Traumatic tricuspid valve regurgitation (TR) is a rare disease, typically caused by blunt chest trauma secondary to motor vehicle accidents. The frequency of traumatic TR has increased over the past 40 years, but the disease may be underestimated because many patients experience few or no symptoms early after the trauma. Although the diagnosis is usually confirmed on 2-D transthoracic echocardiography (2D-TTE), a lack of sensitivity limits the role of 2D-TTE in the diagnosis of traumatic TR. This case report describes a patient with traumatic tricuspid valve detachment from annulus diagnosed on 3-D transesophageal echocardiography.

Figure 1. (A–F) Transthoracic echocardiography and (G,H) transesophageal echocardiography. (A,B) Dilated right ventricular (RV) cavity and diastolic D-shape left ventricle (LV) were seen in parasternal long axis view and short axis view, respectively. (C) In RV inlet view, incomplete coaptation (open triangle) of the tricuspid valve (TV) and a suspicious defect (closed triangle) of the anterior TV were seen. (D) Color Doppler showing regurgitant jets through the 2 gaps in (C). (E) In the anterior TV, 2 suspicious defects (open and closed triangles) were noticed. (F) Color Doppler showing 2 regurgitant jets through the 2 defects in (E). (G) TV (closed triangles) was faintly seen at 0° view. (H) Color Doppler image showing severe TV regurgitation. RA, right atrium.
TTE. The utility of 3-D echocardiography in the evaluation of tricuspid valve (TV) has been suggested. Here, we describe a case of severe TR for which 3-D transesophageal echocardiography (3D-TEE) demonstrated tears of the anterior tricuspid leaflet caused by chest trauma that occurred several years prior to presentation.

A 56-year-old man without a significant prior medical history presented to the outpatient clinic with dyspnea on exertion and general fatigue. He reported that his symptoms started approximately 9 months previously and were gradually worsening. He denied chest trauma at the first visit. His blood pressure was 90/50 mmHg and heart rate was 60 beats/min. Physical examination indicated no significant abnormalities with the exception of an increased jugular venous pressure. Routine laboratory tests showed elevated aspartate aminotransferase (229 U/L), blood urea nitrogen (39.4 mg/dl), serum creatinine (1.43 mg/dl), and N-terminal pro-B-type natriuretic peptide (2,939 pg/ml). Electrocardiogram demonstrated sinus rhythm with right bundle branch block. Cardiomegaly was noted on chest X-ray.

Conventional 2D-TTE showed a markedly dilated right ventricular cavity and severe TR with mild left ventricular dysfunction and left ventricular D-shape (Figures 1A,B). Color Doppler examination showed that the TR consisted of a smaller central jet and a larger eccentric jet (Figures 1C,D). On a focused view of the anterior leaflet, 2 suspicious defects of the leaflet were noted at the area of eccentric regurgitant jet (Figures 1E,F). After 2D-TTE, we could confirm the diagnosis of severe TR, but the etiology of severe TR was still uncertain. It might be functional TR with dilatation of right side heart or primary TV pathology caused by trauma, infective endocarditis, carcinoid disease, or rheumatic heart disease. For evaluating TV morphology precisely, TEE was carried out. The morphology of TV could not be visualized well on 2D-TEE (Figure 1G) although the color Doppler images definitely demonstrated severe TR (Figure 1H).

When we performed 3D-TEE, however, a large ovoid defect between the anterior TV and the annulus was clearly observed (Figure 2A). Moreover, a smaller defect on the anterior TV was noted on color 3D-TEE (Figure 2B). After TEE, traumatic rupture of the TV was suspected as the etiology of the severe TR because of the clear margin of the rupture with otherwise normal TV morphology. When the patient was re-questioned regarding past chest trauma, he recalled a motor vehicle accident several years prior in which he had suffered chest trauma, including a minor rib fracture. TV repair was done. Intraoperative findings were of detachment of the anterior tricuspid leaflet from the annulus (Figure 2C) and a small perforation in the same leaflet (Figure 2D), which were very similar to the images obtained on 3D-TEE (Figures 2A,B). Primary repair of the detachment and the perforation in the anterior TV, as well as annuloplasty, were successfully per-
formed, and the patient recovered without complications. Immediate postoperative TTE demonstrated well-functioning repaired TV with minimal TR.

Isolated, organic TR is relatively uncommon and is typically the result of blunt chest trauma. Traumatic TR is most commonly due to anterior leaflet chordal rupture and less commonly due to rupture of the anterior papillary muscle or leaflet trauma. Traumatic TR is known to be an underdiagnosed condition. This is not only because traumatic TR frequently has no definite physical findings or symptoms, but also because 2D-TTE has a low sensitivity for this condition or is difficult to perform with some trauma patients. Despite a previous study that recommended TEE for patients with blunt chest trauma when TTE produces a suboptimal result, conventional 2D-TTE was unable to visualize the exact mechanism of severe TR, as was 2D-TTE in the present case. Instead, 3D-TEE precisely demonstrated tears of the anterior leaflet, which enabled accurate diagnosis of traumatic TR in a patient with a history of chest trauma several years previously. 3D-TTE may also provide full structural information, but in the present case it had a limitation in differentiating true defects from artifact due to poor spatial resolution (3D-TTE images not shown). The superiority of TEE over TTE in evaluating TV was reported by Victor et al, although the data were pooled using 2-D echocardiography.

Organic TR has been reported to cause high mortality and morbidity, and therefore early diagnosis and consideration of surgical intervention is important. Surgical treatment options for TR include valve repair or replacement, of which the former is generally superior to the latter. Valve repair, however, is not always successful, and the repair should be tailored to the specific valvular apparatus pathology. In the present case, 3D-TEE enabled detailed preoperative assessment, allowing for accurate planning of the TV repair. There have been other reports demonstrating the usefulness of 3D-TEE and 3D-TTE for the diagnosis of tricuspid regurgitations. The present findings, together with the previous reports, suggest the utility of 3-D echocardiography in the evaluation of TV pathology.

References