CASE REPORTS

TRICUSPID CHORDAL RUPTURE FOLLOWING STAB INJURY: SUCCESSFUL REPAIR WITH THE CLOVER TECHNIQUE

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Abstract

We report a case of a 32-year-old male patient who sustained an isolated stab injury to the left chest wall. He was initially treated with emergency surgery for right ventricular free wall rupture, with an uneventful postoperative course. During follow-up, the patient complained of exercise intolerance and dyspnea on effort. Transthoracic echocardiography (TTE) demonstrated a previously undiagnosed severe tricuspid regurgitation due to flail of the anterior leaflet and a ruptured chorda. A redo operation was scheduled, and the valve was successfully repaired, with different techniques employed.

This case highlights the importance of careful clinical evaluation of victims of chest penetrating trauma and how early diagnosis of hidden valvular lesions might increase the odds of valve repair. It also demonstrates the clover technique as a valuable technique in the correction of traumatic tricuspid regurgitation.

INTRODUCTION

Penetrating cardiac injury is a lethal medical emergency with an estimated pre and in-hospital mortality rate of 94% and 50%, respectively.[1] In this context, intracardiac lesions are underdiagnosed despite a reported incidence of 20.9%.[2] Traumatic tricuspid regurgitation is an unusual complication of acute chest injury with most reported cases resulting from blunt chest trauma.[3,4] Tricuspid insufficiency following penetrating chest trauma remains exceedingly rare.[5]

We report one such case and its successful, albeit complex, surgical repair.

DESCRIPTION

A 32-year-old man was admitted to the emergency department after sustaining an isolated stab injury with a knife to the left 4th intercostal space on the mid-clavicular line. On initial observation, the patient was hemodynamically stable despite increasing chest pain. Lab workup revealed elevated cardiac biomarkers, while TTE demonstrated a large pericardial effusion and a clot-contained rupture of the right ventricular free wall. He was admitted to the cardiothoracic surgery department for emergency surgery. Upon opening of the pericardial sac, the patient became hemodynamically unstable and cardiopulmonary bypass (CPB) was rapidly instituted. A 20mm defect was observed in the right ventricular free wall and corrected with 3-0 polypropylene pledgeted sutures. Intraoperative transesophageal echocardiography (TOE) discarded intracardiac lesions after weaning from CPB. The patient made an uneventful recovery and was discharged on the 5th postoperative day.

In follow-up appointments, 2 months after the initial surgery, the patient complained of exercise intolerance and dyspnea on moderate effort after trying to resume his usual activity. A TTE displayed right cardiac chambers dilation, severe tricuspid regurgitation due to anterior leaflet flail and a ruptured chorda. In this context, a redo procedure was scheduled.

CPB was instituted using bicaval cannulation, the aorta clamped and antegrade crystalloid cardioplegia administered. Access to the tricuspid valve was established through a right atriotomy. Inspection of this valve confirmed a ruptured primary chorda tendineae of the anterior leaflet. The valve was initially repaired with the use of 3 CV-5 GORETEXÆ neochordae on the anterior papillary muscle and free anterior leaflet margin. An annuloplasty was performed with a nº 28 Contour 3D annuloplasty ring to correct annular dilation and stabilize the repair. After weaning from CPB, TOE exposed moderate tricuspid regurgitation with a central jet. In this young healthy patient this suboptimal result was rejected and CPB was reinstituted without aortic clamping. The middle points of the free edges of the cusps were then stitched together (Clover technique) with 5-0 interrupted polypropylene sutures. Out of CPB, TOE depicted only residual tricuspid regurgitation with laminar antegrade flow.

Before discharge, TTE confirmed these findings. The postoperative course was, again, uneventful. In follow-up appointments, 2 months after surgery, he remained asymptomatic (NYHA class I), having resumed his normal activity. The latest TTE revealed maintenance of the excellent valve repair results and reversal of right heart chambers dilation.

DISCUSSION

Traumatic tricuspid regurgitation is a rare occurrence after chest trauma although it remains underdiagnosed.[4] Skoularigis J and colleagues emphasized the role of TOE in the diagnosis of intracardiac lesions after penetrating trauma.[2] In our patient, tricuspid regurgitation was not observed intra-operatively with TOE or in the pre-discharge TTE, making misdiagnosis of a severed chordae seem unlikely. We hypothesize that the original stab injury could have partially severed the chorda at the time, with eventual complete tear occurring during the postoperative period. Another possibility is the late detachment of the chorda due to necrosis of the injured myocardium. We highlight the need for careful clinical evaluation of survivors of penetrating chest trauma and the role of systematic TOE in uncovering unexpected lesions, allowing a timely repair. Van Son JA and colleagues described their experience in traumatic tricuspid valve insufficiency in blunt trauma, noticing surgery delay hinders valve repair due to papillary muscles, chordae tendineae and leaflets being frequent-

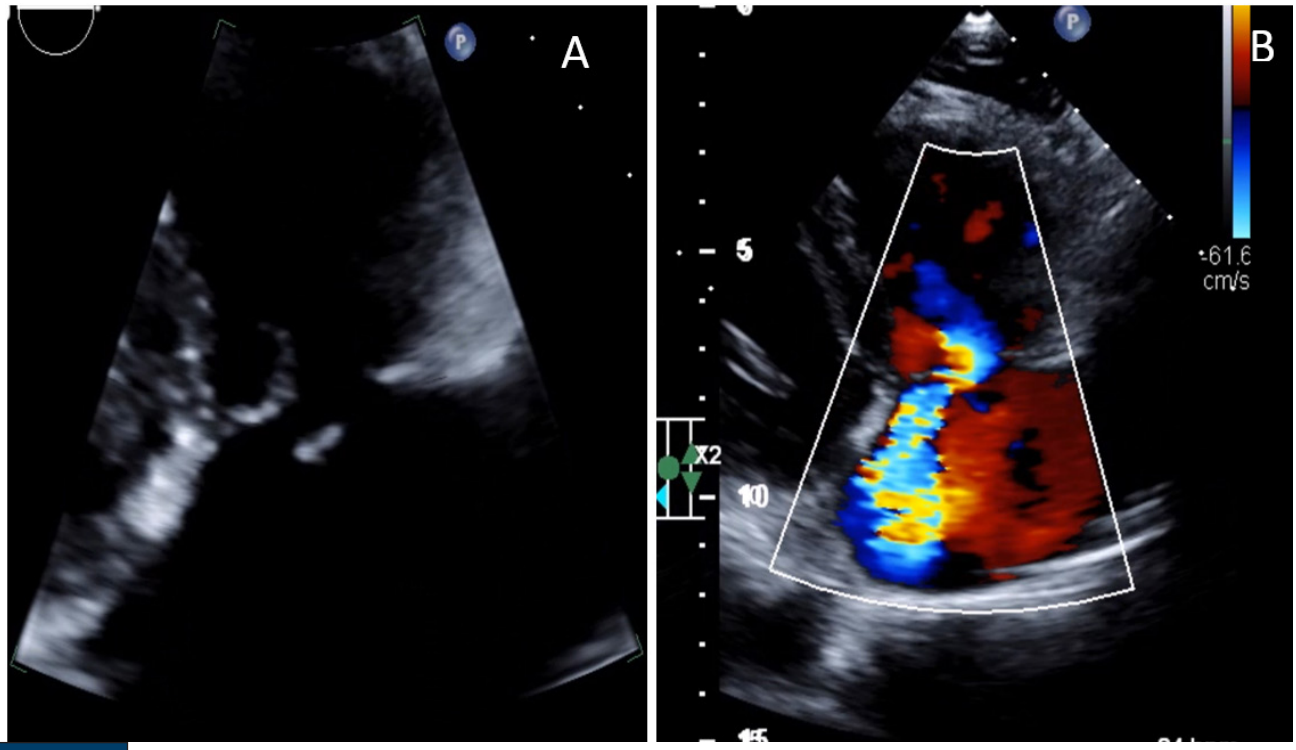

Figure 1

TTE displaying severe tricuspid regurgitation and flail of the anterior leaflet.

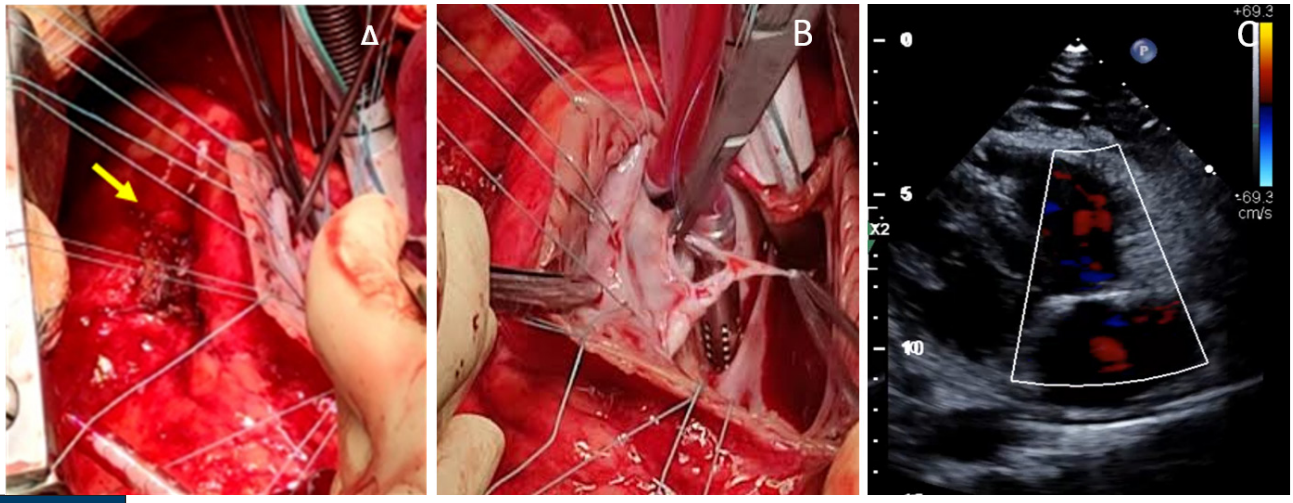

Figure 2 *(A): yellow arrow displays the scar of the laceration of the right ventricle. (B): severed chorda tendinae. (C): repaired tricuspid valve.*

ly found in a contracted and atrophic state.[3] With this in mind, prompt valve repair was proposed to our patient after the diagnosis.

There is scarce information about surgical techniques used to repair the tricuspid valve after penetrating trauma. Alfieri and colleagues reported successful repairs in 45% of cases, with techniques such as artificial chordal implants, quadrangular resection of the flail segment or chordal transposition.[6] The same authors described five cases of traumatic tricuspid regurgitation by blunt chest trauma successfully treated with the clover technique. When we addressed the specific tricuspid valve lesions, regurgitation improved but the original geometry of the valve was difficult to achieve. The result was greatly improved with the use of the clover technique and valve replacement of the valve was therefore not necessary.

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