

Traumatic Left Main Coronary Artery Dissection with Acute Myocardial Infarction after Chest Contusion

Keng-Yi Wu^{1,2}, and Jou-Hong Lai¹

¹Department of Cardiology, Department of Internal Medicine, Taichung Armed-Forces General Hospital, Taichung, Taiwan, Republic of China;
²Division of Cardiology, Department of Internal Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, Republic of China

Abstract

Blunt chest contusion can rarely induce coronary artery dissection with myocardial infarction. Clinical symptoms, electrocardiography, and serial cardiac enzyme evaluations are necessary in patients with thoracic trauma. Angioplasty or bypass surgery is chosen according to the lesion characteristics and associated complications. Here, we report a case of a dissected flap from the left main coronary artery to the left anterior descending coronary artery in a 63-year-old man with acute myocardial infarction secondary to blunt chest trauma during a traffic accident. (J Intern Med Taiwan 2016; 27: 261-266)

Key Words: Chest contusion, Coronary artery dissection, Myocardial infarction

Background

Acute myocardial infarction can be caused by atherosclerosis, dissection, thromboembolism, vasculitis, congenital abnormality or procedure-related.¹ Thoracic injury often causes subcutaneous ecchymosis, rib fracture or pneumothorax.² However, coronary artery injury rarely occurs as a consequence of trauma. Moreover, left main coronary artery dissection secondary to blunt trauma is particularly rare. We report a case of traumatic left main coronary artery dissection complicated with acute myocardial infarction in a 63-year-old man involved in a traffic accident.

Case Presentation

A 63-year-old man, a heavy smoker, had no history of comorbidities such as hypertension, diabetes or coronary artery disease. The patient was involved in a road traffic accident while driving a motor vehicle at a speed of 70 kilometer/per hour. In response to the impact, the patient directly hit the handle bar with chest contusion, and fall down then. So, he was brought to our emergency department with alert consciousness state, multiple abrasion wounds of trunk and deformity of right lower limb. On arrival, he presented stable vital signs and blood pressure of 119/72 mmHg, heart rate of 68

beats/min, respiratory rate of 20 breaths/min, and Glasgow Coma Scale Score of 15. Physical examination revealed multiple facial abrasion injuries, deformities of nasal bone and right lower leg and ecchymosis injury over the anterior chest wall. No other significant or abnormal findings such as rib fracture, pneumothorax or subcutaneous emphysema were observed on a chest radiograph. Initial electrocardiography revealed normal sinus rhythm without ST-T segment change (Fig. 1). Abdominal computed tomography (CT) and brain CT did not show intra-abdominal haemorrhage, abdomi-

nal aortic aneurysm or intra-cranial haemorrhage. After completion of preliminary protocols, including blood laboratory tests, imaging studies, and fluid supplementation, the patient admitted for external fixation operation of right leg deformity. However, the patient gradually developed chest tightness without tearing, ripping sensation but presented a drop in blood pressure (54/42 mmHg). Follow-up electrocardiography (ECG) revealed diffused ST-T segment depression across all leads, rather than elevation in the aVR lead (Fig. 2). Blood laboratory test showed creatinine kinase level of

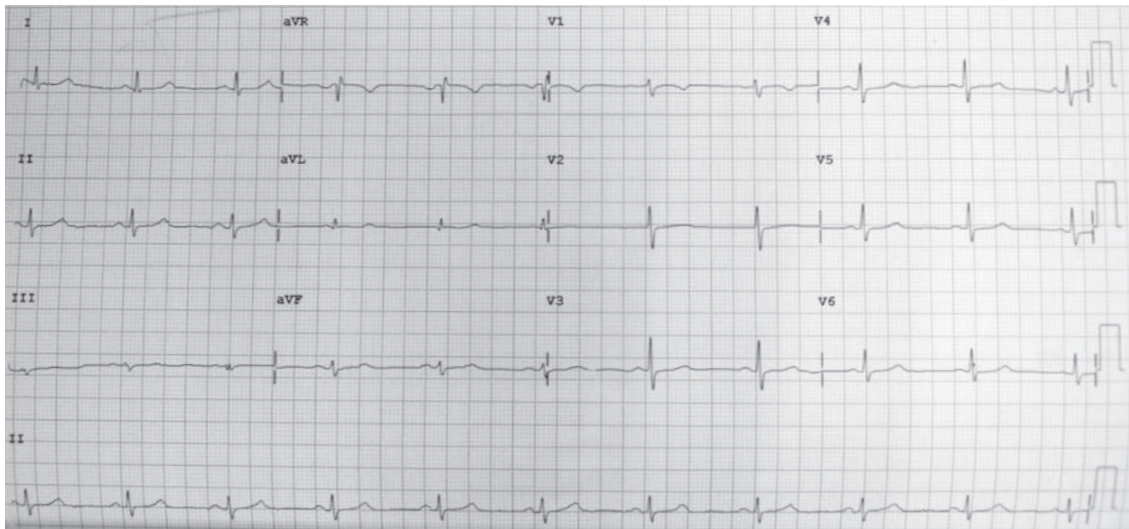


Figure 1. Normal electrocardiogram initially.

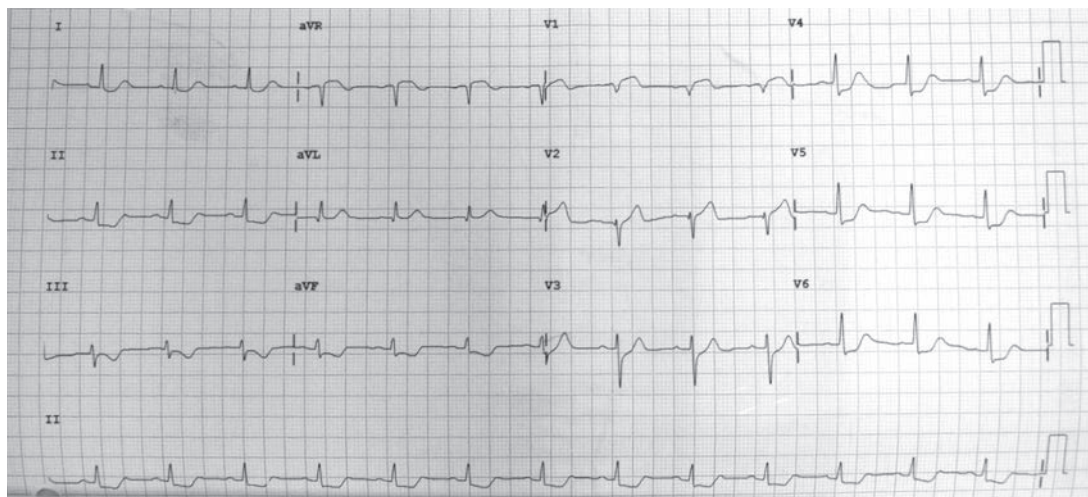


Figure 2. ST segment elevation in the aVR and V1 leads with diffuse ST segment down-sloping in the other leads.

78.6 U/L (normal range, 25–192 U/L), an MB fraction of 77.6 U/L (normal range, 0–23 U/L), a Troponin-I level of 0.13 ng/mL (normal range, <0.4 ng/mL) 3 hours later after the accident. But there was no available echocardiography screen at that time. However, the patient had typical angina manifestation and dynamic ECG changing, we arranged emergent coronary artery angiography examination. Intra-aortic balloon pump and vasopressors were also used to sustain cardiac function and arterial blood pressure. Emergent coronary artery angiography showed a small dissected flap over the proximal part of left main coronary artery (LMCA) with minimizing blood flow in left anterior descending coronary artery (LAD) but good distal run-off in left circumflex coronary artery (LCX) was found initially (Fig. 3). After repeat testing with contrast medium injection, we identified minimal compromised antegrade blood flow in LCX. So, an iatrogenic extended dissected flap was highly suspected via following coronary artery angiography (Fig. 4). We immediately deployed a 3.5×33 mm bare metal stent (BMS) and a 3.0×30 mm BMS from the proximal part of LMCA to the proximal part of LAD and to the proximal LCX sequentially with

Culotte technique. So, well distal coronary artery blood flow in left coronary artery after the procedure was achieved (Fig 5). The patient also got the improved angina symptom and stable vital sign after emergent coronary artery stenting.

Then, the patient underwent the procedure of open reduction with internal fixation operation of the fractured leg on the 8th day of hospitalization. Anti-coagulants and anti-platelet agents were administered on the 10th day, with no evidence of bleeding during hospitalization. The patient was discharged on the 20th days with normal left ventricular function.

Discussion

Blunt chest wall injury is often encountered in the emergency department. Although cardiac injury has rarely been reported in association with chest trauma, it can lead to lethal conditions such as cardiac rupture or coronary artery dissection. Traumatic coronary artery dissection was first described by Kohli et al. in 1988.¹ The mechanism of dissection included intimal tearing with intraluminal thrombosis or coronary artery spasm, with direct injury or deceleration effects. The most common clinical

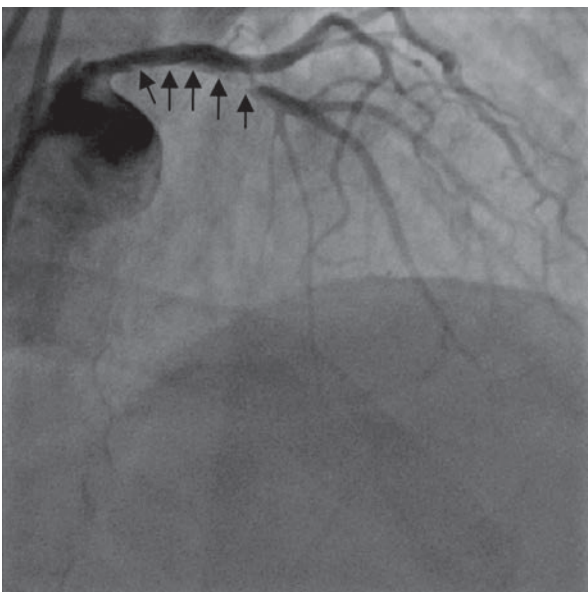


Figure 3. The dissected flap from LMCA to proximal LAD with compromised antegrade blood flow (arrow).

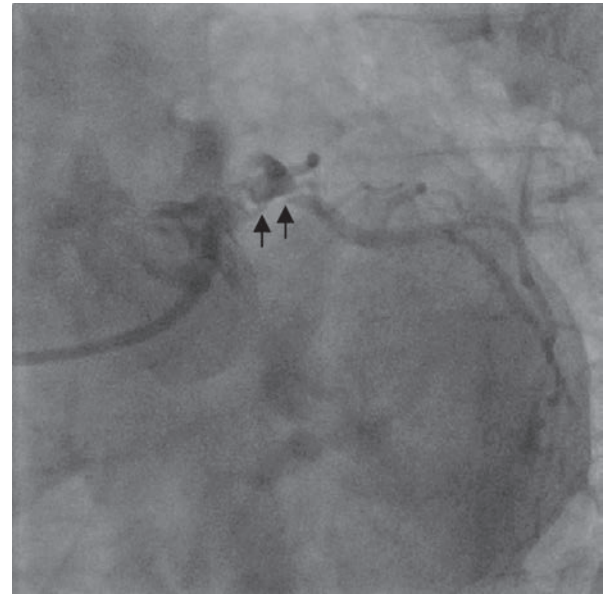


Figure 4. The extended dissected flap from LMCA to proximal LCX with compromised distal flow (arrow) after repeat intra-coronary contrast medium testing.

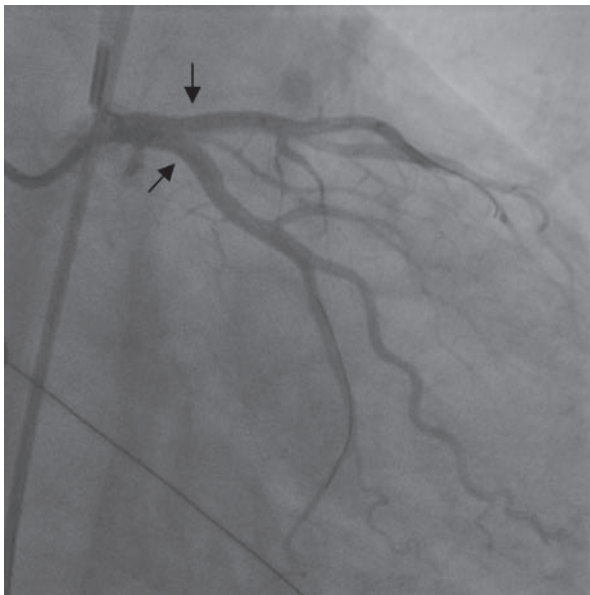


Figure 5. Good left coronary artery distal run-off was achieved after Cullotte stenting (arrow).

symptom of myocardial infarction is chest pain, but it should be differentiated from musculoskeletal injuries, pneumothorax, cardiac rupture, pericardial tamponade, and cardiac arrhythmia.² According to the anatomy of the coronary artery, the left anterior descending coronary artery is the most commonly affected vessel (71.4%), followed by the right

coronary artery (19%), left main coronary artery (6.4%), and circumflex coronary artery (3.2%). At times, two vessels may be involved.³ There are few reported cases of a dissected flap from the left main to the left ascending coronary artery.^{4,5}

Apart from lethal conditions, early detection of traumatic myocardial infarction in the emergency department is very important. The Eastern Association for the Surgery of Trauma guidelines recommend that echocardiography should be reserved for patients who present with hypotension or other unstable conditions, even if there are no initial abnormalities on electrocardiograms or in cardiac enzyme levels.^{6,7,8}

In addition, in our case, manual injection of contrast may further extend the dissected flap to the distal vessel.⁹ Therefore, we should detect the dissected flap in the coronary artery before invasive therapy. So, coronary computed tomography (CTA) may play a diagnostic role in coronary artery dissection in the emergency department; however, it is expensive and provides suboptimal radiographic images and causes an increase in heart rate. Intra-vascular ultrasound (IVUS) enables qualitative and

quantitative evaluation of the dissected coronary artery and provides useful information for determining a suitable strategy for the evaluation of a dissected flap before repeat testing with contrast medium injection and for the prevention of such iatrogenic complications.¹⁰

Anti-coagulants and anti-platelet agents should be used after stent implantation. However, physicians should adjudge the risk of haemorrhage and stent thrombosis in these kinds of patients. Thrombolysis is not advised because of the risk of bleeding from associated injuries.^{11,12} In our patient, clopidogrel and aspirin were administered 2 days after reduction and fixation of the limb fracture, and there were no obvious complications at the 3-month follow-up.

Conclusion

Early recognition of this clinical entity via screening electrocardiogram in the emergency department and taking advanced management of emergent coronary angiography with stent placement could result in a favorable outcome, like our case.

References

1. Kohli S, Saperia GM, Waksmonski CA, Pezzella S, Singh JB. Coronary artery dissection secondary to blunt chest trauma. *Cathet Cardiovasc Diagn* 1988;15:179-83.
2. Chang YC, Wang CH, Han YY, Ko WJ, Lee YC. Successful treatment of traumatic coronary artery dissection with angiographic stenting. *Am J Emerg Med* 2010; 28: 113.e1-113.e4.
3. Hobelmann A, Pham JC, Hsu EB. Case of the month: Right coronary artery dissection following sports-related blunt trauma. *Emerg Med J* 2006; 23: 580-3.
4. Lai CH, Ma T, Chang TC, Chang MH, Chou P, Jong GP. A case of blunt chest trauma induced acute myocardial infarction involving two vessels. *Int Heart J* 2006; 47: 639-43.
5. Lin YL, Yu CH. Acute myocardial infarction caused by coronary artery dissection after a blunt chest trauma. *Intern Med* 2011; 50: 1969-71.
6. Altekin RE, Er A, Oktay C, Baktir AO, Yanikoglu A, Yalcinkaya AS, Kavasog ME. Acute anterior myocardial infarction after being struck on the chest by a soccer ball. *Hong Kong J Emerg Med* 2011; 18: 120-4.
7. James MM, Verhofste M, Franklin C, Beilman G, Goldman C. Dissection of the left main coronary artery after blunt thoracic trauma: Case report and literature review. *World J Emerg Surg* 2010; 5: 21.
8. Keith Clancy, MD, Catherine Velopoulos, MD, Jaroslaw W. Bilaniuk, MD, et al. Screening for blunt cardiac injury: An Eastern Association for the Surgery of Trauma practice management guideline. *Trauma Acute Care Surg* 2012; 73(suppl 4): s301-6
9. Antoniadis D, Apostolakis S, Tzoras S, Lazaridis K. Iatrogenic right coronary artery dissection distal to a total occlusion: a case report. *Cases Journal* 2009; 2: 6797.
10. Bjørnstad JL, Pillgram-Larsen J, Tønnessen T. Coronary artery dissection and acute myocardial infarction following blunt chest trauma. *World J Emerg Surg* 2009; 4: 14.
11. Chun JH, Lee SC, Gwon HC, et al. Left main coronary artery dissection after blunt chest trauma presented as acute anterior myocardial infarction: assessment by intravascular ultrasound: a case report. *J Korean Med Sci* 1998; 13: 325-7.
12. D Leong, M Brown. Blunt traumatic dissection of the proximal left anterior descending artery. *Emerg Med J* 2006;23:e67 doi:10.1136/emj.2006.041426.

創傷性左冠狀動脈主幹枝剝離併急性心肌梗塞

吳耿逸^{1,2} 賴昭宏¹

¹國軍台中總醫院 心臟內科

²國防醫學院三軍總醫院 心臟內科

摘 要

一名63歲男性，無心血管病史及抽菸習慣，此次因騎乘摩托車時發生車禍，導致臉部及前胸有多處擦傷及挫傷，且造成鼻骨及右大腿骨折，而轉至急診求診，於等待行右腿骨折外固定術時，病患突然發生胸悶、冒冷汗等典型冠心症症狀且併有心電圖異常，進而緊急安排心導管檢查手術，檢查結果發現左冠狀動脈主幹枝剝離且併發左側冠狀動脈遠端血流減少之情況，經緊急行血管內支架置放術治療後，該病患於入院二十天後順利出院，且無相關之併發症發生。