

## Traumatic Cardiac Wall Rupture



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### Abstract:

Traumatic cardiac wall rupture is a life-threatening emergency which develops as the result of a severe thoracic trauma. Making a prompt diagnosis in the emergency room and treating in a shortest time possible is of great importance for reducing mortality. In this study, a case brought to the emergency room after an in-vehicle traffic accident who was diagnosed with a cardiac wall rupture on examination is presented. The 37-year-old patient was admitted to the emergency room with the complaint of chest pain. On physical examination, the patient had tenderness on palpation of the sternum and right hemithorax. His measured vital parameters were a blood pressure of 90/60 mmHg and a heart rate of 120 bpm. Computed tomography of the thorax revealed minimal pneumothorax, extensive lung contusion and pericardial effusion. Echocardiography was suggestive of pericardial effusion and a 0.5 cm defect in the wall of the right ventricle. The defect was repaired by cardiovascular surgery team and the recovered patient was discharged after an 8 day follow up. The life threatening condition of cardiac wall rupture or pericardial tamponade should be kept in mind for every patient admitted to the emergency room with thoracic trauma displaying vital parameters of hypotension and tachycardia.

**Key words:** Chest Pain, Pericardial Effusion, Cardiac Tamponade, Heart Rupture, Tomography.

### Introduction

Cardiac injury should be suspected in patients who are admitted with chest, inferior neck, epigastric and precordial injuries. These types of patients should be followed frequently for hemodynamic changes and monitored closely for cardiac tamponade. Inadequacies in first aid treatment and transport and any delays in surgery can cost the patients life. Dysrhythmia, ischemia, hypotension and cardiac failure should raise the suspicion of cardiac trauma.

Patients in cardiogenic shock should be evaluated for structural injuries like cardiac wall rupture, valve injury, papillary muscle rupture or dissection require urgent surgery [1,2]. The aim of this article was to present a case who was brought to the emergency room after a traffic accident with blunt thoracic trauma, was detected to have ventricular wall rupture and recovered after surgery.

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## Case Report

A 37-year-old male patient was brought to our emergency room by the 112 emergency service. On admission, his arterial blood pressure was 90/60 mmHg, his heart rate was 120 bpm and his respiratory rate was 32/min. There was a deep lacerated area 5 cm long located a 1 cm distance from his lower lip. On examination of the chest, there was severe tenderness in the right hemithorax and sternal line with palpation. Laboratory findings were as follows: hemoglobin 14.5 g/dL, hematocrit 42.6%, white blood cell count 5770/mm<sup>3</sup>, platelet count 2.2 lacs/mm<sup>3</sup>, CK-MB 10.86 ng/mL and troponin I 2,342 ng/mL. There were no pathologies found on electrocardiography. Computed tomography of the thorax revealed minimal free fluid in the mediastinum, 2 cm of pericardial fluid, bilateral lung contusion, multiple rib fractures in the anterior part of the right hemithorax and minimal hemo-pneumothorax [Fig.1,2]. Bed-side echocardiography showed a plastering type of thrombus image 1.5 cm in diameter surrounding the heart and pericardial effusion [Fig. 3]. A 4 mm defect was observed on the free wall of the right ventricle.

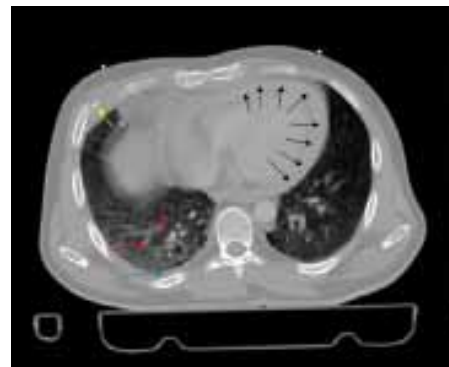
The patient was taken to emergency surgery by the cardiovascular surgery department where a sternotomy was performed, approximately 1700 cc of fluid was evacuated from the pericardium, the defect at the junction of the right atrium and ventricle was repaired and a bilateral chest tube was inserted. The patient was extubated 2 days after the operation and because of the hemothorax-lung contusion was followed by the thoracic surgery clinic for 6 days. He recovered and was discharged.

## Discussion

Chest traumas can lead to a wide spectrum of problems ranging from simple soft tissue disorders to life-threatening intrathoracic organ injuries.



**Fig.1:** Yellow arrow: Rib fracture, Black arrow: Pericardial fluid.



**Fig.2:** Yellow arrow: Rib fracture, Black arrow: Pericardial fluid, Blue arrow: Minimal hemothorax, Red arrow: Lung contusion.



**Fig.3:** Echocardiogram images in the subcostal window. Red arrow: Positive pericardial effusion is on the right.

The most common encountered pathology is rib fractures. In blunt thoracic traumas, one must be careful with regards to cardiac injury. Emergency first aid treatment, fast transport, a quickly made assessment and diagnosis and urgent surgical intervention may be life-saving [2, 3]. Myocardial contusion can cause clinical signs of arrhythmia, hypotension or cardiogenic shock. Injuries arise from the compression of the heart between the sternum and vertebrae. There is no standard criteria for myocardial injury [4]. In blunt thoracic traumas, the findings of shock may not be observed in the early period, however, patients require close monitoring even if clinical and laboratory findings are normal [5]. Our patient had mild tachycardia and chest pain, however, blood pressure values were within normal range.

The incidence of cardiac injury is 4-15% in blunt thoracic traumas. Forces increasing the intravascular hydrostatic pressure after any impact to the chest may lead to cardiac rupture. Heart failure and ventricular septal defect are more rarely seen complications in cardiac traumas. Hemodynamic impairment and ECG changes may result from injury to cardiac structures [6-8]. Our patient had no pathologies on electrocardiography. Vital signs like heart rate, respiratory rate and blood pressure should be evaluated carefully and promptly in a patient of thoracic trauma. Our patient had tachycardia and hypotension. The presence of pneumothorax may be established with auscultation. Murmur, thrill or friction rub may be heard, however, these are non-specific findings. ECG, creatine kinase MB and troponin should be evaluated in all blunt thoracic traumas. Troponin I is specific for myocardial injury [1]. The first radiologic test should be direct radiography which evaluates for rib fractures, pneumothorax and mediastinal pathologies. Computed tomography is superior to direct radiography in a patient whose vital findings are stable. Echocardiography must be performed in a patient who is suspected of having cardiac injury.

Echocardiography evaluates wall motions, valvular function and ejection fraction and determines diagnoses of pleural-pericardial effusions and aortic injury. Our patient had pericardial effusion. Patients in cardiogenic shock should be evaluated for structural injuries. Cardiac wall rupture, valvular injury, papillary muscle rupture and dissection are conditions that require emergency surgery and may be fatal if not treated.

## Conclusion

The physical examination of all patients with thoracic trauma should be detailed. Echocardiography should be urgently performed to exclude any cardiac pathologies in patients with signs of shock. Isolated blunt thoracic trauma is a rare occurrence. In patients with multiple rib fractures trauma in multitraumas, the likelihood of cardiac injury, which is fatal, should always be kept in mind. In cardiac trauma cases, the diagnosis should swiftly be made and surgical intervention should be performed immediately.

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