

## Acute myocardial infarction due to left anterior descending coronary artery dissection after blunt chest trauma

Gerard Oghlakian · Pierre Maldjian · Edo Kaluski ·  
Muhamed Saric

Received: 15 December 2008 / Accepted: 27 January 2009 / Published online: 13 February 2009  
© Am Soc Emergency Radiol 2009

**Abstract** Cardiac complications of chest trauma range from arrhythmias to valvular avulsions to myocardial contusion, rupture, and rarely myocardial infarction. We describe a case of a young patient with blunt chest trauma after a motor vehicle accident in whom the diagnosis of myocardial infarction was established a week later because no electrocardiogram or cardiac biomarkers were obtained on presentation. Retrospective review of contrast-enhanced computed tomography (CT) of the chest done on presentation demonstrated a perfusion defect in the distribution of the left anterior descending artery (LAD). Subsequent coronary angiography demonstrated dissection in the proximal LAD. Our case illustrates the importance of electrocardiography and contrast-enhanced chest CT in initial evaluation of patients with blunt chest trauma and suspected injury to the coronary arteries.

**Keywords** Acute MI · Blunt chest trauma · LAD dissection · Contrast-enhanced CT · Echocardiography · Coronary angiography

### Report

A 27-year-old previously healthy woman was brought to the emergency department after a major motor vehicle accident (MVA). She was the unrestrained driver and

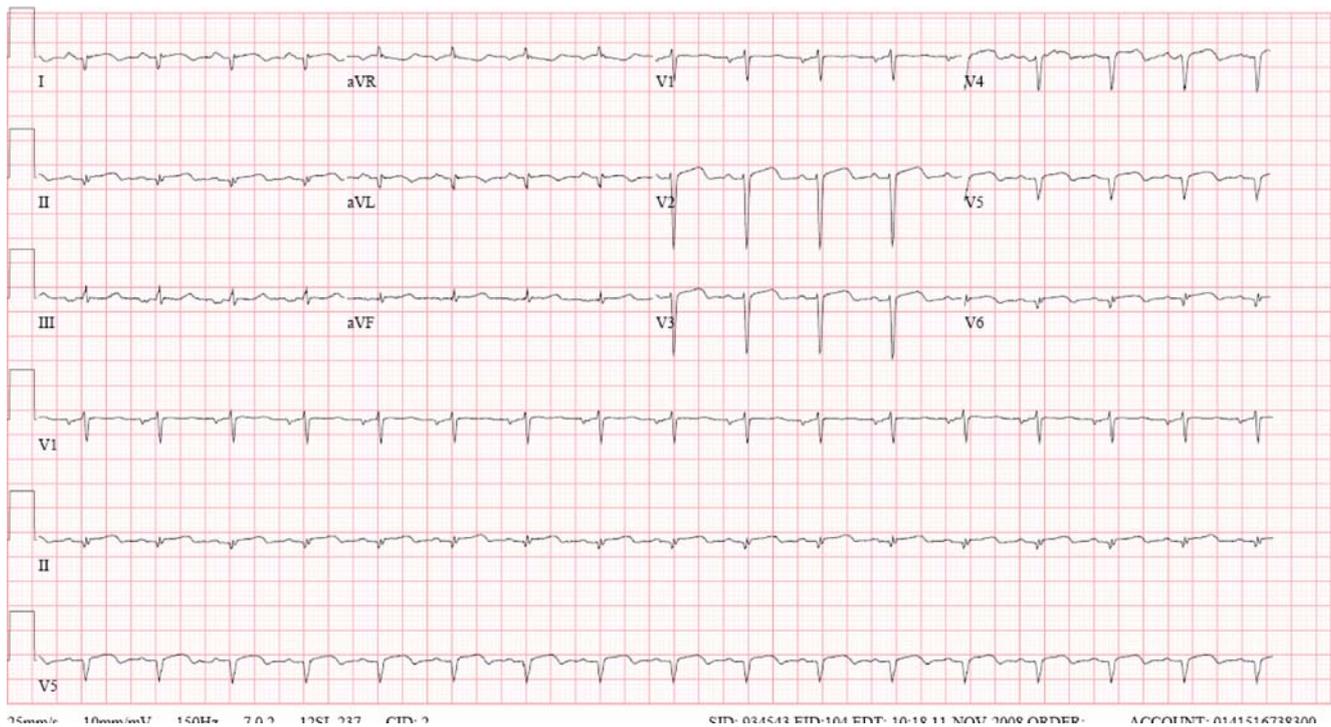
sustained blunt chest trauma, multiple facial fractures, and extremity lacerations.

On initial examination, her blood pressure was 110/70 mm Hg, her heart rate was 130, and respiratory rate was 24 breaths per minute. She was intubated on arrival for airway protection. Besides tachycardia, her cardiac exam was normal. Lung auscultation demonstrated good air entry bilaterally with normal bilateral chest wall motion. Contrast-enhanced computed tomography (CT) of the chest was performed on admission using our routine trauma scan protocol on a 16-slice multidetector scanner (GE light-speed). One hundred and twenty milliliters (mL) of intravenous contrast was administered at a rate of 2 mL/s and scanning was done after a 40-s delay. Five millimeter thick axial images were obtained through the chest at 5-mm intervals. The study revealed a small mediastinal hematoma along with lacerations in the right lobe of the liver and the spleen but no evidence of aortic injury.

Patient had a prolonged intubation complicated by pneumonia in the surgical intensive care unit. In view of her facial injuries and maxillary fractures requiring wiring of her jaw, and because of difficulty weaning off the ventilator, she had a tracheostomy done. Patient was transferred out of the surgical intensive care unit and to a step-down surgical bed and on hospital day 8, she was noted to have frequent premature ventricular complexes on telemetry. A 12-lead electrocardiogram (ECG) revealed sinus tachycardia and 1-mm ST elevations associated with Q waves in anterolateral leads (Fig. 1). Serum cardiac troponin I level was 2.3 ng/ml (normal 0.0–0.4 ng/ml). Transthoracic echocardiogram performed on the same day revealed left ventricular (LV) systolic dysfunction (ejection fraction 25%) due to akinesis of the four apical LV segments as well as the mid segments of the anterior wall and anterior interventricular septum without wall thinning. There was

G. Oghlakian (✉) · E. Kaluski · M. Saric  
Department of Medicine, New Jersey Medical School,  
Newark, NJ, USA  
e-mail: drgerhald@hotmail.com

P. Maldjian  
Department of Radiology, New Jersey Medical School,  
Newark, NJ, USA



**Fig. 1** A 12-lead electrocardiogram performed 8 days after blunt chest trauma shows sinus tachycardia, anterolateral Q waves, and 1-mm ST elevations consistent with subacute myocardial infarction

also moderate circumferential pericardial effusion. The right ventricular (RV) size and function were normal.

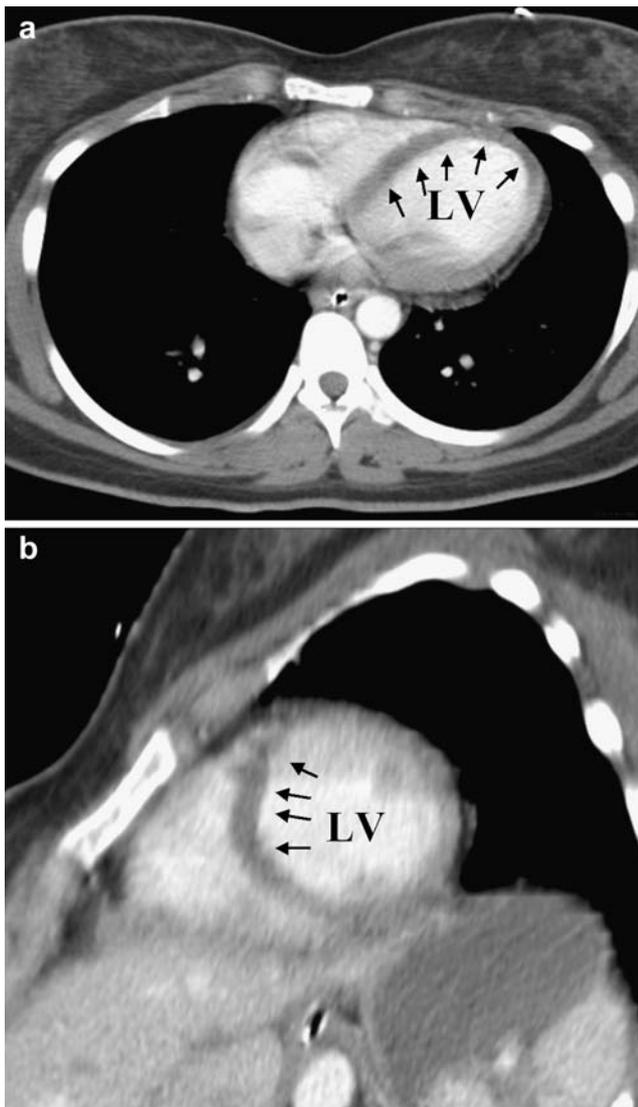
Based on electrocardiographic, echocardiographic, and troponin I findings, the diagnosis of subacute ST elevation myocardial infarction in the territory of the left anterior descending (LAD) artery was established. The CT scan of the chest obtained on admission was then reevaluated. A previously unnoticed lack of contrast uptake in the myocardium of the anterior interventricular septum and the LV apex was identified (Fig. 2a, b). Subsequent coronary angiography demonstrated a filling defect in the proximal LAD consistent with dissection (Fig. 3) which was treated with placement of a coronary stent at the dissection site.

## Discussion

MVAs are the most common cause of blunt chest trauma which often leads to cardiovascular complications [1]. The injury is often related to a combination of direct transfer of energy to the thorax during the impact, rapid deceleration of the heart, and compression of the heart between the sternum and the spine [2]. The presence of mediastinal hematomas, sternal fractures, and vertebral fractures connote extensive injury and should raise the possibility of associated cardiovascular complications such as cardiac contusion, aortic injury, valvular avulsions, myocardial rupture, cardiac tamponade, and myocardial infarction [3].

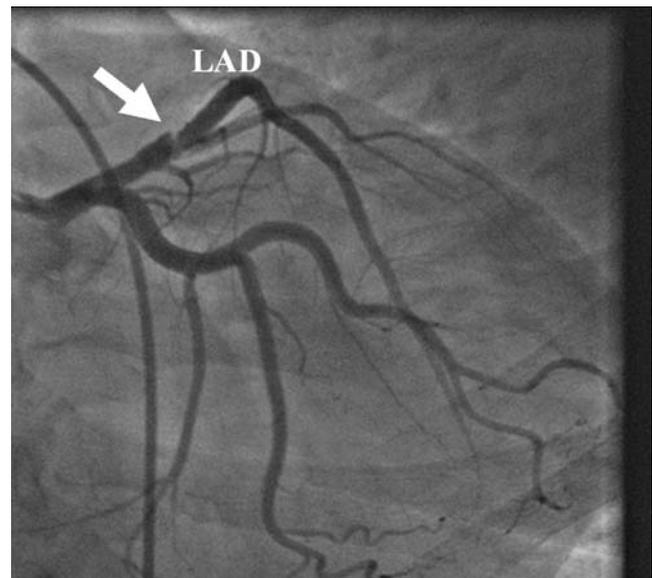
After blunt chest trauma, myocardial infarction resulting from coronary artery injury is rare and may be related to vessel laceration, thrombosis, or dissection. A recent review of the literature uncovered only 77 published cases [4]. Traffic accidents were by far the most common cause of such myocardial infarctions (63% of cases) followed by sports injuries (17%). The LAD was the most commonly injured artery (71%), followed by the right coronary artery (19%), the left main (6%), and the left circumflex artery (3%). Coronary artery dissection was documented only in 16% of cases.

Our case of LAD dissection after blunt chest trauma illustrates two important points: (1) Routine ECG should be an integral part of initial trauma evaluation, even in younger population. Once the patient is hemodynamically stabilized, this readily available and simple test plays an important role in identifying myocardial contusion (manifested as conduction abnormalities and ST or T wave changes), cardiac arrhythmias, and myocardial infarction; (2) Because the CT scan of the chest has become the test of choice for evaluation of all major chest trauma, it should always include critical assessment of myocardial perfusion on contrast-enhanced images. A routine scan done per trauma protocol (as described above) does not allow good coronary visualization but perfusion defects can be very helpful in suggesting an underlying coronary injury. Sato et al. described a case of coronary artery dissection after blunt chest trauma visualized with a multidetector-row computed



**Fig. 2** **a, b** Images from contrast-enhanced CT of the chest obtained for evaluation of traumatic injuries. **a** Axial image through the heart shows dilated left ventricle (LV) with decreased myocardial enhancement of the interventricular septum and the left ventricular apex (arrows). **b** Reformatted short axis view of the heart again demonstrates decreased myocardial enhancement of interventricular septum (arrows)

tomography; however, their scan was done as a dedicated study to evaluate the coronary arteries in the setting of a patient complaining of chest pain [5]. Gosalia et al. also described the ability of contrast-enhanced CT of the chest to identify myocardial infarction with a sensitivity of 83% in a series of 18 patients who had myocardial infarction and a CT scan of the chest done for other reasons [6].



**Fig. 3** Still frame of coronary angiogram in the left anterior oblique view with caudal angulation showing proximal LAD dissection (arrow)

As illustrated by our patient's case, integrating information from multiple tests including electrocardiography, echocardiography, cardiac biomarkers, and other imaging modalities is the key to appropriate management of patients with suspected cardiac involvement after blunt chest trauma. Coronary injuries are rare but should be occasionally suspected because early identification and intervention might improve outcomes.

## References

- Centers for Disease Control and Prevention Accidents/Unintentional Injuries. CDC Web site. Available at <http://www.cdc.gov/nchs/FASTATS/acc-inj.htm>. Accessed Nov 27, 2008
- Orliaguet G, Ferjani M, Riou B (2001) The heart in blunt trauma. *Anesthesiology* 95:544–548. doi:10.1097/0000542-200108000-00041
- Hurst's The Heart*. 12<sup>th</sup> edition. New York: McGraw-Hill. 2008: 2205, table 97–2
- Christensen MD, Nielsen PE, Sleight P (2006) Prior blunt chest trauma may be a cause of single vessel coronary disease; hypothesis and review. *Int J Cardiol* 108(1):1–5. doi:10.1016/j.ijcard.2005.04.010
- Sato Y, Matsumoto N, Komatsu S et al (2007) Coronary artery dissection after blunt chest trauma: depiction at multidetector-row computed tomography. *Int J Cardiol* 118(1):108–110. doi:10.1016/j.ijcard.2006.05.075
- Gosalia A, Haramati L, Sheth M et al (2004) CT detection of acute myocardial infarction. *AJR* 182:1563–1566