Repair of Traumatic Tricuspid Regurgitation

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Severe tricuspid regurgitation (TR) after blunt chest trauma is rare and often results from damage to the subvalvular apparatus. When injured, the damaged subvalvular apparatus may break immediately or at a later stage due to mechanical fatigue. We report the case of a 30-year-old man who sustained a blunt thoraco-abdominal trauma in a motorbike accident. The patient’s condition immediately after the accident precluded any intervention for the moderate TR that was detected by transesophageal echocardiography. However, he later developed a severe TR which required surgical intervention 11 months after the accident. The operative findings included a ruptured anterior common chordae, a contracted and perforated anterior leaflet, and an enlarged annulus. A satisfactory valve competence was achieved with several techniques including chordae re-implantation, suture commissurotomy, and ring annuloplasty. This report highlights the unpredictable course of deterioration in traumatic TR and the possibility of complex repair.

Key Words: Blunt cardiac injury • Tricuspid regurgitation • Tricuspid valve repair

INTRODUCTION

Tricuspid regurgitation (TR) after a blunt chest trauma seldom requires immediate surgical intervention because symptoms are often tolerable, and the risk of complications associated with cardiopulmonary bypass during this time are high. However, traumatic TR may worsen abruptly and compel surgical intervention if the previously injured subvalvular apparatus ruptures. Once valve repair is attempted in severe traumatic TR, its successful completion may be challenging due to the fragile and distorted subvalvular tissues.

CASE REPORT

A 30-year-old man without a history of cardiac disease sustained a substantial blunt chest and abdominal trauma in a motorbike accident. At the accident scene, he was in a state of profound shock. He was brought to our emergency room and underwent a whole-body computed tomography, which showed a significant mediastinal and periaortic hematoma with moderate hemopericardium. The patient soon experienced a cardiac arrest and was revived with an emergency subxiphoid pericardiectomy to release the cardiac tamponade. He was immediately transferred to an operating room, where he underwent a median sternotomy to determine the origin of the hemopericardium. A lacerated right atrial appendage and multiple bleeder over the left internal thoracic artery bed were identified, and immediately repaired. The intra-operative transesophageal echocardiography (TEE) showed no aortic dissection or pseudoaneurysm, but did reveal a moderate TR. A concomitant laparotomy was performed by the consultant general surgeons for a suspected intra-abdominal hemorrhage. A grade 1 liver laceration was found and treated with gauze packing. After these damage-control operations, we decided to treat the TR conservatively. The patient recovered and was discharged with a moderate TR 30 days after the accident. He was followed-up in our outpatient clinic regularly and underwent...
periodic transthoracic echocardiography. However, the traumatic TR worsened in the 9th month after hospital discharge, and was accompanied with symptoms of fatigue and hepatic congestion. Consequently, the patient received elective tricuspid repair 11 months after the initial accident, and the operation was performed on an arrested heart. The operative findings (Figure 1) included a ruptured anterior common chordae, a contracting and perforated anterior leaflet, and a dilated annulus. An acceptable coaptation of leaflets was achieved by re-implanting the common chordae to the anterior papillary muscle remnant, closing the perforation of the anterior leaflet, and applying a downsizing annuloplasty with a 28-mm Edwards MC3 ring (Edwards Lifesciences, Irvine, CA, USA). A regurgitant jet in the anteroseptal commissure was detected by the saline test and corrected with a suture commissuroplasty. Ultimately, a satisfactory valve competence was achieved. The patient recovered well and was discharged on the 14th day after the operation. Figure 2 shows the pre-and post-repair images of the tricuspid valve obtained by TEE. Only a trivial TR was seen after the repair.

DISCUSSION

A flail anterior leaflet with a rupture of the anterior chordae or papillary muscle is the pathognomonic feature of traumatic TR. Following Carpentier’s principle of ‘one lesion, one technique’ in mitral repair, restoration of the original anatomy of the damaged tricuspid apparatus is quite straightforward, as mentioned in this report. The success of this anatomic repair depends on an accurate re-implantation of the ruptured subvalvular apparatus to the correct position in the right ventricle and an effective stabilization of the enlarged annulus with a ring device. However, in cases showing an extremely distorted geometry such as a ruptured papillary muscle or a prolapsed endocardial flap due to a myocardial laceration, the early and mid-term results of the anatomic repair may be unsatisfactory. Once a significant TR persists after an anatomic repair, the simple

Figure 1. (A) The ruptured common chordae of the anterior leaflet (**) and leaflet perforation (*). (B) Re-implantation of the ruptured common chordae (*) to the anterior papillary muscle. (C) Adequate valve competence in a saline test after ring annuloplasty. (D) An illustration of tricuspid valve repair. 1. re-implantation of the common chordae, 2. primary repair of the leaflet perforation, 3. commissural compression suture, 4. annuloplasty.

Figure 2. The preoperative (A) and postoperative (B) transesophageal echocardiogram of the tricuspid valve. The tricuspid regurgitation reduced in severity after repair.
‘clover’ technique which augments the tricuspid coaptation by stitching the mid-points of the free edge of the 3 leaflets may be worth a try before a valve replacement.

REFERENCES


