

Visual Diagnosis in Emergency Medicine

LEFT MAIN OCCLUSION – A TRUE OR FALSE (LUMEN) STEMI DIAGNOSIS?

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CASE REPORT

An elderly man, with history of hypertension and obstructive sleep apnea, woke up with severe chest pain, nausea, and sweating. Upon arrival of the emergency medical team, he had low blood pressure (85/40 mm Hg), with no significant difference between upper limbs, no signs of congestion, and palpable bilateral upper and lower limb pulses. An electrocardiogram (ECG; [Figure 1A](#)) was performed, revealing ST-segment elevation in aVR and aVL and diffuse ST-segment depression, which was interpreted as an ST-segment elevation myocardial infarction (STEMI) equivalent. Morphine, loading doses of aspirin, and ticagrelor were administered, with slight improvement of pain and ECG changes ([Figure 1B](#)), thus, the patient was initially transferred to the Emergency Department. Portable chest radiography was obtained, showing a mildly enlarged mediastinum, and transthoracic echocardiography didn't provide any additional information due to a very poor acoustic window. However, there was recurrence of pain, severe hypotension, and ECG

changes exacerbation a few minutes later, and the decision was to undergo urgent coronarography. This was performed via femoral access, and showed no significant coronary lesions. Aortography was then performed, revealing type-A aortic dissection extending to the aortic root ([Figure 2](#); [Video 1](#), available online), with associated exacerbation of ECG changes and worsening of symptoms upon injection of contrast ([Figure 3](#)). Our interpretation was that the coronarography was performed through the true lumen and the aortography through the false lumen, increasing its pressure and compressing the intima at the coronary ostia, occluding the flow. Despite emergent surgery, the patient died the following day due to intractable hemorrhagic shock.

DISCUSSION

This ECG pattern has been associated with left main (or equivalent) obstruction (or severe three-vessel disease) and thus regarded as a STEMI equivalent in both European and American guidelines, despite its low specificity (and sensitivity) (1–3). Diffuse ST depression occurs due to diffuse subendocardial ischemia, and ST elevation in lead aVR is a reciprocal finding. However, the first ECG also shows pronounced ST elevation in the lead aVL, which, globally, is highly suggestive of complete occlusion of the left main coronary artery,

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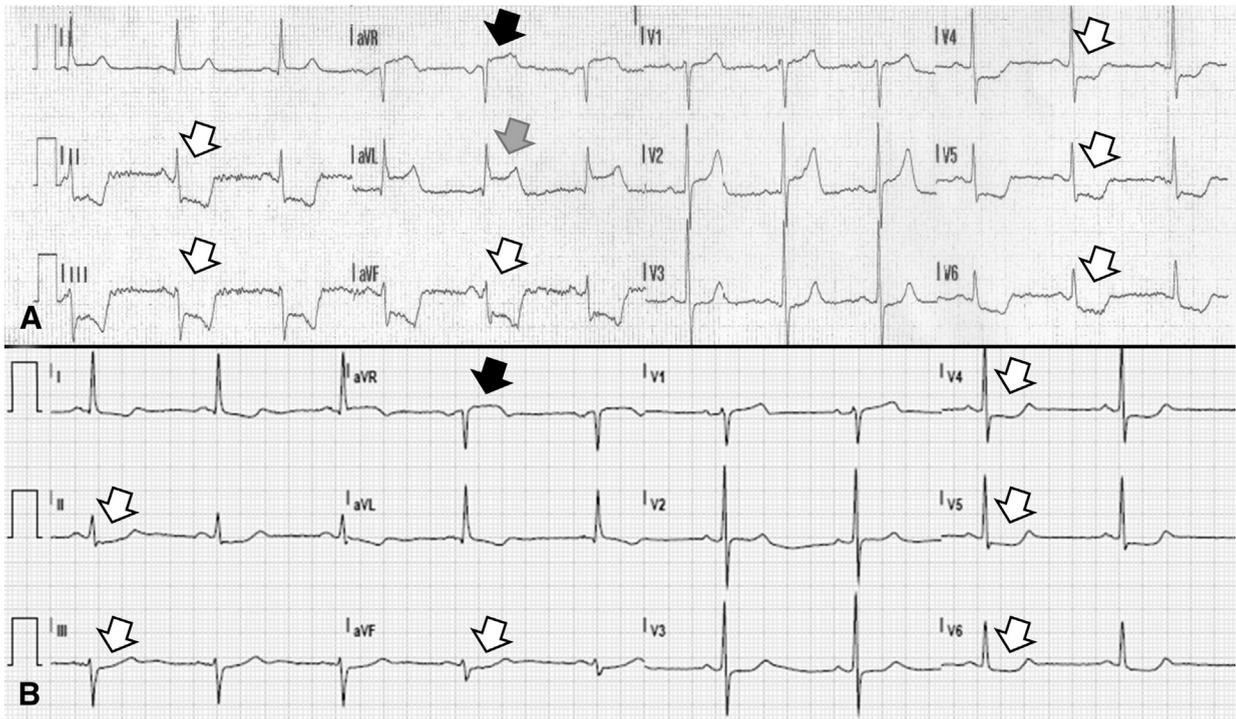


Figure 1. (A) First electrocardiogram (ECG): ST elevation in aVR (black arrow) and aVL (gray arrow) and diffuse ST-segment depression (white arrow). (B) Second ECG, after morphine and antiplatelet therapy: ST elevation in aVR (not in aVL) and much less pronounced diffuse ST-segment depression.

with anterior, lateral, and posterior walls transmural ischemia (with eventual canceling out of the anterior and posterior on the surface ECG). Nevertheless, the described dynamic changes of the ECG (and the clinical picture) make the classic atherosclerotic occlusion unlikely.

Aortic dissection clinical presentation is diverse and may present with such dynamic ECG changes. Despite

a very low incidence (0.51%), obstruction of coronary ostia or coronary artery dissection may occur, thus presenting with STEMI criteria. This, however, predominantly involves the right coronary artery, and the outcome is generally poor (4).

Accurate diagnosis of STEMI prior to administering antithrombotic therapy is crucial. Timing of P2Y12 inhibitor loading is debatable and may be postponed until

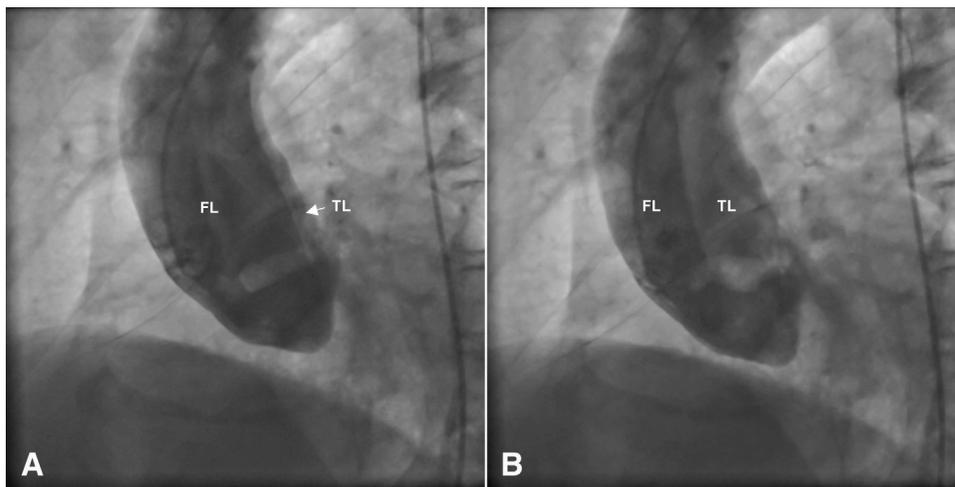


Figure 2. Aortography. TL = true lumen (arrow); FL = false lumen. Type-A aortic dissection, during diastole (A) and systole (B). The pig-tail catheter is within the FL, and the TL is clearly observed during systole.

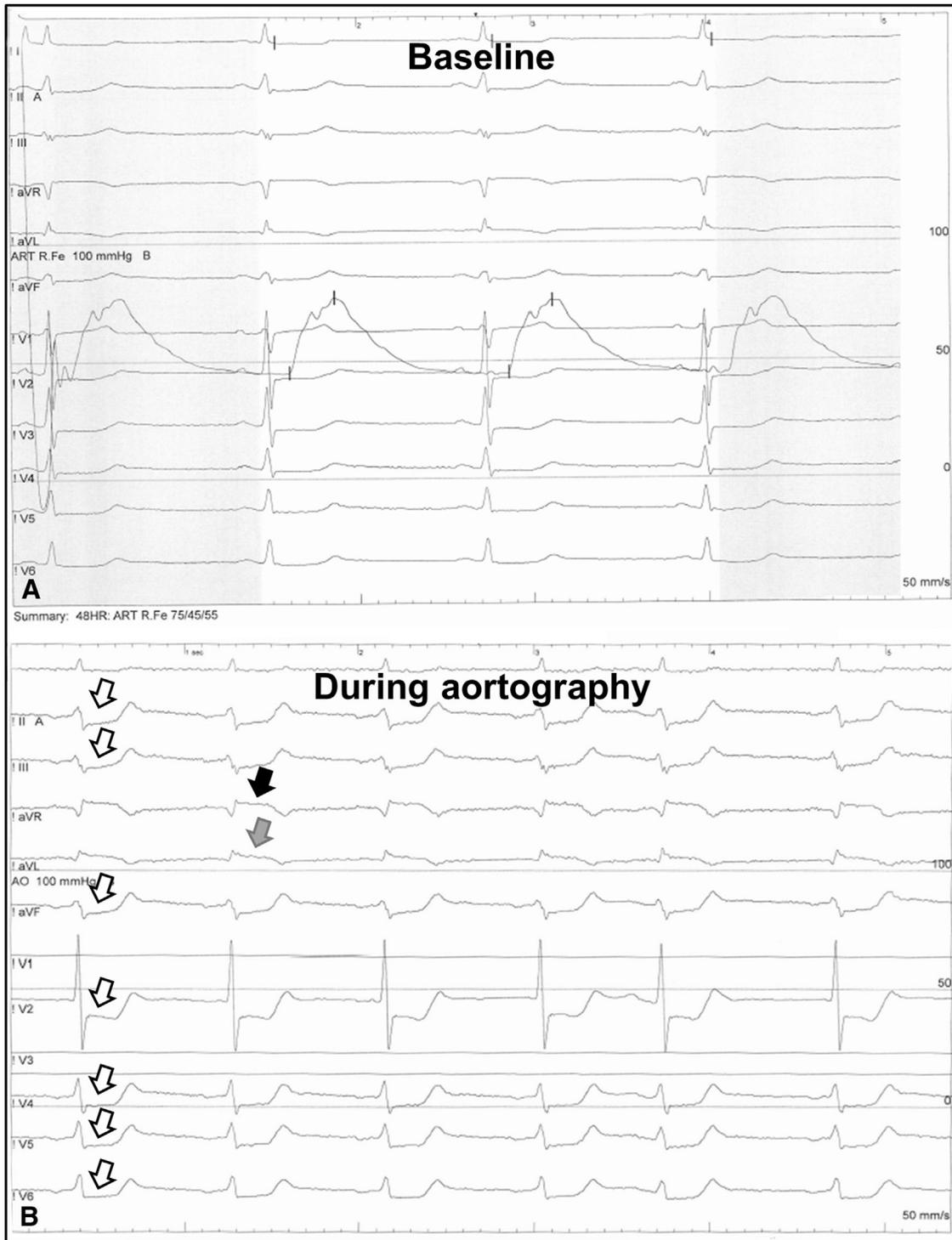


Figure 3. Baseline (A) and during aortography (B) electrocardiographic monitoring traces, with exacerbation of electrocardiogram (ECG) changes during aortography, similar to the first ECG, with ST elevation in aVR (black arrow) and aVL (gray arrow) and diffuse ST-segment depression (white arrow).

the coronary anatomy is known, particularly in doubtful cases such as this, where not only is there a possibility of aortic dissection, but also high likelihood of left main or three-vessel disease requiring surgery

(1). Moreover, despite appearing safe, prehospital administration of P2Y12 inhibitors did not improve pre-percutaneous coronary intervention coronary reperfusion (5).

REFERENCES

1. Ibanez B, James S, Agewall S, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: the task force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society. *Eur Heart J* 2018;39:119–77.
2. O’Gara PT, Kushner FG, Ascheim D, et al. 2013 ACCF/AHA Guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation* 2013;127:e362–425.
3. Miranda DF, Lobo AS, Walsh B, Sandoval Y, Smith SW. New insights into the use of the 12-lead electrocardiogram for diagnosing acute myocardial infarction in the emergency department. *Can J Cardiol* 2018;34:132–45.
4. Zhu Q-Y, Tai S, Tang L, et al. STEMI could be the primary presentation of acute aortic dissection. *Am J Emerg Med* 2017;35:1713–7.
5. Gilles M, van ’t Hof Arnoud W, Frédéric L, et al. Prehospital ticagrelor in ST-segment elevation myocardial infarction. *N Engl J Med* 2014;371:1016–27.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.jemermed.2018.12.004>.

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