Contrast-enhanced computed tomography for early detection of acute myocardial infarction due to blunt chest trauma

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Blunt chest trauma (BCT) may result in injury to the coronary arteries [1]. In patients after BCT the signs of myocardial infarction (MI) may be overshadowed by other injuries and in those who remain conscious retrosternal pain may be interpreted as being secondary to chest wall contusion [2]. Electrocardiography (ECG) and transthoracic echocardiography (TTE) play a fundamental role in the diagnosis of acute coronary syndromes (ACS) and should be fully available within the Emergency Department (ED); however, in patients with BCT their effectiveness may be limited [3]. For these reasons it is important to pay attention during analysis of a polytrauma computed tomography (CT) scan to myocardial perfusion and also to the shape of the left ventricle (LV).

In a 57-year-old comatose woman after a car accident, polytrauma CT scan revealed multiple rib fractures along with impaired myocardial perfusion in the LV apex and the interventricular septum as well as possible contraction abnormalities of the apical and the mid-wall part of the LV (Figure 1 A). Those CT findings urged immediate performance of ECG that showed ST-segment elevation in leads I, aVL, and V2–V6 (Figure 1 B). Even though active bleeding was absent, the patient was hypotensive and required fluid resuscitation along with noradrenaline and dobutamine infusion. Urgent coronary angiography revealed occlusive dissections of the left anterior descending artery (LAD) and the circumflex artery (Cx) (Figure 1 C). The patient was loaded with acetylsalicylic acid (300 mg) and clopidogrel (600 mg). Unfractionated heparin (UFH; 5000 U) was administered intravenously. Percutaneous coronary intervention (PCI) with drug-eluting stent implantation in the LAD and the Cx reestablished flow in both left coronary artery branches (Figure 1 D). First and peak troponin (ARCHITECT STAT hs-TnI assay) plasma concentrations were 0.572 ng/ml and 76.608 ng/ml, respectively. Even though circulation was stabilized and sedative drugs waived the patient remained in a coma. Brain CT scan revealed massive intracranial haemorrhage, which resulted in the patient's death several days thereafter.

In the presented case angiographic findings unequivocally indicated the traumatic mechanism of coronary artery injury; nevertheless, chest contusion may also be a consequence of acute MI. Contrast-enhanced CT is a first-line imaging modality in patients with polytrauma, frequently following car accidents. The study protocol encompasses contrast-enhanced scans of the chest and abdomen; therefore, polytrauma CT scan may be utilized for myocardial perfusion assessment [4]. Of note, usually coronary arteries could not be reliably reconstructed due to the lack of ECG-gating and predominant high heart rate in such patients. The fact that the chronic post-MI scar may mimic under-perfused myocardium on contrast-enhanced CT (dark spots extending from subendocardium), ECG findings and myocardial wall thickness assessment (CT or TTE based) should be integrated to establish a correct diagnosis. Nevertheless, early suggestion of acute myocardial ischemia elucidated from a contrast-enhanced CT enables rapid implementation of adequate diagnostic and therapeutic measures.

The risk of intracranial haemorrhage is high in patients after traumatic brain injury treated with antithrombotic and antiplatelet agents; therefore, the decision to perform PCI should be made with caution and neurosurgeon involvement in the decision-making process seems warranted. It is advisable to limit anticoagulant and antiplatelet therapy as much as possible, reversing UFH with

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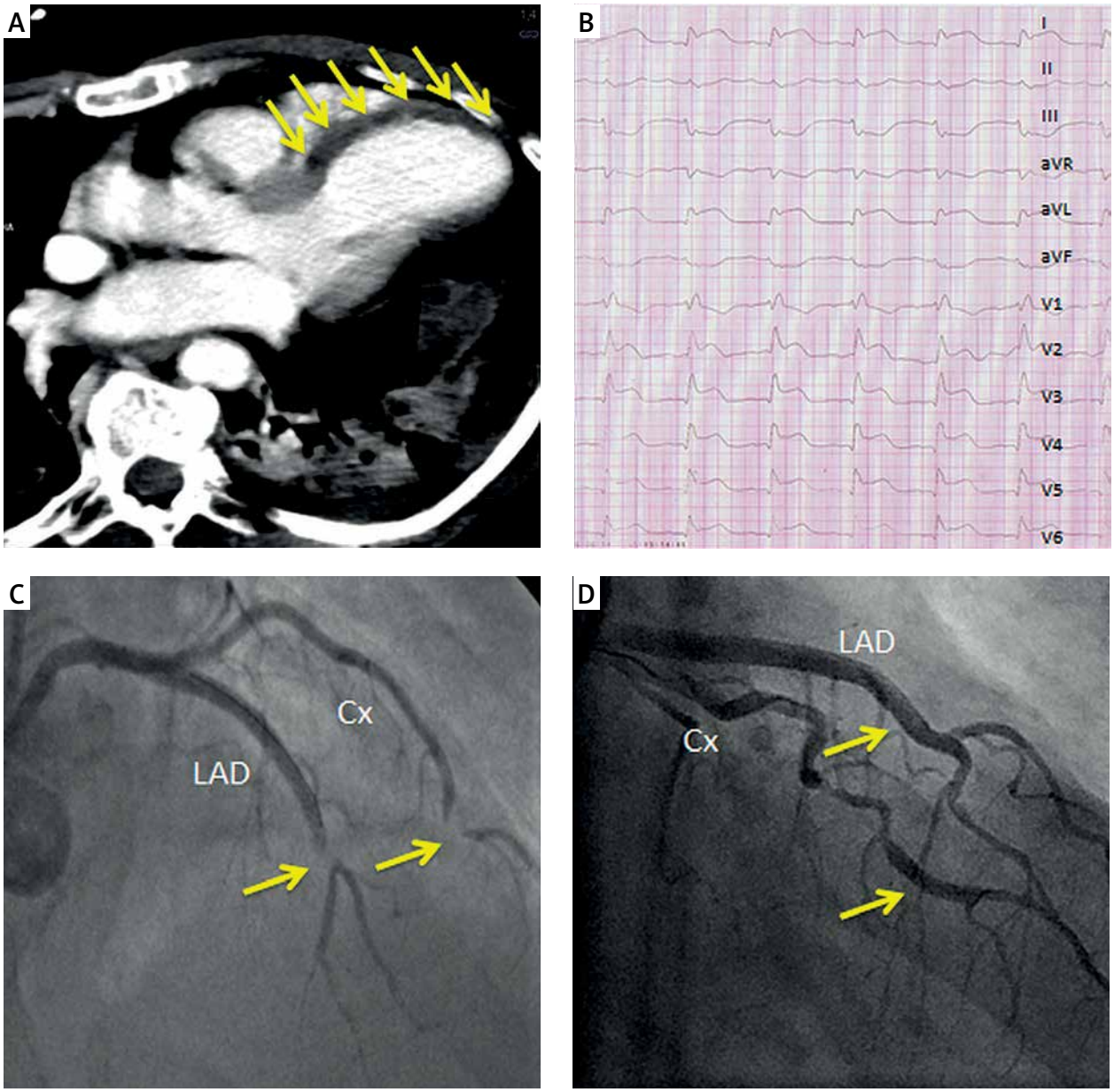

Figure 1. A – contrast-enhanced computed tomography (CT); non-enhanced area (dark spots) within interventricular septum and left ventricle (LV) apex (yellow arrows) suggests impaired regional myocardial perfusion; **B** – electrocardiography; ST-segment elevation in leads I, aVL, V2-V6 indicating anterolateral LV myocardial infarction; **C** – coronary angiography (CA); occlusive dissections (yellow arrows) within the left anterior descending branch (LAD) and the circumflex branch (Cx) of the left coronary artery; **D** – CA; normal flow reestablished in the LAD and the Cx after drug-eluting stent implantation (yellow arrows)

protamine sulfate directly after PCI and restricting the use of IIb/IIIa inhibitors.

Conflict of interest

The authors declare no conflict of interest.

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