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Case report - Vascular thoracic

Repair in traumatic ascending aortic rupture and valve insufficiency

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Abstract

An 18-year-old patient who had chronic traumatic ascending aortic lesion and valve insufficiency, with severe LV dysfunction, was treated by repair of the aortic wall without prosthesis and of the aortic valve by a glutaraldehyde-treated autologous pericardial patch. The patient had an uneventful recovery and minimal residual aortic regurgitation at one-month echocardiographic follow-up. Conservative surgery of these lesions is feasible, with good results, in some cases.

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Keywords: Trauma; Aortic valve insufficiency; Aortic rupture

Aortic valve insufficiency resulting from blunt trauma is an uncommon lesion. The same holds true for rupture of the ascending aorta. Association of both lesions is, thus, exceedingly rare and to our knowledge surgical treatment of both lesions has not been previously described. Herein, we report the repair of the aortic wall and valve on a case of subtotal circumferential tear of the aortic root associated with severe aortic regurgitation due to rupture of the posterior cusp.

1. Case report

An 18-year-old man with the diagnosis of severe aortic regurgitation was admitted to our centre for operation, in June 2003. The past medical history revealed that he had been involved in a motorcycle traffic accident in January 1999, resulting in a thoracic trauma with several left rib fractures and associated haemothorax, together with head (cerebral) and neck contusions. During hospitalisation the haemothorax was treated and resolved with chest tube drainage, and the other lesions had a benign course. He left the hospital without cardiac symptoms after 5 days. He had been asymptomatic until 4 months prior to the current admission, when he started complaining of dyspnoea,

culminating with hospitalisation in severe cardiac failure. The physical examination revealed signs of severe aortic regurgitation. On the ECG there was left ventricular strain and the X-ray showed cardiomegaly. Transthoracic echocardiography revealed severe aortic regurgitation, the proximal ascending aorta was slightly dilated, without signs of dissection, and the left ventricular function was severely impaired. The angiographic study showed a significantly regurgitant aortic valve, a small circumferential ‘enlargement’ in the sino-tubular junction of the ascending aorta (Fig. 1) and severely depressed left ventricular function (EF = 21%).

Upon opening the pericardium, the heart was volume-loaded and hypodynamic. After establishing cardiopulmonary bypass the ascending aorta was opened transversely and antegrade cold crystalloid cardioplegia administered through the coronary ostia. Inspection of the ascending aorta showed a subtotal circumferential disruption of the aortic intima and media, localized immediately above the sino-tubular junction, with no dissection of the aortic wall layers. The aortic valve was tricuspid and the only significant pathological finding was a $4 \times 2 \text{ mm}^2$ perforation in the non-coronary cusp. This lesion was repaired with a patch of autologous pericardium treated with glutaraldehyde, sutured with 5–0 polypropylene (Fig. 2). The lesion of the ascending aorta was treated by plication, including the whole of the abnormal wall in the closing suture of the aorta with a running suture of 4–0 polypropylene.

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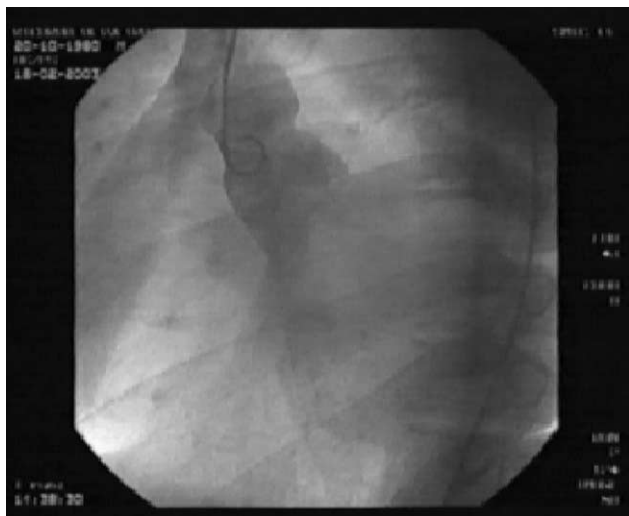


Fig. 1. Aortic angiogram shows the abnormal aortic root and confirms severe aortic valve regurgitation.

The patient was easily weaned from cardiopulmonary bypass. A transoesophageal echocardiogram, performed on the table, showed a competent aortic valve. He remained haemodynamically stable and was discharged 7 days later. He was seen in our Centre 1 month later, by which time he had made a good functional recovery: the echocardiographic study revealed mild (1 +) aortic regurgitation and a small improvement of the left ventricular ejection fraction ($EF = 25\%$).

2. Comment

Traumatic rupture of the aorta involves the descending aorta in more than 95% of the patients and the few cases involving the ascending aorta are usually fatal. On the other hand, rupture of the aortic valve is seen

infrequently and there are only a few reports of surgical treatment in the literature, possibly due to the catastrophic nature of these injuries, especially when associated with coronary artery disruption and aortic rupture [1–3].

In the case presented here there were two different lesions: an aortic wall transection immediately above the sino-tubular junction and a tear of the non-coronary cusp, responsible for the aortic regurgitation. Although they have been reported individually on previous occasions, to our knowledge the association of these two lesions in the same case was never described. In fact, the mechanism of aortic regurgitation in the presence of aortic transection usually involves the disruption of one or more cusps from the annulus leading to cusp prolapse [1,4]. In this case, although there was an almost complete aortic transection, there was no proximal extension and the valve incompetence was due to a tear in the body of the non-coronary cusp. Most probably, a rapid elevation of hydrostatic pressure, occurring at impact, producing a ‘water hammer’ effect, as described by Lundwall [5], caused both lesions.

We thought that this patient could benefit from a conservative operation because, besides the tear, the macroscopic aspect of the valve was normal, and there was no involvement of the aortic annulus. We did not perform graft replacement of the ascending aorta because the transection was chronic and limited, and the root was not significantly dilated.

The results after conservative operation of the aortic valve have been highly variable, according to different types of lesions and techniques used [1,6]. However, there are some reports showing encouraging early and long-term results with such techniques in cases of traumatic aortic valve incompetence [1,7,8]. The favourable clinical and functional surgical results obtained in this patient confirm that a conservative approach is feasible in some cases with good results.

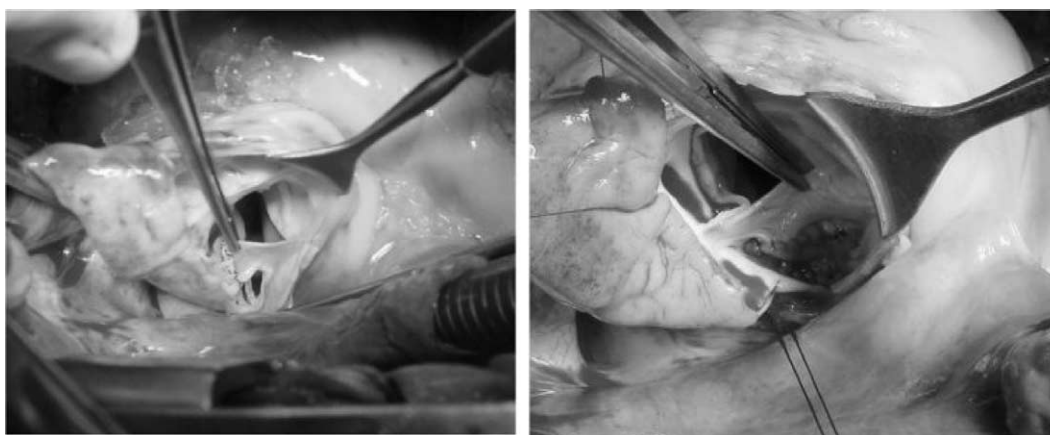


Fig. 2. Intraoperative photographs, before (left) and after (right) repair of the non-coronary aortic valve cusp.

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