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**Cardiothoracic Surgery**

# Traumatic Aortic Valve Rupture: A Case Report

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**Abstract** **Case Report**

Non penetrating blunt chest trauma due to motor vehicle accidents are a daily occurrence in society. However, it is rare for patients to develop traumatic valve regurgitation in isolation [1]. We describe a case of a 22-year-old gentleman who presented with chest pain and acute heart failure symptoms following a motor vehicle accident. Initial ECHO showed a ruptured non coronary cusp of the aortic valve, with severe aortic valve regurgitation. Operation done through a midline sternotomy confirmed the findings, which was duly replaced with a bioprosthetic valve. Early detection, which might be difficult due to masking from coexistent injuries and prompt planning for a surgical repair yields a high success rate, and ensures safe outcome with excellent recovery.

**Keywords:** Traumatic Aortic Valve Regurgitation, Blunt Chest Trauma, Aortic Valve Rupture, Cardiac Surgery, Echocardiography.



## INTRODUCTION

Blunt chest traumas are usually caused by high-intensity road traffic accidents or falls from great heights. Myocardial contusion is one common sequela whereby patient presents with dyspnea, raised cardiac enzymes and mild changes on electrocardiogram. This is usually treated conservatively [2]. However, isolated valvular injury is a rare occurrence and often missed in the initial evaluations as it masks other coexistent chest injuries [2]. The involvement of Aortic valve as a complication post trauma was first described by Panderleath in 18305 and to date, is the commonest valve reported to have ruptured or avulsed as a result of non-penetrating chest trauma. Although the incidence of aortic valve injury in Parmley and associates' [7] large autopsy series was reported only in one, the survivors of blunt chest trauma commonly presents with aortic valve insufficiency either in acute or delayed settings.9 Patients who suffers traumatic aortic regurgitation usually presents with chest pain, acute distress in heart failure and new onset of murmur. Apart from physical examination, plain chest radiograph and cardiac biomarkers, prompt echocardiography, ideally Transesophageal echocardiography (TEE) proves accurate primary diagnosis which further aids in surgical planning and timing.

Here we report a case of traumatic Aortic valve rupture who presented with acute heart failure and distress, requiring ventilator support on the 3rd day post trauma. With early assessment and diagnosis, patient underwent Aortic valve replacement successfully.

## CASE REPORT

A 23-year-old gentleman recently had a motorvehicle accident while he was riding his motorcycle and skidded.

He had complaints of chest pain and was brought by ambulance to seek treatment in a nearby healthcare facility. Initial assessments showed that the patient had no acute life threatening injuries. However a murmur was detected on auscultation. Patient also had difficulty breathing requiring oxygen supplementation. Echocardiographic imaging revealed severe aortic valve regurgitation. He was the referred to our centre for further surgical management. Further assessment of the echo showed that there is a rupture of the non-coronary cusp.

Other studies were unremarkable. Patient condition remain stable and anti-failures were started. We proceeded with surgery and intraoperative findings

were consistent with a large tear at the non coronary cusp. Repair of Ruptured Cusp was not undertaken as the rim left was too thin and decision was made to replace the valve with a bioprosthetic valve.

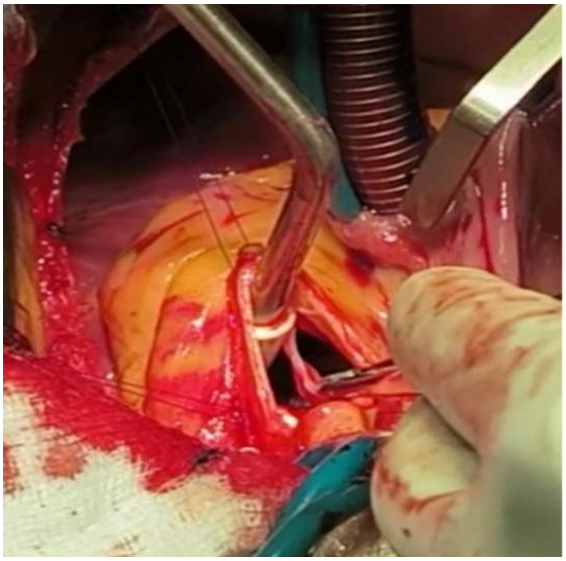

**Figure 1: Intraoperative view showing the ruptured NCC aortic leaflet**

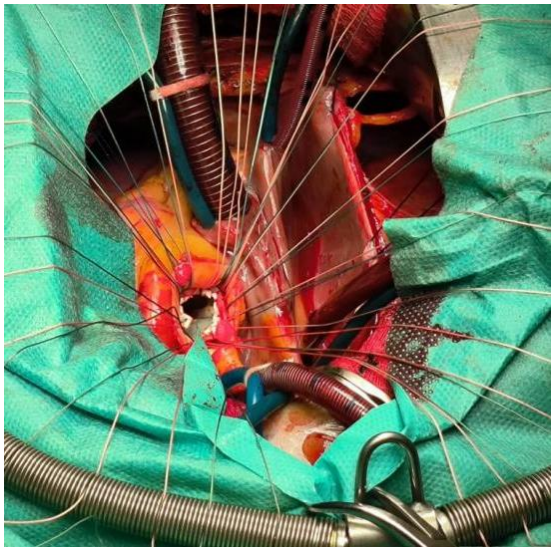

**Figure 2: Intraoperative view of the valve replacement done using bioprosthetic valve**

## DISCUSSION

Traumatic aortic regurgitation (AR) is diagnosed based on history of blunt chest trauma, no previous history of heart disease, acute or insidious onset of heart failure and/or heart murmur, severe AR evidenced by echocardiography [10]. Cardiac injury can be missed during initial evaluations of patients post trauma and very often the coexistent injuries in the intrathoracic cavity may mask the signs and symptoms of cardiac origin.

The mechanism of traumatic Aortic valve regurgitation is explained that during trauma, there will be sudden increase in the intra-thoracic pressure specifically during the diastolic phase where the transaortic pressure is maximum [1]. This steep rise in aortic pressure can cause avulsion of the commisures or tear of the cusps.

The aortic valve is a semilunar valve which lies between the aorta and left ventricle and is typically made up of three membranes(cusps) namely left coronary cusp (LCC), right coronary cusp (RCC) and noncoronary cusp (NCC). Usually only one cusp is damaged (rarely more) [1]. Toshimitsu and associates6 retrospectively studied 96 cases of aortic regurgitation post blunt chest trauma from 1955 to 2015 and concluded that isolated NCC injury is more prevalent compared to other cusps accounting to about 33%, LCC about 17% and RCC about 15%. In this case, the NCC is more prone to rupture as there are no coronary artery coverage to act as buffers against the hemodynamic stress [3].

Valve replacement has been the treatment of choice for correction of aortic valve insufficiency due to blunt chest trauma. Although there are several reports on successful valve repairs, Egoh Y and team [9] interestingly reported on a similar AV rupture that on gross examination looked like an isolated NCC tear but microscopic examination revealed involvement of left cusp as well. This indicates that direct visualization has limitations to accurately diagnose the extent of tear of an isolated cusp, failing which may subject patient to recurrent aortic valve insufficiency in future. Hence, replacement of the entire valve is better and a safer choice in patient's best interest.

## CONCLUSION

We have described a case of a Traumatic Rupture of the Aortic Valve Leaflet which was successfully managed surgically. Postoperative echocardiography showed no residual defect and patient recovered well from the surgery. Clinical examination still remains the best tool to detect a highly suspicious injury. Echocardiography is a useful modality, and in with the right operator can be a highly sensitive tool to detect and delineate this defect. Adequate delineation of the relevant anatomy is essential and can facilitate a smooth surgical repair which carries a high success rate. The defect can lead to acute heart failure which can be poorly tolerated, however in rare instances patients could develop symptoms later in life and diagnosis are made incidentally.

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