

# Left Main Coronary Artery Dissection after Blunt Chest Trauma Presented as Acute Anterior Myocardial Infarction: Assessment by Intravascular Ultrasound : A Case Report

Coronary artery injury after blunt chest trauma is very rare, but this can result in a serious acute myocardial infarction. Coronary artery dissection is an uncommon complication of thoracic injuries. We report a case of a 17-year-old male who was presented with an anterior myocardial infarction following blunt chest trauma after a bicycle accident. His coronary angiography revealed aneurysmal dilatation with dissection of the distal left main stem coronary artery. Intravascular ultrasound showed a dissecting flap at the left main stem coronary artery. The patient was treated conservatively and discharged without serious sequelae. When symptoms and electrocardiographic findings are compatible with acute myocardial infarction, careful evaluation is important in patients with thoracic injuries for proper management. If the patient is stable, medical therapy may be appropriate. But early intervention should be considered in the presence of ongoing myocardial ischemia.

**Key Words :** Dissection, Myocardial infarction, Thoracic injuries, Ultrasonography

Jung Hak Chun, Sang-Chol Lee,  
Hyeon-Cheol Gwon, Sang Hoon Lee,  
Kyung Pyo Hong, Jung Don Seo, Won Ro Lee

Division of Cardiology, Department of Medicine,  
Sungkyunkwan University, College of Medicine,  
Samsung Medical Center, Seoul, Korea

Received : December 8, 1997

Accepted : January 31, 1998

**Address for correspondence**

Kyung Pyo Hong, M.D.  
Samsung Medical Center, 50 Ilwon-dong,  
Kangnam-gu, Seoul 135-710, Korea  
Tel : (02) 3410-3411, Fax : (02) 3410-3417  
E-mail : drhkp@samsung.co.kr

## INTRODUCTION

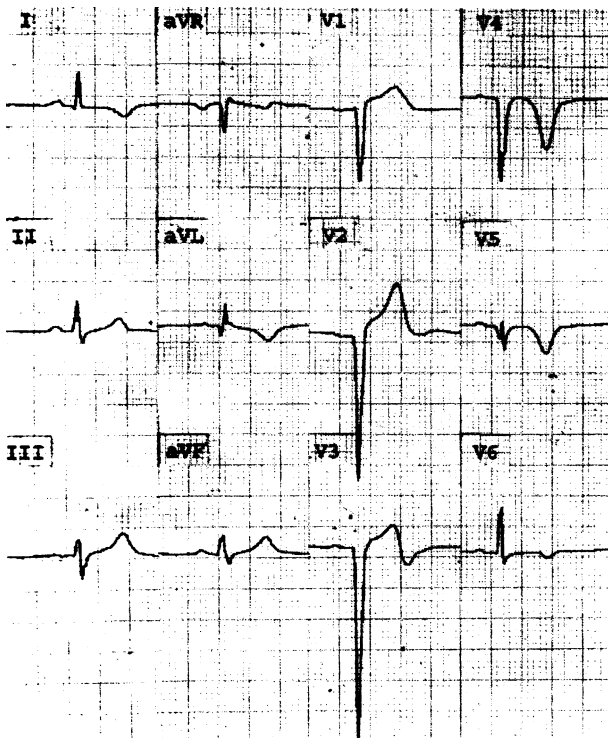
Acute myocardial infarction (AMI) after blunt chest trauma has rarely been reported in traumatic cardiac injuries (1-3). The precise incidence is unknown. AMI following trauma can be due to myocardial contusion or injury to the coronary arteries. A variety of injuries to the coronary arteries, including laceration, thrombosis, intimal dissection, arteriovenous fistula, pseudoaneurysm formation, and frank rupture have been rarely reported following a blunt trauma (3). Coronary artery dissection is an uncommon result of blunt chest trauma (4-9). We report a young man who had blunt chest trauma resulting in AMI due to distal dissection of the left main stem coronary artery, which was confirmed by intravascular ultrasound (IVUS).

## CASE REPORT

A 17-year-old male fell off his bicycle followed by transient loss of consciousness. He sustained anterior chest wall trauma and was brought to the emergency room complaining of dyspnea and anterior chest pain. No major

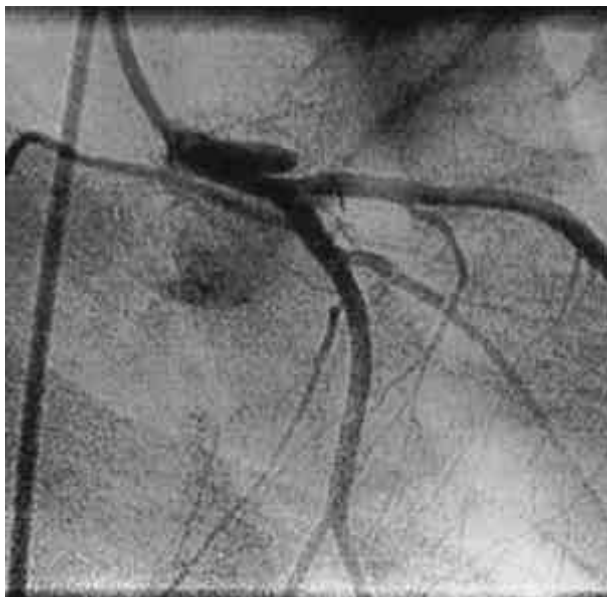
risk factors for coronary artery disease were present.

His physical examination, on arrival, revealed a blood pressure of 110/60 mmHg, a regular pulse rate of 80 beats per minute, and respiration at the rate of 18 per minute. Carotid and jugular venous pulsation were normal. Examination of the chest wall showed no sign of injury. Auscultation of the lungs was normal. The first and second heart sounds were normal with a soft S3 gallop and no murmur or rub was heard. Examination of the abdomen and extremities was normal. Chest x-ray film findings were within normal limits. The electrocardiogram (ECG) showed ST elevation and Q waves in the precordial leads (V1-V5), which was consistent with an acute anterior myocardial infarction (Fig. 1). The serum level of creatine kinase increased from 420 IU/L on admission to a peak of 7,500 IU/L at second hospital day, with a positive MB fraction. Transthoracic echocardiography showed evidence of akinesis in the septum and the anterior wall, but he was hemodynamically stable. He was given full anticoagulation with heparin and had no thrombolytic therapy. On the next day, his chest pain settled. Three days later, a stress-rest Thallium-201 myocardial perfusion scan demonstrated a fixed perfusion defect in the entire anterior wall and septum without



**Fig. 1.** Electrocardiogram showing evidence of acute anterior myocardial infarction with normal sinus rhythm.

significant redistribution. He remained hemodynamically stable. Clinical course during admission was satisfactory with no recurrence of chest pain, pericardial effusion, or severe arrhythmia.



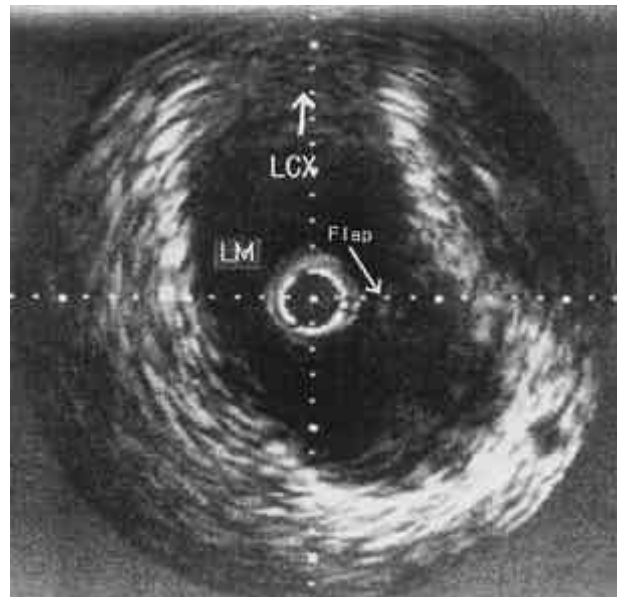
**Fig. 2.** Left coronary angiogram in the right anterior oblique view revealed aneurysmal dilatation with dissection of the distal left main stem coronary artery.

Three weeks after injury, cardiac catheterization was performed. The left ventriculography showed akinesia of the anterolateral and apical walls. The ejection fraction was 40% and intracavitary thrombus was not found. Coronary angiography revealed an aneurysmal dilatation in the distal left main stem coronary artery with 60% eccentric narrowing just distal to the aneurysmal dilatation, a finding compatible with dissection (Fig. 2). The right coronary artery was normal. IVUS showed a dissecting flap at the left main stem coronary artery (Fig. 3).

No surgery or intervention was performed because of the stable hemodynamics and no evidence of residual myocardial ischemia. He was discharged asymptotically and received aspirin 100 mg daily, captopril 12.5 mg and metoprolol 25 mg two times daily.

## DISCUSSION

Blunt trauma to the heart may result in various cardiac injuries (10). Among the recorded consequences are: cardiac arrhythmias, septal damage, valve damage, coronary fistulae, coronary artery damage, ventricular aneurysm, cardiac rupture, and as in this case, myocardial infarction. The proposed mechanisms of AMI following blunt chest trauma include dissection of the coronary artery, thrombosis, focal spasm, vessel rupture, dissecting aneurysm, or coronary embolism (1). Thrombosis has been the main suspect in pathogenesis of coronary occlusion following trauma (1, 2).



**Fig. 3.** Intravascular ultrasound showed a dissecting flap (arrow) at the left main stem coronary artery (LM: left main stem coronary artery, LCX: left circumflex artery).

Coronary artery dissection following blunt chest trauma has been considered extremely rare. Coronary artery dissection has been reported to occur following blunt chest trauma, cardiac surgery, during coronary angiography and spontaneously in the peripartum period (4, 6). Although dissection occurs with blunt chest trauma, it is a rare phenomenon. Shearing forces during the traumatic episode may produce a small intimal tear which subsequently activates platelets, fibrin, and other clotting system components until thrombosis is complete (1). The left anterior descending artery is the most frequently injured, followed by the right coronary; the circumflex is only rarely involved (1, 6). Presentation and management of coronary artery injuries vary with the specific lesion.

IVUS is a new imaging modality that enables qualitative and quantitative assessment of coronary arteries. IVUS provides a method to describe and classify morphologic characteristics of coronary vessels, and the effects of angioplasty (11, 12). The advantages of IVUS to demonstrate abnormalities of the multilayered vascular wall structure are evident in comparison with the planar luminogram obtained by coronary angiography. This information could be used to determine the most suitable strategy to treat the dissection.

Patients with coronary artery dissections usually present myocardial infarction and sudden death. The early recognition and a high level of suspicion of cardiac injury in blunt chest trauma is of great importance to offering the required prompt treatment. Management of patients following cardiac injury has to be individualized. If the chest trauma patients have symptoms and electrocardiographic changes suggesting AMI, immediate coronary angiography should be considered and further management may depend on angiographic findings. The serial findings on coronary angiography support the data that coronary artery dissection can heal spontaneously (5, 8). Most of the patients who were diagnosed angiographically survived with medical therapy alone with a few exceptions (7, 9). Thrombolytic therapy for the acute phase of these patients is controversial, because it may worsen the dissection itself (9). Bypass surgery or coronary angioplasty should be considered if the patient's

condition changes with ongoing ischemia.

The prognosis of patients with coronary dissection depends on the severity of the myocardial infarction.

## REFERENCES

1. Vlay SC, Blumenthal DS, Shoback D, Fehir K, Bulkley BH. *Delayed acute myocardial infarction after blunt chest trauma in a young woman. Am Heart J* 1980; 100: 907-16.
2. Anto J, Cokinos S, Jonas E. *Acute anterior wall myocardial infarction secondary to blunt chest trauma. Angiology* 1984; 35: 802-4.
3. Barton EN, Henry R, Martin AS, Ince W, Bartholomew C. *Acute myocardial infarction following blunt chest trauma due to the kick of a cow. West Indian Med J* 1988; 37: 236-9.
4. Grady AE, Cowley MJ, Vetrovec GW. *Traumatic dissecting coronary arterial aneurysm with subsequent complete healing. Am J Cardiol* 1985; 55: 1424-5.
5. Kahn JK, Buda A. *Long-term follow-up of coronary artery occlusion secondary to blunt chest trauma. Am Heart J* 1987; 113: 207-10.
6. Goulah RD, Rose MR, Strober M, Haft JJ. *Coronary dissection following chest trauma with systemic emboli. Chest* 1988; 93: 887-8.
7. Boland J, Limet R, Trotteur G, Legrand V, Kulbertus H. *Left main coronary dissection after mild chest trauma. Chest* 1988; 93: 213-4.
8. Marik PE. *Coronary artery dissection after a rugby injury. S Afr Med J* 1990; 77: 586-7.
9. Imamura M, Tsuchiya Y, Tahara H, Nii T, Nakashima Y, Arakawa K, Kawaguchi H. *Acute myocardial infarction in a patient with primary coronary dissection and severe coronary vasospasm. Angiology* 1995; 46: 951-5.
10. Liedtke J, DeMuth W. *Nonpenetrating cardiac injuries: a collective review. Am Heart J* 1973; 86: 687-97.
11. Waller BF, Pinkerton CA, Slack JD. *Intravascular ultrasound: a histological study of vessels during life. The new 'gold standard' for vascular imaging. Circulation* 1992; 85: 2305-10.
12. Honye J, Mahon DJ, Jain A, White CJ, Ramee SR, Wallis JB, Al-Zarka A, Tobis JM. *Morphological effects of coronary balloon angioplasty in vivo assessed by intravascular ultrasound imaging. Circulation* 1992; 85: 1012-25.