Late Posttraumatic Tricuspid Valve Insufficiency Repaired By Artificial Cordae

Yapay Korda ile Tamir Edilen Geç Travma Sonrası Görülen Triküspit Kapak Yetmezliği

Yapay Korda ile Onarulan Travmatik Triküspit Yetmezliği / Posttraumatic Tricuspid Insufficiency Repaired By Artificial Cordae

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Özet

Anahtar Kelimeler
Travmatik Triküspit Kapak Yetmezliği; Mitral Kapak Yetmezliği; Yapay Korda; Ring Anuloplasti

Abstract
We report the case of a 45-year-old female who was referred to our clinic with dyspnea and palpitation. We learned from patient history that she had sustained a car accident 15 years ago. Transthoracic echocardiography revealed rupture of anterior tricuspid leaflet and prolapse of mitral valve causing severe tricuspid and moderate mitral valve regurgitation. Mitral valve was repaired with artificial chordae replacement and ring annuloplasty. Tricuspid valve was also repaired with anterior tricuspid leaflet triangular plication and ring annuloplasty after artificial chordae implantation. Longitudinal right atrial incision was sutured vertically and right atrium size was reduced with plication. First and sixth month echocardiographic follow up’s showed trivial tricuspid insufficiency without any complaints.

Keywords
Posttraumatic Tricuspid Valve Insufficiency; Mitral Valve Regurgitation; Artificial Chordae; Ring Annuloplasty
Introduction
Posttraumatic tricuspid insufficiency (TI) due to rupture of the chordal structure of the tricuspid valve (TV) is a very rare entity and mostly caused by blunt chest trauma. Clinical symptoms are generally mild and the hemodynamic consequences are often well-tolerated, so most of the cases has been diagnosed and treated several years after initial trauma [1]. Posttraumatic TI can be caused by several reasons such as annular detachment of leaflets, anterior leaflet chordae rupture and papillary muscle rupture [2-4]. Here we present the surgical repair of tricuspid and mitral valve regurgitation which was caused by blunt chest trauma 15 years ago.

Case Report
A 45-year-old female patient was referred to our hospital with complaints of progressive dyspnea and palpitation. She did not have any reported medical problem; however we learned that she had suffered from blunt chest trauma 15 years ago because of a car accident. A detailed physical examination revealed a grade 3-4/6 pansystolic murmur along the left lateral sternal border. Chest X-ray revealed an enlarged cardiac silhouette. Transthoracic echocardiography (TTE) showed severe (4+) TI with severe right ventricular dilatation, right atrial dilatation (8.9x9.0 cm), rupture of the chordae of the anterior tricuspid valve leaflet and moderate (2+) mitral insufficiency due to mitral valve prolapse. Right ventricular ejection fraction was 56%.

Further investigations with cardiac catheterization and coronary angiography revealed normal coronary arteries. Magnetic resonance imaging (MRI) was planned to patient and MRI confirmed right ventricular dilatation with major axis 8.9 cm and minor axis 5.5 cm. On the basis of these findings medical treatment was established with b-blockers and diuretics and surgery was planned.

Operation
A standard midline sternotomy incision was performed. After pericadiotomy, a giant right atrium was observed. After full systemic heparinization, cardiopulmonary bypass was established by aortic and bicaval cannulation. Myocardial protection was provided by antegrade/retrograde cold crystalloid cardioplegia, topical cooling and moderate systemic hypothermia. Right atrium was opened with horizontal incision. Mitral valve was evaluated via atrial septum (transseptal approach) and anterior mitral valve prolapsus was observed. Prolapse of the anterior leaflet of the mitral valve was repaired with artificial chordal replacement. The loop technique which uses the Hegar dilator to prepare loops of artificial neo-chordae was previously described [5].

Mitral valve repair was completed by the application of a flexible mitral ring and the iatrogenic atrial septal defect was primarily sutured. Saline injection test was made to control the coaptation. After completion of mitral valve repair, tricuspid valve was examined. There was flail anterior tricuspid leaflet due to ruptured chordae (Figure 2, a). Furthermore secondary chordae was tethering and restraining the motion of the anterior leaflet. Tethering secondary chordae were cut to improve the motion of the anterior leaflet.

The same artificial chordal loop technique was used for the corrective repair which was completed by flexible ring annuloplasty. (Figure 2 b,c,d). Triangular resection and plication was performed (Figure 2, e (triangular area)). Saline injection test was made to control the coaptation (Figure 2, f).

After completion of the mitral and tricuspid valve repair, horizontal right atrial incision was plicated vertically (Figure 2 g). A two-chambered atrium, consisting of caval part and functional right atrium, was created to reduce the size (Figure 2 h). Following declamping, normal sinus rhythm was obtained and decannulation was performed without any hemodynamic problem.

Postoperative period was uneventful and the patient was discharged at the postoperative 7th day. Follow-up transthoracic echocardiography revealed a normal tricuspid valve with no regurgitation.

Figure 1. Tricuspid valve, Flail anterior leaflet (arrow). (RA right atrium, RV right ventricle)
echocardiographic studies, which were performed at 1st and 6th month postoperatively, revealed normally functioning valves (Movie 1).

Discussion
Blunt chest-wall trauma is common during traffic accidents. Traumatic cardiac injuries include myocardial contusion, pericardial effusion, injuries of great vessels or coronary arteries and valvular disruptions. Among valvular injuries, aortic valve is the most frequently affected valve [2, 6, 7].

A sudden antero-posterior compression generates a severe tension and a regurgitant jet that can result in the rupture of papillary muscle and/or chordae tendineae, especially during the end-diastolic phase. Furthermore, valvular disruption can occur over time because of inflammation, necrosis or contusion of the papillary muscles or chordae tendineae [1, 8].

There is an ongoing debate in the use of echocardiography as a screening tool in patients who are suffering from blunt chest wall trauma. Furthermore, both TTE and transeosophagial echocardiography(TEE) have their limitations, though the diagnostic value of TEE is 56% and upon TTE, the yield is lower [7]. We suggest repeat examinations or the application of other imaging methods if clinical suspicion exists.

Traumatic TI is a very rare condition but the true frequency of this disease is probably underestimated because of a possible long asymptomatic phase [9, 10]. Patients become symptomatic following dilatation of right cardiac chambers and the annular dilatation. Mitral valve involvement contributes the progressive dilatation resulting in right ventricular failure.

Functional TI is more amenable for repair to preserve the right ventricular function. Right atrial dilatation over 8 cm and right ventricular dilatation over 5.5 cm is a challenging situation. However, tricuspid valve repair is superior with lower mortality and freedom from reoperation rates [11, 12]. Precise measurement of artificial cordae length and adequate plication of the leaflet without reducing the valve area and increasing the coaptation zone were the key pitfalls in this successful repair. Short term results shows this method can be used even delayed cases of posttraumatic TI with ventricular and atrial dilatation.

Competing interests
The authors declare that they have no competing interests.

References