

Proximal LAD Occlusion Detected by CTA of the Thoracic Aorta in a Patient with ROSC

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Dear Editor,

The significance and diagnostic value of coronary artery lesions detected on non-cardiac thoracic CT scans is a dark side in the care of critically ill patients in emergency departments. Coronary artery occlusion is responsible for approximately 60-80% of out-of-hospital deaths.¹ Invasive coronary angiography is recommended when ST elevation myocardial infarction (STEMI) is observed on a 12-lead ECG obtained after successful resuscitation, but invasive coronary imaging is not routinely recommended in patients without ST elevation.² Nevertheless, it is necessary to look for clues in patients without ST elevation to rule out coronary occlusion and/or to help recognize it in the emergency setting.^{1,2} There are not enough studies on the evaluation of coronary vessels in contrast-enhanced thoracic tomography to rule out fatal diagnoses such as aortic dissection, pulmonary embolism, and chest trauma. The study by Jabri et al. contains very important clues in this respect.¹ In this study, severe coronary artery calcification was observed in 57% of patients, and critical stenosis was observed on invasive coronary angiography in 42% of all patients. Radiologists reported coronary perfusion defects on CT in 45% of patients and cardiologists in 34%. However, the consensus between the two was that 32% (n = 17) of the patients had coronary perfusion defects. According to the method of the study, the degree of coronary calcification was influential in this consensus and there was moderate agreement (kappa value: 0.689, $P < 0.001$).¹ Although the diagnostic value seems to be 62% (medium strength conformity), we think that it is guiding data in the care of out-of-hospital cardiac arrest patients.

Coronary artery calcifications (CAC) are the most common incidental lesions seen on non-gated thoracic imaging and often lead to confusion. In particular, non-gated thoracic CT has been shown to have a significant

diagnostic value of 42% in severe coronary stenoses, but its diagnostic value is lower in low and moderate stenoses.³ It has also been emphasized that calcification may complicate the evaluation of cardiac CT images.³ In addition, severe CAC previously observed on non-gated thoracic CT may be considered as a factor to be considered when choosing a test. Although these findings observed on non-cardiac CTs do not directly indicate coronary artery stenosis, they may raise suspicion in the clinician. Coronary CT angiography, in which the coronary arteries are imaged non-invasively, is a procedure that can be performed in low- or intermediate-risk, stable patients and requires optimal preparation (such as discontinuation of vasodilator drugs, avoidance of tachycardia-inducing foods), premedication (such as IV metoprolol), and optimal duration.⁴ However, emergency departments are often unable to provide these conditions. In emergency departments, non-cardiac CT angiography is frequently performed in unstable and high-risk patients to exclude diseases included in the differential diagnosis of acute myocardial infarction (AMI).⁴ The association of coronary artery stenoses observed on non-cardiac CTs performed in the emergency department with acute myocardial infarction (AMI) has always been a concern for emergency medicine specialists.⁵ We would like to emphasize that there is very little data on this subject.

In another important study, Mostafa et al. analyzed non-cardiac CT images (thoracic or abdominal CT angiograms) of 22 patients with suspected AMI and investigated incidental perfusion disorder findings.⁵ They suggested that visual assessment of hypoperfusion in myocardial tissue with angiograms may help recognize acute myocardial infarction. For this purpose, heart images on non-cardiac CT angiograms were compared with the results of invasive coronary artery imaging. Using the American Heart Association (AHA) 17-segment model, the presence of visible hypoattenuation in segments of the

left ventricular myocardium on arterial and/or venous phase images and their mural extent were graded from 0 to 4 (0 = no hypoattenuation, 1 = hypoattenuation <25%, 2 = hypoattenuation 25-50%, 3 = hypoattenuation 50-75%, 4 = hypoattenuation >75%). A total of 22 patients were evaluated. The extent of hypoperfused segments was classified as grade 4 in 16 patients, grade 3 in four patients and grade 2 in one patient. In this study, a strong correlation was found between total coronary occlusion and severe coronary stenosis detected during invasive coronary interventions and perfusion abnormalities observed by non-cardiac CT angiography (kappa value: 0.73, $P \leq 0.001$).⁵ To optimize the duration of early invasive coronary intervention, demonstration of large hypoperfused areas on thoracic CT may be instructive. This study emphasizes that while myocardial perfusion may raise suspicion of acute coronary occlusion, other emergent pathologies, such as GI bleeding and left ventricular wall rupture, can also lead to impaired myocardial perfusion without coronary occlusion.⁵

These data have shown that non-cardiac CT angiograms may be helpful when searching for the etiology of cardiac arrest in out-of-hospital cardiac arrest cases and may be effective in the decision of early percutaneous coronary intervention.^{1,5} Because, although early percutaneous coronary invasive interventions are beneficial in preventing life-threatening arrhythmias by preserving myocardial tissue in patients with coronary occlusion, performing invasive coronary interventions in all patients with out-of-hospital cardiac arrest may lead to a delay in the application of hypothermia, which can provide both cost and neuronal survival.¹ Therefore, the importance of non-invasive techniques to optimize invasive interventions for critically ill patients is increasing.

We want to share an experience related to this topic.

A 51-year-old male patient returned home after travelling by plane from abroad and suddenly collapsed while hugging his relatives at home, followed by cardiac arrest (CPA). The first intervention to the patient was made by his relatives at the scene, basic life support was started, and then the emergency call system (112 is the Emergency Call System in Turkey) was alerted. Paramedics in the emergency aid team took over the basic life support initiated by the patient's relatives and started advanced cardiac life support. After a total of 15 minutes of intervention, the patient was observed to have returned spontaneous circulation (ROSC) and was taken to the ambulance and transported to the emergency department. The patient was then taken to the red area in the emergency department. He was unconscious and intubated. The first vital signs were as follows: blood pressure: 122/67 mmHg, pulse rate: 90/min, oxygen saturation on pulse oximetry: 99%, temperature: 36.3°C, and fingertip blood glucose: 128. A 12-lead ECG was performed and showed no significant pathology. CTA of the thoracic aorta and pulmonary artery was planned to exclude possible acute aortic and pulmonary pathologies because he did not have any complaints and had a history of travelling. CTA showed no obvious pathology in the aorta and pulmonary artery, but the proximal left anterior descending artery (LAD) branching from the left main coronary artery (LMCA) was not contrast-enhanced and was thought to be an occluded lesion (Figure 1). The cardiology unit was contacted, and the patient was taken to the emergency coronary angiography unit. Coronary angiography revealed a critical stenosis in the proximal LAD (Figure 2). Balloon dilatation was applied to the occluded area. Afterwards, the patient was followed up in the intensive care unit. The patient was discharged with a cure on the 8th day of hospitalization.

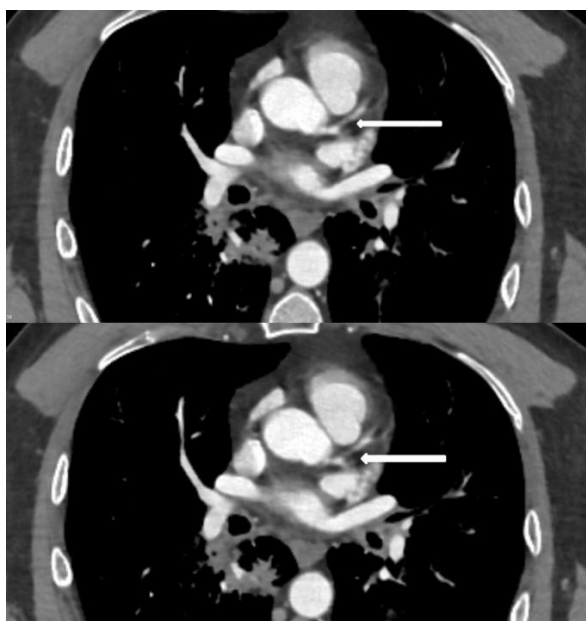


Figure 1. Thoracic CT Angiogram Image Suggestive of Coronary Occlusion.

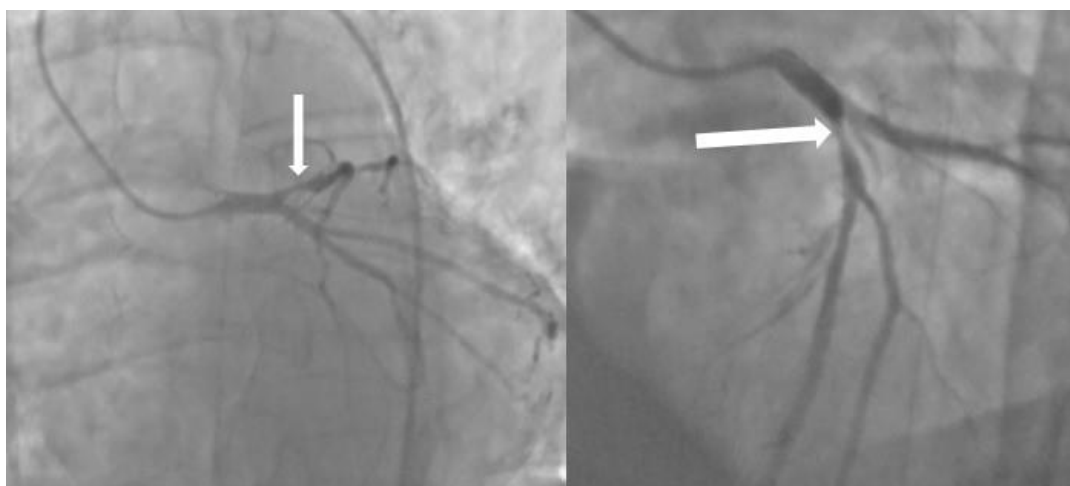


Figure 2. A Critical Stenosis was Observed in the Proximal LAD on Coronary Angiography.

In this case, the patient's heart rate was not suitable for a coronary CT angiography (90 beats/minute), and the option of slowing the heart down was not available as the patient was unstable and had ROSC after CPA. Additionally, no radiologic editing of the images for artifacts due to heart rate was performed. Thoracic aorta angiography is not a standard imaging method for coronary artery lesions. However, in this case, it raised suspicion of coronary artery occlusion and was indicative of an occlusion that could not be detected on an ECG.

Conflict of Interest Disclosures

The author declares no conflict of interest.

Ethical Approval

The authors declare that human rights were respected according to the Declaration of Helsinki, and written informed consent was obtained from the patient.

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