Case Report

A case of delayed presentation of post-traumatic mitral regurgitation and VSD following penetrative cardiac injury.

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Abstract

Penetrating cardiac trauma has a very high mortality and successful surgical management will involve lifesaving procedures where residual injuries may get easily overlooked. We report a case of a 49 year old male presenting with progressive symptoms of congestive cardiac failure nine years following a stab injury to the heart. He had undergone emergency surgery where the weapon was removed and the penetrating injury to the right ventricle repaired. Echocardiography during the current presentation revealed severe mitral regurgitation (MR) and a muscular VSD with congestive cardiac failure and moderate pulmonary hypertension. The MR was due to a perforation in the A2 segment of the anterior mitral leaflet which was successfully repaired with a pericardial patch and the VSD was closed with a poly tetra fluoro ethylene patch. The case emphasizes the need of post-operative follow up in patients with penetrative cardiac trauma.

Introduction

Penetrating cardiac traumata are life threatening injuries in which only a minority of patients will survive to reach the hospital. In the emergency situation the challenge to the surgeon is basically to keep the patient alive following a 'damage control' strategy. There can be residual intracardiac injuries, easily overlooked by the operator as these might not be endangering life in the emergency situation. This is worsened by the fact that the urgency of the situation will not allow any confirmatory investigation prior to, or within the duration of the procedure. For these reasons it is vitally important to follow up these patients to look for residual or deteriorating cardiac lesions.

Case report

We report a case of a 49 year old male who presented with progressive symptoms of congestive cardiac failure nine years following a stab injury to the heart.

At the age of forty he had been stabbed with a knife and had undergone emergency thoracotomy in a tertiary care hospital where a 10mm laceration of the right ventricular wall had been closed by the general surgical team. With the emergency surgery, initial resuscitation and subsequent intensive care he had recovered fully and the 2D echo at discharge had been unremarkable.

Within the following nine years he had developed worsening exercise intolerance which later progressed to orthopnoea and dyspnea.

Physical examination revealed a deviated thrusting apex with a pan-systolic murmur best heard in the cardiac apical area. Following initial management by a physician, he had presented to a cardiologist who performed a transthoracic echocardiogram and detected severe mitral regurgitation (MR) and a muscular VSD with congestive cardiac failure. The ejection fraction was 45% and both atria and the left ventricle were grossly dilated. Moderate pulmonary hypertension was detected.

Subsequent trans-oesophageal echocardiography revealed that the MR jet is coming from a perforation in the A2 segment of the anterior mitral leaflet. The patient was referred to our cardiothoracic surgical unit for mitral valve replacement and VSD closure. By this stage he was in NYHA class III and had clinical features of severe congestive cardiac failure.

Following medical optimization he underwent surgery on cardiopulmonary bypass with bicaval cannulation and cardioplegic arrest. He was detected to have dilated ventricles and left atria with a scar on the anterior right ventricular wall close to the apex with pericardial adhesions. With right atriotomy and trans-septal approach we could detect a perforation on the A2 segment of the anterior mitral leaflet (Figure 1).

The previously detected VSD was found in the upper 1/3rd of the septum (Figure 2). It was noted that the scar in the ventricular wall, the muscular VSD and the perforation in the mitral valve leaflet were aligned together in a straight line representing the track of the initial stab injury.

Case Report

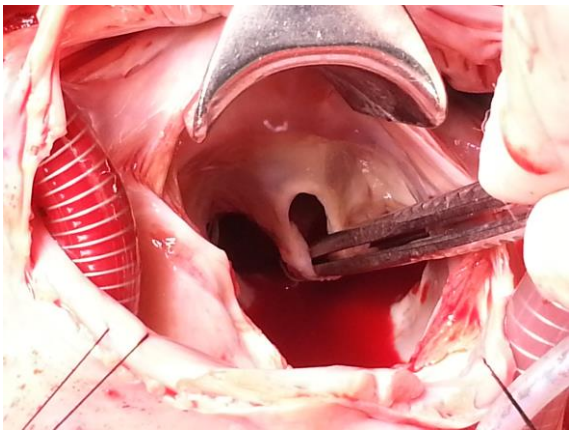

Figure 1 – Perforation in the anterior mitral leaflet.

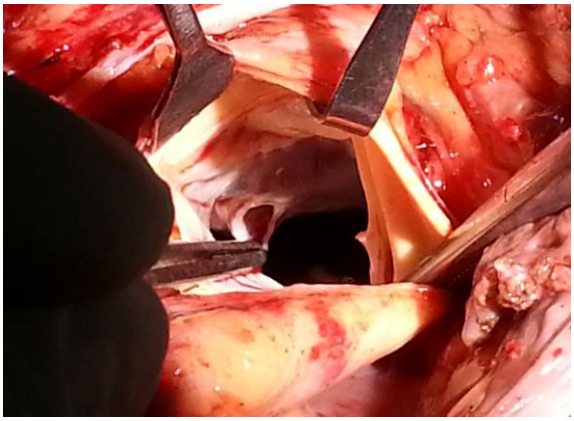

Figure 2 – Traumatic VSD

The mitral valve defect was repaired with a gluteraldehyde treated pericardial patch. A primary approximation of the perforation was not attempted as it would create tension in the suture lines and restrict the movement of the mitral leaflets leading to the so called 'aortic valve effect'. The VSD was closed with a PTFE patch. The post-operative recovery was uneventful and the mitral and VSD repairs were confirmed to be successful with TOE.

Discussion

Penetrating chest trauma can cause a spectrum of cardiac injuries that range from the breach of the cardiac free wall to the more complex injuries of intra cardiac structures. The latter may include interventricular and interatrial septa, cardiac valve complexes, conduction system, and coronary arteries and veins [1] The incidence of intracardiac injuries in penetrative thoracic trauma varies between individual studies and is approximately 5% [2].

Intracardiac injuries following penetrating trauma has approximately a 5% incidence, although different values were seen in different studies. Ventricular septal defect (VSD) is the commonest sequelae to intracardiac injury due to penetrating cardiac injuries[1,2]. The next commonest are traumatic fistulae between aorta or right ventricle or atrium. The injuries to the atrioventricular or semilunar valves are less common. The combination of VSD with valve injury is very rare and has been reported in only less than 20 cases worldwide. More importantly most of these cases were identified at the primary surgery and only a few cases of delayed presentation were found [2,3].

Following emergency surgery for cardiac trauma suspicion of a residual lesion is normally raised by the suboptimal haemodynamic status or following an incidental detection of a cardiac murmur. The clinical features may be persisting post-operatively or presenting anew, depending on whether the lesion was a significant one from the start or whether a residual minimal lesion deteriorated with time. The reason why a residual injury becomes symptomatic can be due the defect becoming worse with time. Ongoing fibrosis, enlargement of a cardiac chamber or a superadded pathology may lead to this [4,5]

Assessing the cardiac status of a post traumatic patient is best done with echocardiography [4,6]. As these lesions are likely to be progressive, routine echocardiography within reasonable intervals should be planned and carried out. In the described case both the perforation of the anterior mitral leaflet and the VSD would have enlarged with time at which stage the patient would have become increasingly symptomatic.

The consequent mitral valve regurgitation would lead to left atrial and ventricular volume overload together with increased back-pressure on the pulmonary circulation. Resultant dilatation of the left ventricle would theoretically, further increase the defect in the ventricular septum [5].

The left to right shunting of blood through the VSD exposes the right heart to volume overload and the resultant pulmonary over-circulation would lead to pulmonary hypertension. Furthermore the loss of right ventricular myocardium due to the penetrating wound and the repair resulting in a fibrotic non-contractile segment must have affected the efficiency of ventricular contractions

to a certain degree. The combination of above lesions would have led to the symptoms of worsening congestive cardiac failure with which the patient presented. As the presentation was delayed the cardiac failure was in an advanced stage. It should be emphasized that, if the patient was subjected to a routine follow-up, the condition would have been detected in an early stage with preserved cardiac function and the prolonged morbidity would have been avoided.

Anterior mitral leaflet perforation is a condition typically more commonly associated with infective damage than trauma. In addressing the resultant valve regurgitation due to the perforation, current evidence supports that the repair of the valve is superior to valve replacement in short and long-term outcome [7]. Smaller perforations of the leaflet (< 0.75cm2 according to a study by Basar *et al*) can be safely closed primarily.

Primary repair of larger perforations run the risk of worsened regurgitation with loss of apposition due to 'aortic valve effect' with loss of characteristic mitral leaflet architecture. Accordingly a pericardial patch was used in repairing the perforation. As the VSD was of significant size a PTFE patch was utilized in its repair.

Conclusion

Patients who survive penetrating cardiac injuries are known to have residual lesions which were overlooked in the emergency situation. Without timely detection these lesions may lead to high morbidity. Hence it is highly advisable for this patient group to undergo routine follow up with clinical and echocardiographic assessment.

Consent: Informed written consent was obtained from the patient for publication of this case report and any accompanying images.

References

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