostic utility for STEMI

equivalent (Smith et al., 2012). LBBB is a common condition in clinical cardiovascular. Suspected AMI in the setting of LBBB presents an unparalleled diagnostic and therapeutic challenge to the clinician. The diagnosis is especially difficult due to electrocardiographic (ECG) changes caused by altered ventricular depolarization. LBBB concerning acute STEMI is very important. Yasser et al. (2019) (Elsayed, 2021) reported a case of LBBB with thereafter developed acute STEMI that was indicating for thrombolytic therapy. The prevalence of atrial fibrillation (AF) is higher in patients with bundle branch block (BBB) than without BBB1. There is no significant impact on mortality rate or length of hospital stay (Khan et al., 2021). Wide-QRS complex due to LBBB is a significant risk factor for systolic heart failure (SHF) and AF (Cho et al., 2010). Cardiac resynchronization therapy (CRT) with using of an implantable cardiac device (ICD) may provide clinical benefits for patients with LBBB (Prinzen et al., 2013). Intraventricular conduction disorders (IVCD), such as LBBB, are usually stable and remain unchanged, irrespective of heart rate. However, in some patients, LBBB may vary with heart rate, and during episodes of AF, aberrant ventricular conduction, or wide-QRS complex tachycardia (WQT), known as Ashman beats, can occur (Singla et al., 2013; Hasebe, 2018).

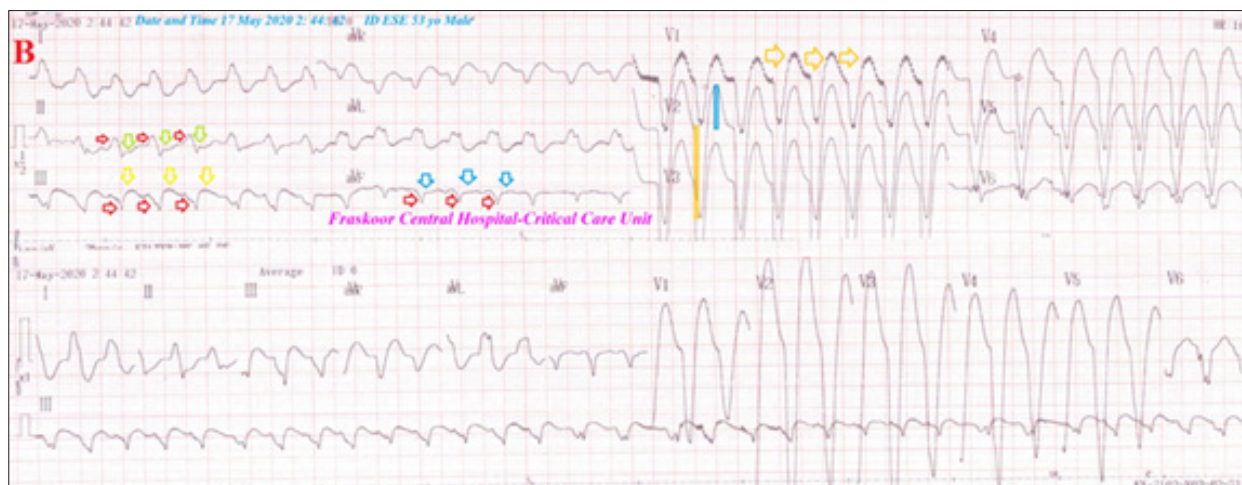
### Case Presentation

A 53-year-old married Painter heavy smoker Egyptian male patient presented to the Emergency Department (ED) with acute severe chest pain and palpitations for about 12 hours. Vomiting and profuse sweating were associated symptoms. Chest pain was anginal. The patient gave a recent history of psychosocial stress. Informed consent was taken. Upon general physical examination; generally, the patient was sweaty, pale, and distressed, with an irregular pulse rate VR of 165, blood pressure (BP) of 140/70 mmHg, respiratory rate of 20 bpm, a temperature of 36 °C, and pulse oximeter of oxygen (O<sub>2</sub>) saturation of 94%. He seemed thin and long. No more relevant clinical data were noted during the clinical examination. The patient was admitted to the ICU with angina, LBBB, and AF. Initially, he was treated with O<sub>2</sub> inhalation (100%, by nasal cannula, 5L/min). Pethidine HCL 100mg is given on

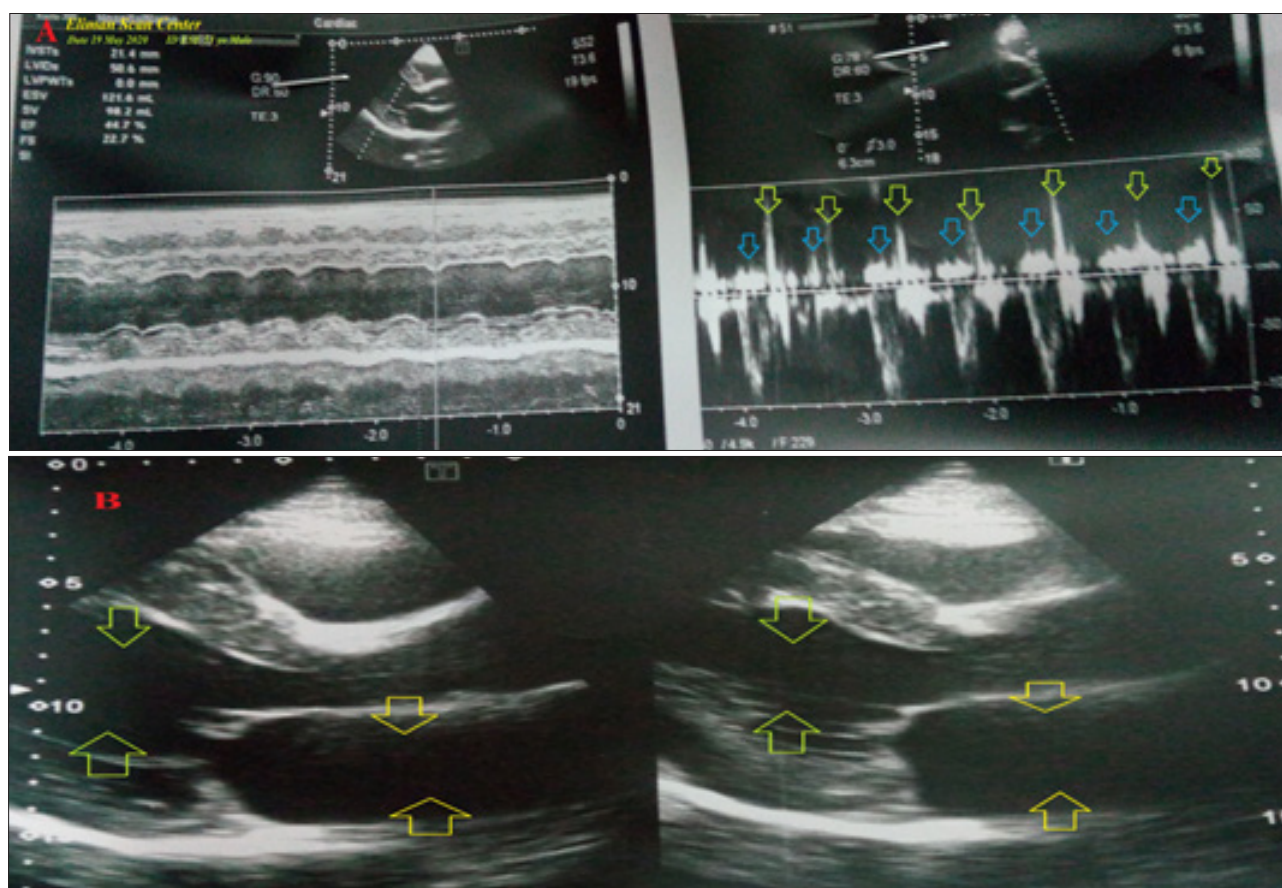
intermittent IV doses. Intravenous nitroglycerin infusion (5µg/min with intermittent titration) was given. SC enoxaparin 80 mg, BID), aspirin 4 chewable oral tablet (75mg, then OD), clopidogrel 4 oral tablet (75mg, then OD), streptokinase IVI (1.5 mu over 60 minutes), amiodarone IVB (150 mg; 2 amp over 20 minutes), and atorvastatin tablets (20mg, OD) were added. The troponin test had become positive (41 ng/dl). The initial complete blood count (CBC); Hb was 14 g/dl, RBCs; 4.1\*10<sup>3</sup>/mm<sup>3</sup>, WBCs; 18. \*10<sup>3</sup>/mm<sup>3</sup> (Neutrophils; 70.3%, Lymphocytes: 27.7%, Monocytes; 1%, Eosinophils; 1% and Basophils 0%), and Platelets; 154\*10<sup>3</sup>/mm<sup>3</sup>. RBS was; 192 mg/dl. Serial ECG tracings were done. The initial ECG was done on the initial presentation showing LBBB with AF (of VR; 165). There is discordant ST elevation > 5 mm with increased ST-segment elevation to S-wave (ST/S ratio) in anterior leads (V1, 2, and V3). There is discordant ST-segment depression in lead II, discordant ST-segment elevation in lead III, and concordant ST-segment depression in lead aVF (Figures 1A and 1B) Echocardiography was done on three days of the ICU admission showing low EF (44%), generalized myocardial hypokinesia, diastolic dysfunction, dilated both left atrium, and left ventricle (Figures 2A and 2B). ECG tracing was done within 24 hours of the ICU within about 23 hours of streptokinase, IVI showing LBBB with AF (of VR; 91). There is discordant ST-segment elevation > 5 mm with increased ST-segment elevation to S-wave (ST/S ratio) in anterior leads (V1, 2, and V3). There is discordant ST-segment depression in lead II, discordant ST-segment elevation in lead III, discordant ST-segment elevation in the aVR lead, and concordant ST-segment depression in lead aVF (Figures 3A and 3B). Atrial fibrillation with left bundle branch block and suspected acute myocardial infarction was the most probable diagnosis. Within 24 hours of the above management, the patient finally showed nearly clinical and heart rate improvement. The patient was continued on captopril tablet (25 mg twice daily), aspirin tablet (75 mg, once daily), clopidogrel tablet (75 mg, OD), nitroglycerin retard capsule (2.5 mg BID), ), amiodarone tablets (200 mg; BID), and atorvastatin (40 mg OD) in the ICU and on discharged on the 5<sup>th</sup> day. Planning for cardiac resynchronization therapy was the option with future cardiac follow-up.



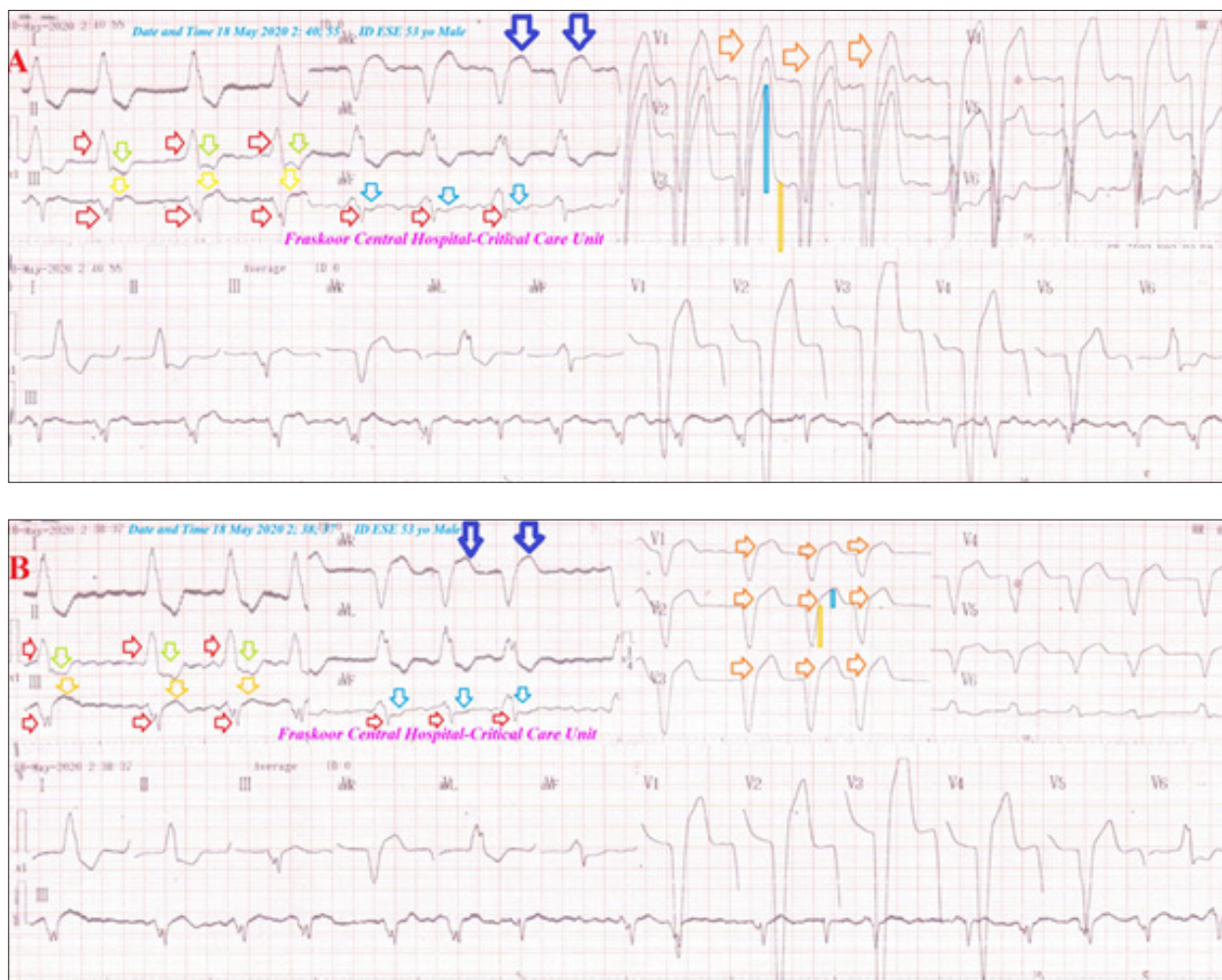




**Figure 1:** ECG tracing-1A with full calibration was done on the initial presentation showing LBBB with AF (of VR; 165). There is discordant ST elevation > 5 mm in anterior leads (V1, 2, and V3) (orange arrows), with increased ST-segment elevation (blue rectangle) to S-wave depth (golden rectangle) (ST/S ratio) in anterior leads (V1, 2, and V3). There is discordant ST-segment depression in lead II (lime and red arrows), discordant ST-segment elevation in lead III (golden and red arrows), and concordant ST-segment depression in lead aVF (blue and red arrows). ECG tracing-1B with halve calibration was done within one minute of the initial presentation showing the above changes but with minimization to the halving.



**Figure 2:** Echocardiography was done on three days of the ICU admission 2A. Echo images of M- mode and Doppler showing low EF (44%) and diastolic dysfunction (lime and blue arrows) 2B. Echo images of 2D-mode showing dilated both left atrium (yellow arrows) and left ventricle (lime arrows).



**Figure 3:** ECG tracing-3A with full calibration was done within 24 hours of the ICU within about 23 hours of streptokinase, IVI showing LBBB with atrial fibrillation (of VR; 91). There is discordant ST elevation > 5 mm in anterior leads (V1, 2, and V3) (orange arrows), with increased ST-segment elevation (blue rectangle) to S-wave depth (golden rectangle) (ST/S ratio) in anterior leads (V1, 2, and V3). There is discordant ST-segment depression in lead II (lime and red arrows), discordant ST-segment elevation in lead III (golden and red arrows), discordant ST-segment elevation in the aVR lead (dark blue arrows), and concordant ST-segment depression in lead aVF (light blue and red arrows). ECG tracing-3B with the one-fourth calibration was done within 3 minutes before the above ECG tracing showing the same above changes of VR; 85 but with minimization to the fourth.

## Discussion

### Overview

A middle-aged married Painter heavy smoker Egyptian male patient was admitted to the intensive care unit with acute anginal chest pain with atrial fibrillation and left bundle branch block.

The primary objective for my case study was the presence of acute anginal chest pain with the AF and LBBB in the admitted ICU patient.

The secondary objective for my case study was the question; how did you manage the case?

There was a history of acute angina in newly diagnosed LBBB with a positive troponin test suggestive of acute myocardial infarction.

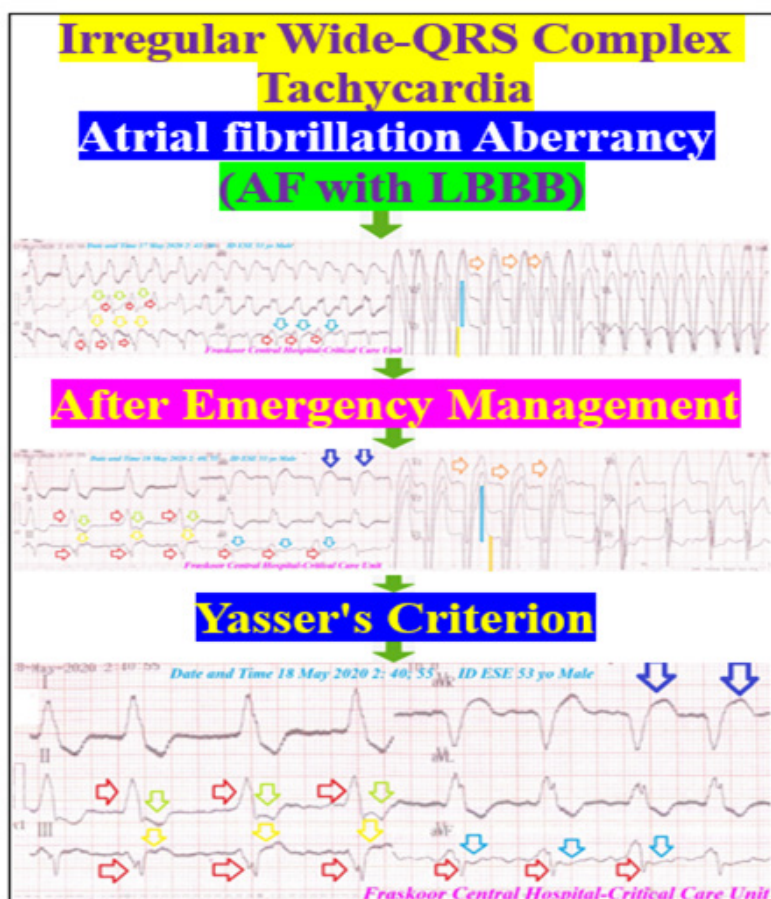
The electrocardiographic Sgarbossa criterion of LBBB of

an excessively discordant ST-segment elevation, defined as greater than or equal to 5 mm of ST-segment elevation when the QRS result is negative (2 points) the only present criterion. The presence of a modified Sgarbossa rule of ST-segment elevation to S-wave depth (ST/S ratio) was proposed to have better diagnostic utility for STEMI equivalent will strengthen the diagnosis of AMI.

The presence of diverse inferior ST-segment deviations is newly described as an unknown mechanism.

“Yasser’s Criterion” is a newly described criterion in atrial fibrillation with aberrancy (atrial fibrillation and left bundle branch block). It is characterized by discrepant inferior ST-segment deviations with ST-elevation in III and aVR leads with ST-depression in II and aVF leads. It is an unknown mechanism. Both inferior infarctions of a single lead and pulmonary embolization are possible associations. It may be interpreted as accompanied by severe specific ischemic myocardial insult (Figure 4).





**Figure 4:** Showing the author caricaturing a graphical presentation of Yasser's criterion.

The delayed presentation of the acute chest pain post-12 hours may interpret the current cardiomyopathy.

There is a Wide-QRS complex tachycardia due to AF with LBBB is a significant risk factor for systolic heart failure (SHF) and AF (Cho et al., 2010).

Cardiac resynchronization therapy with using of an implantable cardiac device is a future suggested therapy (Prinzen et al., 2013).

Wide-QRS complex tachycardia due to LBBB with pre-excitation was the most probable electrocardiographic differential diagnosis for the current case study. But there is no delta-wave of white Parkinson white syndrome.

I can't compare the current case with similar conditions. There are no similar or known cases with the same management for near comparison.

The only limitation of the current study was the unavailability of coronary angiography.

### Conclusion and Recommendations

Yasser's criterion "Discrepancy criterion" is a new descriptive criterion for atrial fibrillation with aberrancy (atrial fibrillation and left bundle branch block).

It is characterized by discrepant inferior ST-segment deviations with ST-elevation in III and aVR leads with ST-depression in II and aVF leads.

It is an unknown mechanism. Both inferior infarctions of a single lead and pulmonary embolization are possible associations. It may be interpreted as accompanied by severe specific ischemic myocardial insult.

Future wide-research studies for Yasser's criterion (Discrepancy criterion) for sensitivity and specificity will be recommended.

### Conflicts of Interest

There are no conflicts of interest.

### Acknowledgment

I wish to thank the nurse team of the intensive care unit in Fraskoor Central Hospital to give me extra copies of the ECG to help me.

### Abbreviations

AMI : Acute myocardial infarction  
AF : Atrial fibrillation  
CBC : Complete blood count  
ECG : Electrocardiography  
ICU : Intensive care unit  
IV : Intravenous  
LBBB : Left bundle branch block

O<sub>2</sub> : Oxygen  
 SGOT : Serum glutamic-oxaloacetic transaminase  
 SGPT : Serum glutamic-pyruvic transaminase  
 STEMI : ST segment elevation myocardial infarction  
 VR : Ventricular rate

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