



## CASE REPORT



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# Mitral papillary muscle rupture associated with blunt chest trauma and the effect of alcohol: A case report

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### Abstract

Mitral regurgitation associated with papillary muscle rupture following blunt chest trauma is an extremely rarely seen pathology. The risk of myocardial injury is much higher than normal in blunt chest traumas that develop in people who have consumed high doses of alcohol. In this case article, we present our successful diagnosis and treatment approach in a 39-year-old patient who had high-dose alcohol intake and developed acute mitral regurgitation as a result of blunt chest trauma due to a traffic accident. It may be life-saving to keep in mind that there may be life-threatening myocardial injuries in patients with blunt thoracic trauma who have consumed alcohol.

**Keywords:** Papillary muscle, alcohol, mitral valve, blunt chest traumas

### Introduction

It is rare for mitral regurgitation to form as a result of blunt chest trauma. Mitral regurgitation occurs after tearing and rupture in the leaflets or subvalvular structures. This clinical status is seen at greater numbers than other traumas and generally occurs after traffic accidents. Disruption in hemodynamics due to mitral regurgitation generally occurs immediately [1]. However, there are also reports of cases that have been diagnosed weeks or years later [2]. There is no case in the literature of the presence of alcohol with mitral papillary muscle damage. The acute effect of alcohol on the myocardium is to weaken the contraction capability of the heart (negative inotropic effect). Data obtained from isolated papillary and myocyte experiments have shown that alcohol at acute physiological intoxicating doses (80-250 mg/dl) could have a negative inotropic effect [3,4]. The case described here is a rarely reported instance of a patient with mitral muscle damage due to alcohol intoxication, who was successfully treated.

### Case Presentation

A 39-year-old male presented at the Emergency Department (ED) with complaints of sensitivity in the left upper region of the thorax following a traffic accident within the vehicle. At the time of presentation, blood pressure of the patient was 93/49 mm/Hg, pulse was 140/min, respiratory count was 22/min, and temperature was 36.5°C. The blood alcohol level of the patient on presentation was 189.20mg/dL. The laboratory test values recorded at the time of presentation at ED were creatinine:1.54 mg/dL (normal range: 0.57-1.25), AST: 95 U/L (normal range: 5-34), ALT:38 U/L (normal range: 0-55), LDH:456 U/L (normal range: 125-243), CK:664 U/L (normal range: 30-200), and CK-MB: 188 U/L (normal range: 0-24). On the thorax computed tomography (CT) taken of the patient, there were determined to be bilateral contusions in the lungs, minimal hemopneumothorax in the left hemithorax, fracture of the left-side 4-5-6-7-8 costae, and fracture in two different places in the sternum. The patient had no history of diabetes, hypertension, or coronary artery disease.

### CITATION

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The electrocardiography revealed normal sinus rhythm, right branch block, frequent ventricular extrasystole, and inferior ST depression. On echocardiography, severe mitral regurgitation and flail valve were seen. The cordal structures were prolapsed towards the atrium and ventricle in every systole. Mild tricuspid failure was seen. Pericardial effusion was not observed. The blood pressure of the patient was low, so support treatment was started and the patient was intubated. Due to the acute severe mitral regurgitation and flail valve, the patient was evaluated by the Cardiology and Cardiac and Vascular Surgery Departments together and the decision was taken for emergency surgery. The patient, who was in cardiogenic shock and intubated, was admitted for emergency surgery. A median sternotomy was performed and the sternum and costae fractures were seen. Both pleural cavities were opened, and pneumothorax and hemothorax on the left side were observed. Within the pericardium, there was seen to be hemorrhagic fluid, oedematous tissues, and a macerated appearance. The left atrium wall was fragile and oedematous. Under emergency conditions, a cardiopulmonary bypass was performed. Following the left atriotomy, it was observed that the anterior papillary muscle was completely ruptured from the attachment site to the ventricle (Figure 1, Figure 2). Partially preserving the mitral valve, it was replaced with a no. 29 Sorin mechanical prosthetic valve (Figure 3). No complications developed postoperatively, and the patient was discharged as recovered on the 7th postoperative day with the recommendation for polyclinic follow-up.

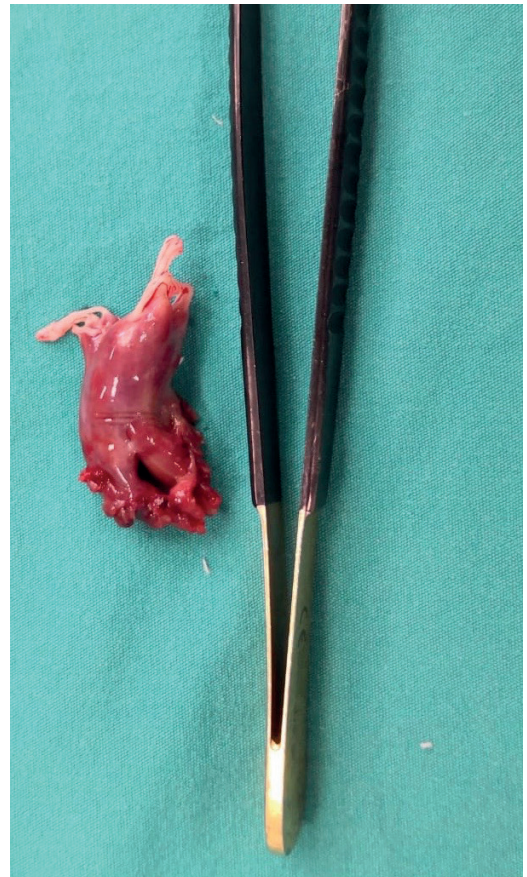


Figure 2. The torn papillary muscle

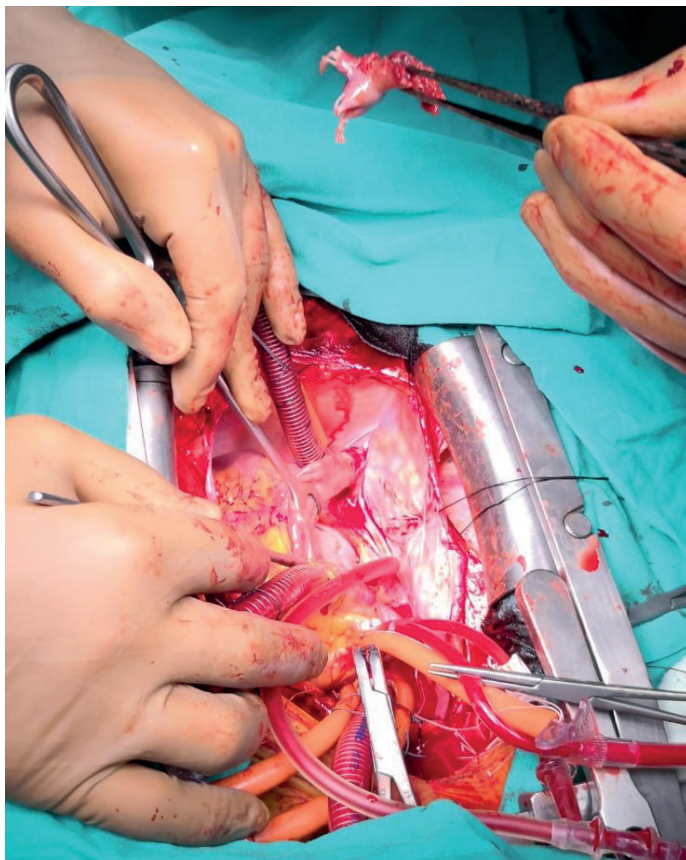


Figure 1. Intraoperative image of the case

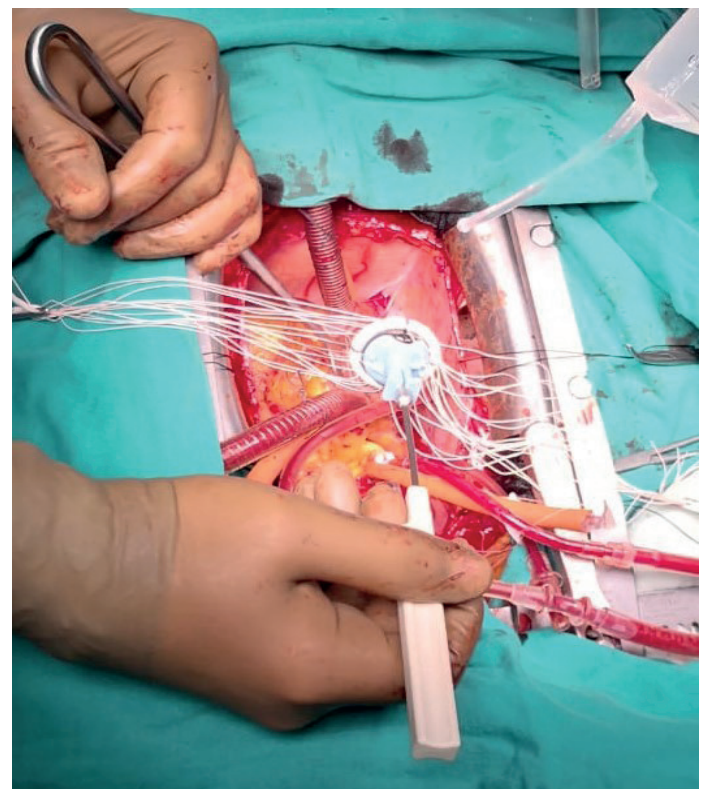


Figure 3. The mechanical prosthetic valve replacement



## Discussion

Compression of the chest in trauma may cause cardiac damage as a result of increased intrathoracic and intracardiac pressure. When heart chambers are filled to the maximum, if there is chest pressure or compression with increased pressure, there is a greater probability of cardiac rupture forming [5].

Following blunt chest trauma, there may be myocardial contusion and rupture, valve damage, large vessel or coronary artery injuries, pericardial damage and dysrhythmia [6]. The most frequently seen injury is myocardial contusion [7]. Although valve injuries are rarely seen, the most frequently seen injured valve in the heart is the aorta valve, followed by injuries to the mitral and tricuspid valves. If intrathoracic pressure increases suddenly during late diastole and early systole, the papillary muscle head or cord may be tearing in the mitral valve.

Following acute alcohol intake left ventricle dysfunction occurs, cardiac output decreases, and myocardial damage may increase following severe cardiac trauma [8,9]. Acute alcohol intake may also cause atrial fibrillation and ventricular tachycardia [10]. It was thought that the alcohol intake in the current case increased the damage formed in the heart and the extent of the mitral papillary muscle rupture. No study of papillary muscle rupture could be found in the literature on an individual who has consumed alcohol. Therefore, this case is the first on this subject in literature.

In these types of patients, rapid evaluation without disrupting hemodynamic, and transfer to early surgical treatment before the patient enters cardiogenic shock are crucial. In the current case, although the patient was in acute cardiogenic shock and was admitted for emergency surgery while intubated, the treatment was successful and the patient was discharged with full recovery. Despite the high morbidity and mortality of these types of cases in experienced clinics, surgical treatment was successfully performed in our center.

## Conclusion

Injury to the cardiac structures should be included in the differential diagnosis of blunt chest trauma injuries. The cardiac enzymes of the patient must be analyzed in the laboratory, and additionally,

electrocardiography and echocardiography (transthoracic echocardiography, transoesophageal echocardiography) must be performed. Taking into consideration that intoxicated individuals will be more predisposed to cardiac injury, greater care must be taken regarding cardiac injuries. Early diagnosis and prompt referral for early surgical treatment will enhance the chances of success in surgical intervention. In cases of blunt chest trauma, severe mitral regurgitation may be missed due to mitral papillary muscle damage not showing serious findings in the early period, but early diagnosis and timely referral to cardiac surgery will be life-saving in such trauma cases.

### Conflict of Interests

*The authors declare that there is no conflict of interest in the study.*

### Financial Disclosure

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