

A case of mitral papillary muscle rupture due to blunt chest trauma

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SUMMARY: Bakiler AR, Aydođdu SA, Eriřen S, Yenigün A, Atay Y. A case of mitral papillary muscle rupture due to blunt chest trauma. Turk J Pediatr 2011; 53: 97-99.

Mitral regurgitation due to papillary muscle rupture after blunt chest trauma is uncommon. Sudden onset severe mitral regurgitation may lead to death due to heart failure if surgical repair is delayed.

A previously healthy 12-year-old girl underwent splenectomy and chest tube insertion for pneumothorax after a traffic accident in a vehicle 15 days before. She was discharged from the hospital after a nine-day follow-up. She was presented to our hospital due to respiratory distress. On physical examination, an apical holosystolic murmur radiating to the axillary region was recognized. Transthoracic echocardiogram showed severe mitral regurgitation with freely moving posterior mitral chordae and prolapse of the posterior mitral valve leaflet. She received reimplantation of the complete ruptured posteromedial papillary muscle of the mitral valve. Her medical condition improved after the operation. On the postoperative echocardiogram, the left ventricular systolic function was normal with no mitral regurgitation.

Key words: blunt chest trauma, papillary muscle rupture, mitral regurgitation.

Blunt trauma is the leading cause of cardiac trauma in childhood¹. Motor vehicle accidents are the major cause of blunt trauma, accounting for 81% of cases². Blunt cardiac injuries are often unsuspected injuries associated with multiple system trauma³.

Case Report

A 12-year-old girl was presented to our hospital due to shortness of breath, palpitation and chest pain. It was reported that she had been involved in a traffic accident in a vehicle 15 days before, and underwent splenectomy and chest tube insertion for left pneumothorax due to rib fracture in another hospital. After nine days of follow-up, she was discharged home. Due to deterioration in her medical condition, she was brought and admitted to our hospital.

Her medical history was unremarkable. Her general condition was poor, with a heart rate of 116 /bpm, blood pressure of 70/50 mmHg, temperature of 36.8°C, respiratory

frequency of 36/min, and SpO₂ of 85%. On physical examination, intercostal retractions and bilaterally crepitant rales in basal lung regions and a holosystolic murmur radiating to the axilla were recognized.

Laboratory tests showed: erythrocyte sedimentation rate 24 mm/h, C-reactive protein 7 mg/L, creatine phosphokinase (CPK) 110 mg/dl, CPK-MB 3.4 mg/dl, and troponin I <0.2 mg/dl. The ECG was normal. Chest X-ray showed pulmonary edema.

Given the history of a traffic accident and findings compatible with mitral regurgitation, a transthoracic echocardiogram was done, which revealed freely moving posterior mitral chordae and prolapse of the posterior mitral valve leaflet with severe mitral regurgitation (Figs. 1, 2). Inotropic support with dopamine was started, and the patient was immediately transported to the cardiovascular surgery center.

The patient was operated the next day through midline sternotomy. On inspection of the mitral valve, complete rupture of the posteromedial

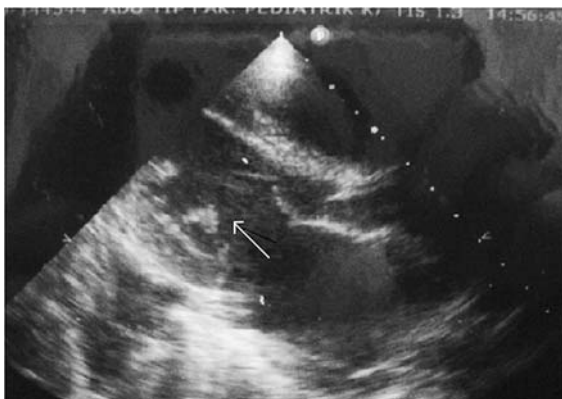


Fig. 1. Freely moving posterior mitral chordae with the ruptured papillary muscle (arrow).

papillary muscle was noted. The ruptured muscle was reimplemented. The postoperative course was uneventful, and her medical condition improved quickly. A transthoracic echocardiogram demonstrated normal left ventricular systolic function with no mitral regurgitation on the 3rd postoperative day. The patient was discharged home after a five-day follow-up.

Discussion

Without a gold standard, it is difficult to determine the true incidence of cardiac injury after blunt chest trauma, which has been reported to range from 8% to 76%⁴. Compression of the chest can cause damage through increased intrathoracic and intracardiac pressures. Cardiac rupture is more likely if compression occurs during maximum filling of the chambers³. The clinical spectrum of cardiac injuries after blunt chest trauma includes myocardial contusion, myocardial rupture, valvular disruptions, injuries to the great vessels or the coronary arteries, pericardial involvement, and dysrhythmias⁵. Among them, the most common is myocardial contusion⁶. The diagnosis of myocardial contusion can usually be made in patients with chest trauma if the ECG demonstrates a dysrhythmia or changes compatible with ischemia or contusion, if cardiac isoenzyme, especially troponin I, is elevated, and the echocardiogram is abnormal⁷.

Valvular injury from blunt chest trauma occurs infrequently. The aortic valve is the most frequently affected valve followed by the mitral

and tricuspid valves. Mitral valve lesions are usually due to the rupture of a papillary muscle or chordae³. The most useful and feasible diagnostic test for valvular injury is echocardiography, either transthoracic or transesophageal⁵.

The clinical findings of valvular injury vary from no symptoms to acute cardiogenic shock. Surgery is dictated by the extent and location of injury, presence of hemodynamic deterioration and accompanying injuries⁵.

In a recent review of the English and French literature regarding cases of surgically corrected mitral valve insufficiency from blunt chest trauma, Pasquier et al.⁸ reported that 47 of 82 patients required a valve replacement. While 19 of 20 patients with complete rupture of the anterior papillary muscle necessitated mitral valve replacement, only 5 of 10 patients with complete rupture of the posterior papillary muscle required valve replacement. The most common mitral valve lesion was papillary muscle injury, with a 60% frequency, followed by chordae tendineae damage.

In our case, the mitral posteromedial muscle was ruptured completely, fortunately without any damage to other valve components. Thus, primary repair was accomplished, obviating the need for lifelong anticoagulation therapy. Her early postoperative and two-month echocardiograms showed no leakage and trivial leakage, respectively.

In conclusion, patients presenting with severe or moderate blunt chest trauma should raise suspicion regarding possible cardiac injury and

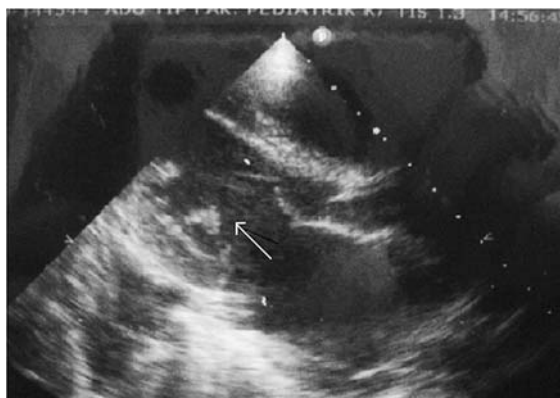


Fig. 2. Color Doppler study showing severe mitral regurgitation (MR).

the patients should undergo cardiac evaluation, ideally with an echocardiogram. In experienced hands, and depending on the nature of the valve damage, primary repair is possible.

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