



## CASE REPORT

# ST-segment elevation myocardial infarction mimic and Passing phenomenon or Yasser's phenomenon with squaring sign; don't hurry for an emergency management; A case report

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### Abstract

**Rationale:** The ST-segment elevation myocardial infarction has been considered one of the most momentous cardiovascular disorders. Dynamic changes during an electrocardiographic registration are well-established alterations. There is wide-differentiation for ST-segment elevation. The new Passing phenomenon (Yasser's phenomenon) is a group of fleeting electrocardiographic dynamic changes. These changes are extemporaneously reversed within a few seconds to a few minutes without any medical interventions. They were commonly reported initially as an abnormal diagnosis by cardiologists. The changes are unusual taking the opposite normal side. They may be passing as physiological or even transient changes. **Patient concerns:** A 48-year-old married, female, Egyptian teacher patient presented to the emergency department with palpitations and paroxysmal supraventricular tachycardia. **Diagnosis:** The ST-segment elevation myocardial infarction mimic and the Passing phenomenon (Yasser's phenomenon) after paroxysmal supraventricular tachycardia. **Interventions:** Electrocardiogram, oxygenation, echocardiography, and verapamil intravenous injection. **Outcomes:** A spontaneously dramatic recovery of electrocardiographic changes without clinical impact. **Lessons:** Don't hurry for the emergency management Passing phenomenon (Yasser's phenomenon) which is associated with squaring sign until an accurate well-established evaluation. *Differential diagnosis* is very important. Reassurance and follow up is the keystone in the management.

Keywords: ST-segment elevation myocardial infarction mimic, Passing phenomenon or Yasser's phenomenon, Technical default, Squaring sign

## 1 | INTRODUCTION

ST-segment elevation myocardial infarction (STEMI) is the most emergency manifestation

of ischemic heart disease. It has great morbidity and mortality. Indeed, A total thrombotic coronary occlusion in STEMI is often caused by an atherosclerotic plaque in an epicardial coronary vessel. Early diagnosis and prompt reperfusion intervention are the most choice ways to limit myocardial ischemia and infarct size and thereby reduce the risk of post-STEMI complications and heart failure (1). The current 2018 clinical definition of myocardial infarction (MI) requires the confirmation of the myocardial ischemic injury with abnormal cardiac biomarkers (2). It is a clinical syndrome involving myocardial ischemia, ECG changes, and chest pain (3). Other pathologies that can cause ST-segment elevations include: myocarditis, pericarditis, Takotsubo cardiomyopathy, benign early repolarization (BER), Coronary artery spasm (CAS), spontaneous coronary artery dissection, left bundle branch block (LBBB), channelopathies, and electrolyte imbalance (3). The American College of Cardiology (ACC), American Heart Association (AHA), European Society of Cardiology (ESC), and the World Heart Federation committee (WHC) established the following ECG criteria for STEMI (4):

(A). New ST-segment elevation at the J point in 2 contiguous leads with the cutoff point as greater than 0.1 mV in all leads other than V2 or V3

(B). In leads V2-V3 the cutoff point is greater than 0.2 mV in men older than 40 years old and greater than 0.25 in men younger than 40 years old, or greater than 0.15 mV in women.

**Dynamic alterations during an ECG registration** are well-established frequent physiological and electrical changes. These changes were usually interpreted and misdiagnosed initially by cardiologists despite they are exceptionally taking the way of

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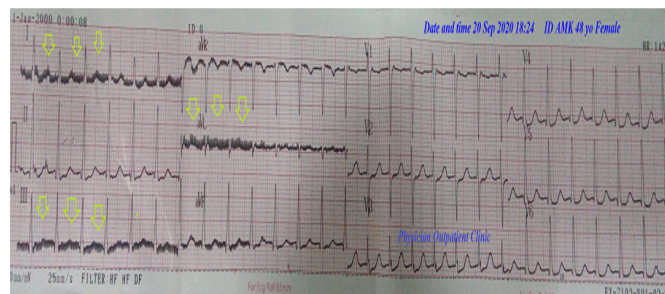
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the normal side. These changes may be passing as transient physiological or even electrical changes (5). The new **"Passing phenomenon"** or (Yasser's phenomenon) is a transient ECG change that spontaneously reversed within a few seconds to a few minutes without any medical interventions and apparent hemodynamic impact. Reassurance is the prompt therapeutic option (5). An ECG dynamic change with their urgent conversion from abnormal to normal way without any medical interference is the key to the new phenomenon (5).

## 2 | 2. CASE PRESENTATIONS

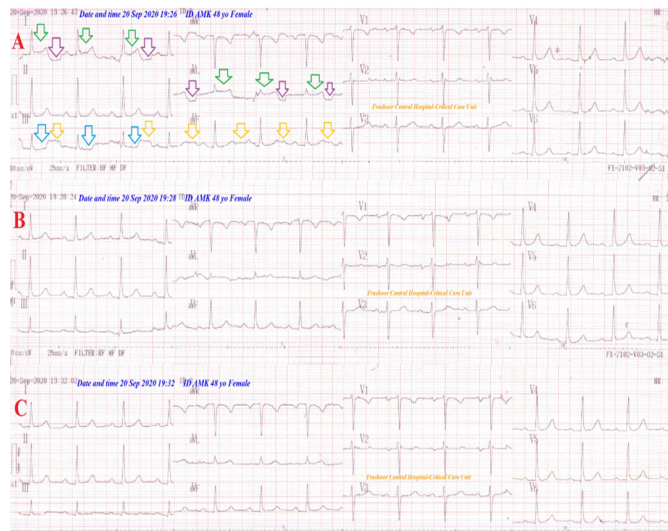
A 48-year-old married, female, Egyptian teacher patient presented in the emergency department with palpitations and dizziness. The profuse sweating was the only associated symptom. The patient gave a history of recurrent episodes of paroxysmal supraventricular tachycardia. He denied a history of other cardiovascular diseases or other special habits. Upon general physical examination; generally, the patient was irritable, severe sweaty, had cold extremities, with a regular heart rate of 140 bpm, blood pressure of 150/90 mmHg, respiratory rate of 20 bpm, the temperature of 36.4 °C, and pulse oximeter of O<sub>2</sub> saturation of 96%. No more relevant clinical data were noted during the clinical examination. An initial Emergency presentation ECG tracings showing regular tachycardia with typical PSVT of VR; 142 bpm. There are AC artifacts in the leads I, III, and aVL (**Figure 1**).



**FIGURE 1:** An initial Emergency presentation ECG tracings showing regular tachycardia with typical PSVT of VR; 142 bpm. There are AC artifacts in the leads I, III, and aV (lime arrows).

He was admitted to the ICU with paroxysmal supraventricular tachycardia and hypertension. *The patient was already connected to the ICU monitor for vitals and O<sub>2</sub> saturation follow up.* Unfortunately,

Valsalva maneuvers were tried with no response. Oxygen inhalation (5 L/min) was given. One verapamil hydrochloride amp 5mg was taken by IV bolus over 2 minutes. Serial ECG tracings in ICU **A. tracing** was taken within 10 minutes after verapamil injection showing normal sinus rhythm of VR;74 bpm with ST-segment elevations in high lateral leads (I and aVL) and ST-segment depressions in the single inferior lead (III). There are atypical square T-P-segment elevations in two inferior leads (II and III) atypical square T-P-segment depressions in the high lateral lead (aVL) (**Figure 2A**). **B. tracing** was taken within 2 minutes after A. tracing showing NSR of VR;75 bpm with spontaneous resolution of the above ST-elevations and ST-depressions in the above-affected leads in figure 2A (**Figure 2B**). **C. tracing** was taken within 6 minutes after A. tracing showing NSR of VR;73 bpm with the same of B. tracing (**Figure 2C**). The initial workup lab was; Immediate ABG and electrolytes profile was (PH;7.37 mmHg, PCO<sub>2</sub>;40.6 mmHg, HCO<sub>3</sub>;23.9 mmHg, SO<sub>2</sub>; 97%, and PaO<sub>2</sub>; 94 mmHg), the measured random blood sugar; 96 mg /dl, full blood count (FBC); (Hb was 13.1 g/dl, RBCs; 5.02\*10<sup>3</sup> /mm<sup>3</sup>, WBCs; 6.3\*10<sup>3</sup> /mm<sup>3</sup> (neutrophils 64.5 %, lymphocytes: 29.1%, monocytes; 6.4%), platelets; 212\*10<sup>3</sup> /mm<sup>3</sup>), liver enzymes; SGPT was;22 U/L, SGOT was; 26 U/L, kidney function tests were normal; serum creatinine (0.9 mg/dl), blood urea (18 mg/dl), plasma sodium was (137 mmol/L), serum potassium was (4.8 mmol/L), serum ionized calcium (1.22 mmol/L). The serial troponin tests were negative (less than 0.001 ng/L). Later echocardiography was normal with EF 66%. No more workup was done. ST-segment elevation myocardial infarction mimic and Passing phenomenon (Yasser's phenomenon) after PSVT with technical default was **the most probable diagnosis**. The patient was discharged within 12 hours after clinical relieving and electrocardiographic normalization. Oral long-acting verapamil tablet was prescribed on discharge. Planning for the future electrophysiological study was recommended.



**FIGURE 2:** Serial ECG tracings in ICU **A. tracing** was taken within 10 minutes after verapamil injection showing normal sinus rhythm of VR;74 bpm with ST-segment elevations in high lateral leads (I and aVL; green arrows) and ST-segment depressions in the inferior lead (III; blue arrows). There are atypical square T-P-segment elevations in the inferior leads (II, and III; golden arrows) atypical square T-P-segment depressions in the high lateral lead (aVL; purple arrows). **B. tracing** was taken within 2 minutes after A. tracing showing NSR of VR;75 bpm with spontaneous resolution of the above ST-elevations and ST-depressions in the above-affected leads (figure 1A). **C. tracing** was taken within 6 minutes after A. tracing showing NSR of VR;73 bpm with the same of B. tracing.

### 3 | 3. DISCUSSION

- **Overview:** A 48-year-old married, female, Egyptian teacher patient presented to the emergency department with palpitations and paroxysmal supraventricular tachycardia. ST-segment elevations and the Passing phenomenon (Yasser's phenomenon) had happened with a dramatic spontaneous recovery.
- **The primary objective** for my case study was the presence of paroxysmal supraventricular tachycardia, ST-segment elevations, and the Passing phenomenon (Yasser's phenomenon).
- **The secondary objective** for my case study was the management of the paroxysmal supraventricular tachycardia, ST-segment elevations, and Passing phenomenon (Yasser's phenomenon).

- **Study question here;** How did differentiate for all ST-segment elevation from technical default?
- ST-segment elevation in high lateral leads (I and aVL) and ST-segment depressions in the inferior lead (III) had taken an atypical picture.
- The dramatic spontaneous rapid recovery of both above ST-segment elevation in high lateral leads (I and aVL) and reciprocal ST-segment depressions within three minutes without treatment is directing for the Passing phenomenon (Yasser's phenomenon).
- The negative serial troponin tests and normal echocardiography were reliably excluding ST-segment elevation myocardial infarction.
- Atypical square T-P-segment elevations in the inferior leads and atypical square T-P-segment depressions are the keys for a technical default.
- T technical default was a suggested cause.
- The acute ST-segment elevation myocardial infarction (STEMI) is the main **differential diagnosis**.
- Don't hurry for emergency management with thrombolytic therapy. Reassurance and follow up is the keystone in the management.
- I can't **compare** the current case with similar conditions. There are no similar or known cases with the same management for near comparison.
- **Limitations of the study:**
- There are no known limitations in the study

#### 4 | CONCLUSION AND RECOMMENDATIONS

- Don't hurry for emergency management of the Passing phenomenon (Yasser's phenomenon) which is associated with squaring sign until an accurate well-established evaluation.
- Atypical square T-P-segment elevations and depressions are the keys to a technical default.
- Also, it is recommended to extend the research on the clinical and electrocardiographic impact of atyp-

atypical square T-P-segment elevations and depressions.

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#### Conflicts of interest

- There are no conflicts of interest.

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