Aortic valve repair for traumatic aortic insufficiency

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Prolapse of a commissural portion of the aortic valve due to partial intimal tear following a blunt chest trauma is a rare condition. Aortic valve repair is a technically demanding operation and the presence of aortic incompetence due to leaflet prolapse often leads to aortic valve replacement. We report the case of a patient with aortic insufficiency due to commissural disruption following a road traffic accident, and in whom aortic valve repair was performed.

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Reconstructive heart valve surgery has been proven to be better than valve replacement with regard to long-term survival and prevention of complications related to anticoagulant therapy. Mitral valve repair is a well established procedure while aortic valve repair is more technically demanding and long-term results are still debated. We describe a rare case of aortic valve insufficiency due to traumatic dislodgment of a commissure in which a conservative procedure was accomplished with optimal results.

Case report

A 65-year-old white male had a car accident followed by a 2-week coma with no neurological consequences. After a few days he suffered two recurrent episodes of acute pulmonary edema in concomitance with the appearance of a diastolic murmur. Transesophageal echocardiographic examination showed severe aortic insufficiency due to disruption of the commissural edge between the right and the non-coronary sinus leading to the prolapse of both leaflets. Left ventricular function was normal without any ventricular dilation. The absence of other aortic rupture sites was demonstrated by angiography and coronary arteries were normal. After clinical stabilization following medical therapy and complete recovery from traumatic injuries, an operation on the aortic valve was planned.

After anesthetic induction with 1.5 mg/kg propofol, 250 μg fentanyl and 8 mg pancuronium, normothermic cardiopulmonary bypass and cold blood retrograde cardioplegia followed by controlled reperfusion were used to obtain aortic valve access by a transverse aortotomy extended to the non-coronary sinus. On direct examination the aortic valve was tricuspid with apparently normal leaflet tissue. A partial intimal tear of the commissural site between the non-coronary and right cusp was detected leading to the prolapse of both cusps in the left ventricular outflow tract. The intimal tear without any signs of parietal dissection was easily identified and the disrupted commissure was sutured back to the aortic wall by means of a 5/0 prolene (Ethicon, Edinburgh, UK) U stitch reinforced at both sites with a pericardial glutheraldeyde fixed pledget. The aorta was closed with two running 4/0 prolene sutures. The patient was easily weaned from cardiopulmonary bypass without requiring inotropic support. Transesophageal echocardiography performed in the operative room revealed trivial central aortic regurgitation without hemodynamic significance (Fig. 1). The patient had complete recovery and after 5 days he was transferred to a cardiac rehabilitation center. Echocardiographic control after 2 months documented the absence of aortic regurgitation and a normal ventricular size and function.

Discussion

Road traffic accidents are responsible for a great number of bone injuries and vis-

Figure 1. *Postoperative transesophageal echocardiography documenting optimal result of aortic valve repair.*

ceral contusions but the lesions of the ventricular and atrial wall as well as of the heart valves are often underestimated[1]. After a blunt chest trauma, the appearance of a new heart murmur should raise the suspicion of a valvular lesion. It is important to note that clinical signs can be very attenuated but acute overload of the left or right ventricle can lead to severe clinical impairment with dismal prognosis. Routine examinations such as chest X-ray, electrocardiogram and blood tests could mislead the severity of the injury and clinical status may worsen rapidly before a diagnosis can be made. Echocardiography is the investigation of choice: transthoracic and whenever possible transesophageal analysis offer good imaging of the four chambers and of the heart valves as well as of the pericardium leading to a prompt and specific diagnosis.

The presence of a ruptured valve with functional insufficiency after blunt chest trauma represents an indication to surgical correction: obviously timing for the operation must be considered taking into account the clinical stability of the patient.

The successfully repair of post-traumatic mitral or tricuspid insufficiency has been reported applying standard surgical procedures such as artificial chordae or papillary muscle reimplantation, edge-to-edge technique or quadrangular resection possibly in association with prosthetic ring implantation[2-4].

Aortic insufficiency following chest trauma can be due to leaflet disruption from the annular tissue or caused by a commissural subtotal tear with intimal displacement. Circumferential intimal tear of the aortic root with prolapse of the three aortic valve commissures has also been described[5]. Finally, subluxation of a single cusp is another possible mechanism of valve regurgitation[6]. The presence of a bicuspid valve can be an associated risk factor[7]. Aortic valve replacement is the usual outcome in these patients but reparative techniques must be taken into account when feasible. Suture of the disrupted leaflet to the annular tissue, if necessary, using an autologous pericardial patch is an option when a single leaflet is damaged[8].

In the presence of a commissural prolapse, both single or circumferential resuspension of the lacerated part reinforced with pericardial pledgets is the otpimal solution. In the presented case the commissural tissue was firmly reattached to the aortic wall leading also to the closure of the intimal tear, a possible site for late aortic dissection and perhaps even rupture.

Transesophageal echocardiographic control in the operative room is mandatory in order to be sure of the valve competence before weaning from cardiopulmonary bypass.

Obviously clinical and echocardiographic long-term follow-up is mandatory even if a normal appearance and function of the repaired aortic valve have been reported[9].

In conclusion, the presence of significant aortic valve regurgitation following blunt chest trauma is an indication to surgical correction. In all these cases surgical reconstruction of the aortic valve is feasible and must be considered as a durable option.

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