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Case report

Traumatic left main coronary artery dissection in a young adult following blunt chest trauma – A case report^{☆☆}

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ARTICLE INFO

Article history:

Received 23 December 2021

Revised 9 January 2022

Accepted 12 January 2022

Keywords:

Coronary artery dissection

Blunt chest trauma

ABSTRACT

Blunt chest trauma may cause variable degrees of thoracic injuries. Most of the patients may remain asymptomatic after sustaining blunt chest trauma. But in rare instances, life-threatening conditions such as coronary artery dissection may occur. The authors present a 29-year-old male adult with persistent chest pain following blunt trauma with a rise in cardiac troponins and elevated ST segment in ECG. Coronary CT and conventional angiography demonstrated dissection of the left main coronary artery. It is deemed necessary to suspect cardiac injury in patients with a history of blunt chest trauma in appropriate clinical settings. Early recognition of coronary artery dissection is vital to reduce morbidity and mortality. ECG combined with cardiac enzymes can be essential tools helping the physicians raise the suspicion towards a cardiac injury followed by cross-sectional and conventional angiographies for confirmation.

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Introduction

Patients with blunt chest trauma are commonly observed in the emergency department for non-cardiac injuries as cardiac injuries are less common. However, physicians need to be aware of rarely occurring life-threatening entities such as

coronary artery dissection in patients with blunt chest trauma [1,2]. One of the cardiac-related emergency conditions in patients sustaining chest blunt trauma is coronary artery dissection [3,4]. Life-threatening complications can occur following coronary artery dissection such as myocardial infarction and sudden cardiac death [3]. Hence, early diagnosis of coronary artery dissection can minimize the cardiac damage and

* Competing interests: The authors declare that they have no competing interests.

☆ Acknowledgments: There is no funding source.

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¹ The authors are submitting the article from Afghanistan; a low-income country and eligible for publication fee waiver; a policy Elsevier is following. Hence, we request for publication fee waiver, if the manuscript is accepted for publication

<https://doi.org/10.1016/j.radcr.2022.01.016>

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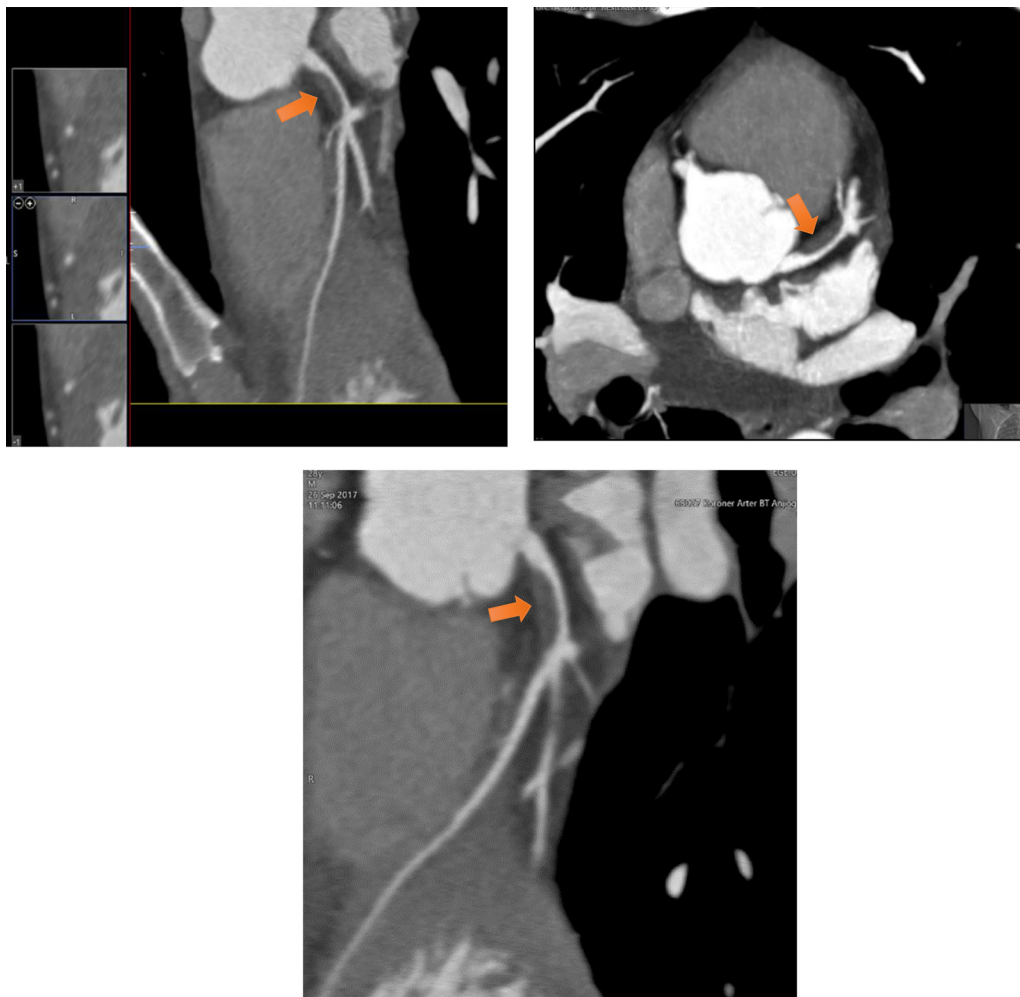


Fig. 1 – (A-C) oblique and axial contrast enhanced ECG gated CT angiographic views demonstrate intramural hematoma and long tapered luminal narrowing of proximal left main coronary artery (orange arrows); features of coronary artery dissection.

mortality rate, for which clinical suspicion and ECG findings are required at the first stage [1,5,6]. The authors present a 29-year-old male patient complaining of chest pain following blunt trauma who was subsequently diagnosed with a dissection of the left main coronary artery.

Case presentation

A 29-year-old male patient was brought to the emergency department with persistent chest pain following an altercation. However, physical examination was normal. No injuries were detected in the body. There was no sign of injuries to the chest wall during physical examination. Due to the persistent chest pain, he was referred to the cardiology department for further work-up. Initial ECG demonstrated elevation of 1 mm ST-segment in aVR and aVL leads as well as 1 mm ST-segment depression in D2, D3, aVF leads. (ECG image not available) For further assessment, cardiac enzymes were ordered to ascertain the diagnosis of acute cardiac injury. The result

of enzymes demonstrated a significant rise in the cardiac troponins. For further evaluation and definite diagnosis coronary CT angiography (128-slice Siemens) was performed demonstrating a long segment intramural hematoma at the left main coronary artery with significant luminal narrowing denoting coronary artery dissection. Figs. 1 and 2 Afterward, the patient was referred for coronary angiography, demonstrating tapered luminal stenosis at the left main coronary artery. Fig. 3 However, distal vascular opacification was present. After receiving the radiology report, the patient was lost to follow up.

Discussion

Blunt chest trauma may cause variable degrees of thoracic injuries [1]. Although the majority of the cases remain silent after blunt chest trauma, [6] but in a few cases (5%-15%) it may cause emergency cardiac conditions [1] such as conduction abnormalities, cardiac contusion [7], and even cardiac rupture [6,3,4]. Coronary artery dissection is a rare condition the develops secondary to blunt chest trauma [1,6,2,4], that may lead to

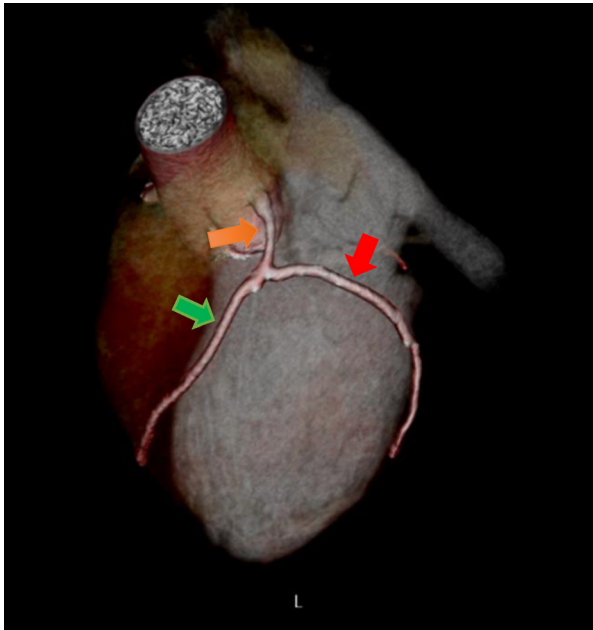


Fig. 2 – 3D VRT image of the left main coronary artery showing diffuse narrowing (orange arrow); normal appearing left anterior descending artery (green arrow), and left circumflex artery (red arrow).

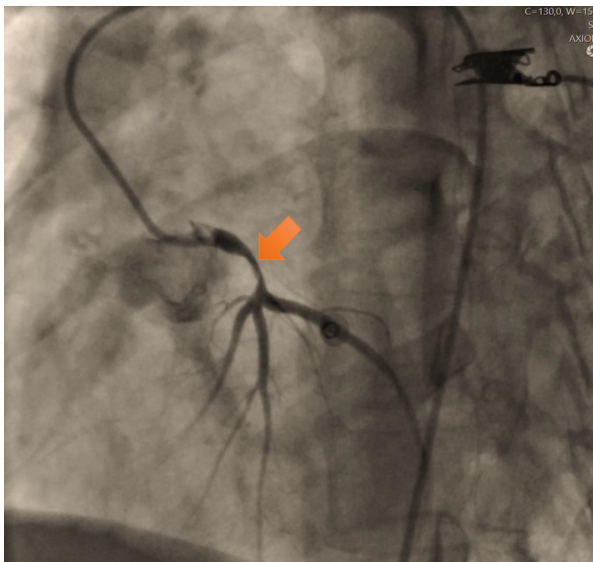


Fig. 3 – Coronary angiogram demonstrating diffuse luminal stenosis of the left main coronary artery (orange arrow); a coronary artery dissection.

myocardial infarction [8,3]. Ischemic heart disease is considered extremely rare following a coronary artery dissection [2].

Motor vehicle accidents are considered the most common cause of cardiac injury, followed by crush injuries and bicycle accidents. The heart can be compressed between spine and sternum in compression injuries or translation of the heart against sternum in deceleration injuries [4].

The relationship of severity between blunt chest trauma and coronary artery dissection is still not clear [6]. The left anterior descending artery is more susceptible to trauma due to its anterior location (76%) [1,6,7,2]. The right coronary artery (12%) [6] and the circumflex artery (6%) involvement are relatively rare [1,7,2]. Dissection of the left main coronary artery is exceedingly rare [7]. As in our case, the dissection is in the left main coronary artery. Non-traumatic dissections can be spontaneous or iatrogenic. It is thought that there is either a background of coronary artery disease, hormonal induction or [7] diseases causing tissue fragility such as Marfan syndrome or Ehlers Danlose syndrome [7,3]. Hence, females have 4:1 predilection to spontaneous dissection during pregnancy or peripartum period [7].

The clinical presentation varies from symptomless cases to acute coronary syndrome and death [1,6]. The diagnosis of the coronary artery dissection is delayed due to its low incidence [6] and limited information of practitioners about this injury [2]. The diagnostic protocol in polytrauma patients with a chest injury and/or chest pain includes ECG and cardiac enzymes [6]. Both cardiac injuries and skeletal muscle injuries may cause high troponin levels in patients with blunt chest trauma. In addition to the elevated cardiac troponins, the hyperacute T wave and ST-segment elevation in ECG prompts more towards acute coronary injury, [6] denoting the importance of ECG in discriminating cardiac from non-cardiac injuries [7]. The pertinent ECG findings in acute coronary dissection are hyperacute T waves, and ST-segment elevation [1,2], thus, ECG is considered a valuable tool in the diagnosis of acute cardiac injury [1,6,2]. According to the guidelines of the eastern association for the surgery of trauma, ECG should be performed in patients with blunt chest trauma [2,4] Echocardiography can be a helpful tool in patients with low blood pressure. It can detect pericardial effusion, cardiac tamponade, and apical thrombus [7]. Echocardiography is needless in normotensive patients [7]. Coronary angiography is the modality of choice in patients with positive ECG findings that implicate cardiac injury [1,6] Coronary angiography is described as the selective choice of examination [6]. The angiographic findings can be contrast filled false lumen or diffuse long smooth stenosis [9] as in our case. Radiologic studies are important diagnostic tools in the evaluation of cardiac injuries [4] such as CT scan and MRI [6]. The CT coronary findings of coronary artery dissection include tapered luminal stenosis; abrupt luminal stenosis; intramural hematoma; dissection flap; and perivascular fat stranding [10].

The treatment of traumatic coronary dissection varies from bypass grafting, balloon angioplasty to conservative treatment and thrombolysis [6,7]. In patients with minimal cardiac injuries, conservative management is preferred by administering anticoagulation in addition to continuous monitoring. Thrombolytic therapy is an option in cases with intimal tear and thrombosis but may be contraindicated in multiple injuries. Based on the clinical scenario, revascularization is another choice [6,7]. There is no established evidence about success rates for the above treatment strategies due to the small number of the cases and insignificant follow up [6].

Coronary artery dissection due to blunt chest trauma is a rare entity. Early recognition and accurate diagnosis are critical in this fatal complication. The involvement of the left

main coronary artery is a rarer finding. The emergency physicians play important role in differentiating cardiac from non-cardiac injuries by administering ECG and cardiac enzymes, in the correct clinical context. Therefore, patients may be directed towards proper management with significantly reduced morbidity and mortality.

Ethics approval and consent to participate

The manuscript has got ethical review exemption from the Ethical Review Committee (ERC) of the authors' institution (EGE University Hospital - {EHU}) as case reports are exempted from review according to the institutional ethical review committee's policy. Written consent is obtained from the participants for publishing the case.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study (as this is a case report).

Author contributions

All of the authors have participated sufficiently in the submission and take public responsibility for its content. SB: select-

ing the case. MNN: writing the manuscript, and selecting the images. NF: writing, revising, editing, and corresponding with the journal. All of the authors have read and approved the final manuscript.

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