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Case Report

Don’t forget the ECG! Coronary occlusion following blunt chest trauma: a case report

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ABSTRACT

A rare but potentially life-threatening consequence of blunt chest trauma is ST elevation myocardial infarction (STEMI) due to coronary artery occlusion. Here we describe a case of coronary artery occlusion following blunt chest trauma to consider the role of electrocardiography (ECG) and troponin testing as part of the workup of blunt chest trauma.

Keywords: Case reports, Coronary artery occlusion, Chest trauma, Angiography

INTRODUCTION

Cardiac sequalae of blunt chest trauma are important considerations and can sometimes require urgent intervention. These include cardiac tamponade, cardiac chamber rupture, valvular disruption, and very rarely, injury to coronary vessels resulting in spasms, occlusions or dissection. Approach to blunt chest trauma includes the usual primary and secondary survey as per ATLS guidelines but should include adjuvants to the primary survey such as Chest Xray, eFAST and an initial electrocardiography (ECG).[1] Repeated ECG readings and troponin evaluation can often be overlooked in a trauma scenario where priorities may include obtaining further imaging with computed tomography (CT) or managing more obvious injuries. It may be difficult to determine whether chest pain in a patient with significant thoracic injury is cardiac or related to other injuries, for example rib fractures. Coronary vessel injury is often not appreciated on imaging initially, placing the importance for emergency physicians and trauma surgeons to be cognisant in obtaining early and repeated ECG and troponin evaluations.[2] Myocardial infarction due to coronary vessel injury is a rare consequence of blunt chest trauma with disastrous consequences if missed. We will describe a case in which a repeated ECG and troponin testing assisted in the early diagnosis of a right coronary artery occlusion requiring stenting.

CASE REPORT

A 65-year-old man presented to the emergency department with chest pain after being assaulted the previous day. The assailants headbutted him and stomped on the left side of his chest. Following the incident, he went home and did not seek medical attention however had increasing left sided chest pain, neck pain and headache, prompting presentation the following afternoon. His medical background is significant for a previous oral SCC and he is a current pack-a-day smoker. He had no prior cardiac history nor previous cardiac symptoms. Initial primary and secondary survey raised

concern for left sided rib fractures and initial ECG demonstrated non-specific T wave changes. However, his subsequent CT scan demonstrated soft tissue bruising around the sternum but did not demonstrate any fractures or radiologically evident injuries. Subsequently, a repeat ECG was performed (Figure 1), which demonstrated inferior ST elevation with reciprocal changes in AVL, prompting troponin testing, which was found to be 2962. Repeat troponin increased to 5092 and urgent referral to cardiology was made. Bedside TTE revealed moderate-severe LV dysfunction and severe RV dysfunction, with no pericardial effusion and no major valvular issues. They proceeded with coronary angiography, which showed a 100% occlusion of the mid Right Coronary Artery (RCA) (Figure 2).

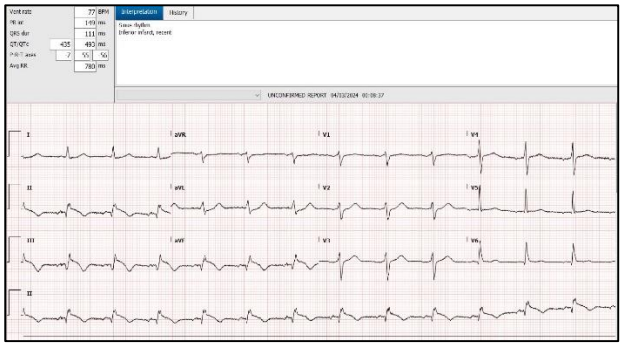

Figure 1: Initial electrocardiography.

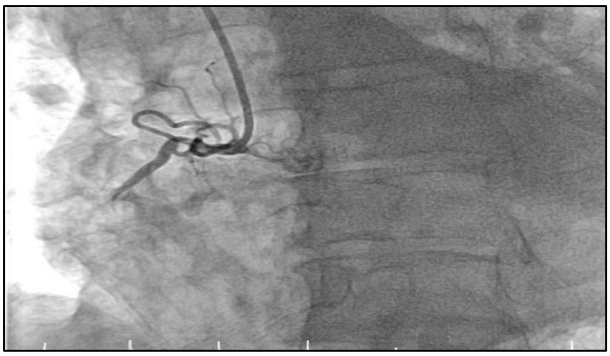

Figure 2: Angiogram of RCA prior to percutaneous coronary intervention- 100% occlusion mid RCA.

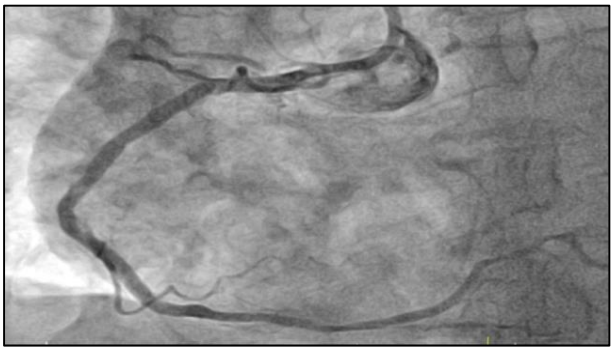

Figure 3: Angiogram of RCA post stenting and post-dilation-demonstrates TIMI 3 flow.

The angiogram also revealed disease elsewhere with LAD 50% occlusion, proximal D1 30% occlusion, and mid left circumflex artery 50% occlusion. He underwent balloon angioplasty and flow was re-established distal to the RCA occlusion. Sequential stenting was performed (with 3 drug eluting stents) from mid RCA to the ostium of the RCA with re-establishment of TIMI 3 flow (figure 3). Following the procedure he had issues with hypotension, requiring a dobutamine infusion and IVF resuscitation. He was also commenced on broad spectrum intravenous antibiotics to cover for an infective cause, of unclear origin. He subsequently improved and safely discharged home 8 days after coronary intervention on DAPT, rosuvastatin, spironolactone and valsartan.

DISCUSSION

Blunt chest trauma is an uncommon cause of coronary vessel occlusion resulting in STEMI. Usual risk factors for STEMI include physical inactivity, smoking, hypertension, hyperlipidaemia, and diabetes mellitus, among others.[3] Trauma is not a widely discussed cause of coronary artery occlusion. Rather, in the context of blunt chest trauma, we are more likely to see cardiac injury such a myocardial muscle contusion, cardiac chamber rupture, valvular disruption, pericardial effusion and tamponade.[1] The literature estimates that between 15-75% of patients with blunt chest trauma may have sustained a blunt cardiac injury (BCI)-a broad estimation reflecting the difficulty of accurate diagnosis.[4]

Blunt cardiac injury is most associated with motor vehicle collisions.[5] Electrocardiography and cardiac biomarkers (troponin) can provide useful information; however, they are often not performed when there is a low index of suspicion for cardiac pathology, especially when there is another suspected cause for pain such as rib fractures or pneumothorax. ECG alone is generally an accepted screening tool in patients in which BCI is suspected.[6] Previous studies have suggested that if initial ECG is normal, the patient can be safely cleared from a cardiac perspective, however further reviews have noted that a significant number of patients with BCI in fact had normal initial ECG, but subsequent ECG and troponin testing showed abnormalities.[2] Current literature suggests that both ECG and troponin need to be performed in any patients in which BCI is possible or suspected, as only if both ECG and troponin are normal can BCI be safely ruled out.[2,6]

Suspected mechanisms of myocardial infarction in patients with blunt chest trauma include coronary artery dissection, intimal tearing from shear force leading to intraluminal thrombosis, vascular rupture, coronary artery spasm or disruption to pre-existing plaque resulting in dislodgement of plaque material.[7,8] Management of coronary artery occlusion in the context of blunt cardiac injury is controversial and there are no evidence-based guidelines due to the infrequency of this pathology. Immediate cardiology consultation is integral, generally

for urgent angiography, although some sources advocate for involvement of cardiothoracic surgery for consideration of bypass surgery. Generally, the literature suggests avoidance of thrombolytics due to bleeding risk.[9] The use of DAPT and anticoagulation could also be complicated in the trauma setting, particularly if the patient has other injuries or concerns for haemorrhage.

CONCLUSION

In the setting of blunt chest trauma, if there is any suspicion of cardiac injury, electrocardiography and cardiac biomarkers (troponin) should be performed. Although rare, coronary artery occlusion must be a considered as a differential in blunt chest trauma. Prompt diagnosis is important, as well as early involvement of cardiology. Decisions around anticoagulation, thrombolysis and angiography must be made on a case-by-case basis with close collaboration between trauma and cardiology teams.

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