

Case of the month: Right coronary artery dissection following sports-related blunt trauma

A Hobelmann, J C Pham, E B Hsu

Emerg Med J 2006;23:580–583. doi: 10.1136/emj.2006.034595

Coronary artery dissection is a rare life-threatening complication resulting from blunt traumatic injury. Most cases of coronary artery injury, including dissection, involve the left anterior descending artery given its anatomical location relative to the impact. Right coronary artery (RCA) dissection secondary to blunt trauma is a particularly unusual occurrence, and has not previously been reported in the emergency medicine literature. We present a case of RCA dissection following low impact sport-related blunt chest trauma and discuss the pathophysiology, risk factors, diagnosis and current treatment options.

A 32-year-old African-American male presented to the emergency department with chest pain and shortness of breath. Several days earlier, he had been struck sharply in the midsternum by an opponent's elbow during a basketball game. At the time, the patient noted feeling intensely "winded", but denied chest pain, dizziness or syncope. After resting briefly, he resumed the game without incident.

On the day of presentation, the patient experienced acute onset of substernal chest pain, dyspnea and dizziness shortly after the start of another game. He immediately stopped playing, with resolution of symptoms. Later in the day, the patient experienced recurrent chest tightness, left arm tingling and shortness of breath, prompting him to seek hospital evaluation.

The patient was in good health, with his only significant history for a remote gunshot wound to the lower extremity; family history was non-contributory. The patient reported no medications or drug allergies. He admitted to occasional drinking but denied illicit drug use.

Vital signs included a respiratory rate of 16, heart rate of 50, blood pressure 130/87 and temperature of 36.4°C. Oxygen saturation was 99% on room air. On physical examination, the patient appeared in no apparent distress. Head, eyes, ears, nose and throat examination was normal. Lungs were clear to auscultation. Cardiac examination was normal without murmurs, rubs or gallops. Chest examination revealed no external signs of injury. Abdominal examination was unremarkable. There were no signs of peripheral oedema.

Initial electrocardiogram revealed sinus bradycardia with first-degree atrioventricular block. Laboratory findings included positive cardiac markers with an initial troponin of 0.09. While in the emergency department, the patient received aspirin, three nitroglycerin 0.4 mg sublingual, enoxaparin 80 mg subcutaneous and morphine 1 mg intravenous and subsequently became chest pain-free. He was taken directly for cardiac catheterisation.

Diagnostic catheterisation showed total occlusion of his right coronary artery (RCA) with a mid-RCA dissection. (fig 1) The left coronary was without significant stenosis. A transthoracic echocardiogram demonstrated an aneurismal

atrial septum, normal right ventricular size and function with mild concentric left ventricular hypertrophy and normal left ventricular function. The patient was transferred with heparin and eptifibatid infusions to a tertiary care hospital cardiac unit for further management.

The patient remained asymptomatic. Repeat physical examination on arrival at the tertiary care hospital remained unchanged. Cardiac enzymes peaked at creatine kinase 595, creatine kinase-myocardial band 46 and troponin 5. In the cardiac catheterisation laboratory, extensive spiral dissection into all major epicardial branches from the RCA was seen. There was also extensive thrombosis in the RCA. An attempt was made to revascularise the RCA by placing two overlapping stents in the blood vessel with restoration of minimal flow.

The patient returned to the cardiac unit where he experienced no post-catheterisation chest pain or other symptoms. A transthoracic echocardiogram repeated prior to discharge demonstrated normal left ventricular function and mild concentric left ventricular hypertrophy with an ejection fraction of 50–55%. Four days after his initial presentation, the patient was discharged to home.

DISCUSSION

The differential diagnosis of chest pain in the setting of blunt trauma is extensive and may include injury to the chest wall, lungs, pleura, great vessels and the heart. Injury to the heart and coronary vessels should be suspected in patients who present with chest pain or dyspnea after sustaining significant blunt chest trauma.¹ Mechanisms of injury suspected of causing dissection include intimal tearing, intraluminal thrombosis or coronary spasm.^{2,3} Coronary artery dissections can be completely asymptomatic or result in acute coronary syndromes and sudden death.¹ In this case, we postulate a dissection without occlusion during the initial injury, followed by occlusion shortly before the patient sought medical care. Good collateralisation from the left to the right side of the heart may have protected this patient from a severe inferior myocardial infarction.

Although other potential causes of coronary dissection, such as severe systolic hypertension or intense physical exertion, cannot be completely ruled out, the temporal relationship of direct blunt trauma to the coronary dissection suggests itself as the most probable mechanism of injury in this otherwise well-conditioned, relatively young individual.

When differentiating between myocardial contusion and more life-threatening injuries like myocardial infarction, myocardial rupture, ventricular septal defects, valvular injury and coronary dissection, recognition of patients at risk should include careful assessment of historical clues such as traumatic injury, extreme physical exertion, notable past medical history (eg coronary artery disease or severe systolic hypertension) and family history (eg connective tissue disorders). The initial diagnostic examination should include

Abbreviations: ECG, electrocardiogram; RCA, right coronary artery



Figure 1 Cardiac catheterisation, left anterior oblique view of right coronary artery demonstrating complete dissection with minimal distal flow.

ECG, serial cardiac enzymes and continuous cardiac monitoring. If the index of suspicion remains high for cardiac injury, early cardiology consultation is indicated. Echocardiogram can differentiate between structural and

non-structural damage to the heart. When coronary dissection leading to myocardial ischaemia is suspected, cardiac catheterisation is aimed at restoring perfusion and minimising infarct size.

Patients with coronary artery dissection are treated in various ways including angiography with stenting, thrombolytics, surgical revascularisation and conservative management.¹⁻⁴ As with any myocardial infarction, timing is critical in establishing early reperfusion.

In summary, coronary artery dissection after blunt chest trauma is a rare but potentially devastating complication. One must consider cardiac injury not only after high impact events, but also in low-impact sports-related trauma as presented here.

Authors' affiliations

A Hobelmann, J C Pham, E B Hsu, The Johns Hopkins University Medical Institutions, Departments of Emergency Medicine and Anesthesiology and Critical Care Medicine, Baltimore, Maryland, USA

Correspondence to: Dr Edbert B Hsu, The Johns Hopkins University Medical Institutions, Department of Emergency Medicine, 5801 Smith Avenue, Davis Building, Suite 3220, Baltimore, MD 21209, USA; edhsu@jhmi.edu

Accepted for publication 26 January 2006

REFERENCES

- 1 **Pretre R**, Chilcott M. Blunt trauma to the heart and great vessels. *New Engl J Med* 1997;**336**:626-2.
- 2 **Dixon AE**, Shulman S, Fontaine G, et al. Sudden death during sports activities [correspondence]. *N Engl J Med* 1995;**333**:1784-5.
- 3 **Ginzburg E**, Dygert J, Parra-Davila E, et al. Coronary artery stenting for occlusive dissection after blunt chest trauma. *J Trauma* 1998;**45**:157-1.
- 4 **Shah P**, Dzavik V, Cusimano RJ, et al. Spontaneous dissection of the left main coronary artery. *Can J Cardiol* 2004;**20**:815-8.

IMAGES IN EMERGENCY MEDICINE.....

The missed clavicle fracture in children?

M J Reed, N Fernandez-Dias

An 8-year-old boy presented to our emergency department having fallen onto his right shoulder. On examination there was tenderness over the clavicle midpoint, with a reduced range of shoulder movements. Initial radiographs (two views) were confirmed to be normal by a consultant paediatric radiologist (fig 1). He was managed symptomatically and discharged in a broad-arm sling with analgesia.

Eight days later he re-attended with a lump in the right clavicle region, which was confirmed on clinical examination. There had been no further trauma. Repeat radiographs confirmed a fracture of the middle third of the right clavicle (fig 2). The patient was advised to continue with the sling and was kept under review until fracture union had been achieved.

It is recognised that the initial radiograph may be normal in children (and occasionally adults) with suspected clavicle fractures.¹ This case reiterates that all clinical fractures with a normal radiograph should be treated as a fracture.

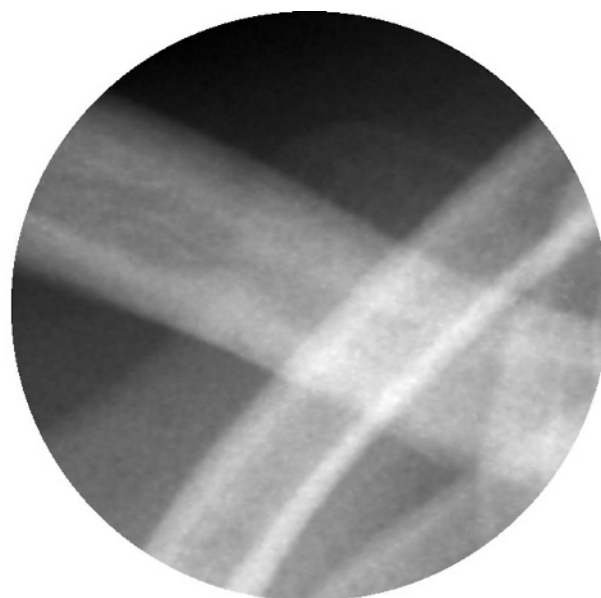


Figure 1 Magnified view over subsequent fracture site showing no obvious fracture (Enlarged from plain radiograph of right clavicle taken at time of initial presentation).

M J Reed
N Fernandez-Dias
Emergency Department, Royal Hospital for Sick Children, Edinburgh, UK