

Abnormal electrocardiogram obtained after an automobile accident

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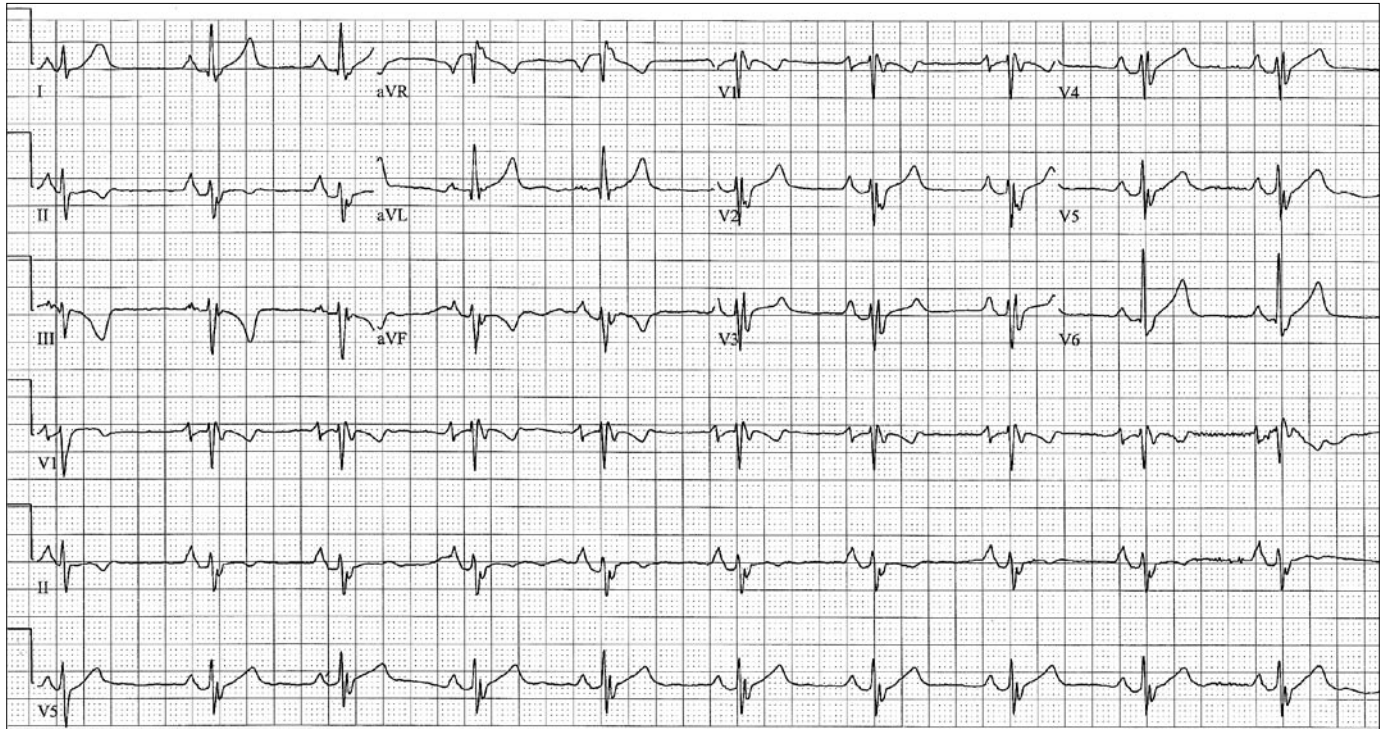


Figure 1. Electrocardiogram recorded in the emergency department. See text for explication.

A 24-year-old previously asymptomatic man suffered a fracture of his femur in an automobile accident. Because he also complained of chest pain after the accident, an electrocardiogram was obtained (Figure 1). It shows sinus rhythm with tall (>2.5 mm in lead II and >1.5 mm in leads V₁ and V₂) and broad (0.12 seconds in the precordial leads) P waves indicating atrial enlargement, predominantly right. The QRS complexes are wide (0.13 seconds), with broad S waves in leads I and V₆, broad R waves in lead aVR, and a multiphasic (rSf_s) configuration of relatively low voltage in the anterior precordial leads. Thus, the pattern is that of atypical right bundle branch block. These findings do not suggest a myocardial contusion, which was the point of concern, but are typical of Ebstein's anomaly of the tricuspid valve (1, 2), a diagnosis that was confirmed by echocardiography (Figure 2).

Ebstein's anomaly is an uncommon congenital cardiac malformation (1 per 20,000 live births with equal occurrence in males and females). It is characterized by displacement toward the right ventricular apex of the hinge point of the septal and

posterolateral leaflets of the tricuspid valve, with the anterior leaflet only rarely involved (2, 3). This displacement results in a small functional right ventricle, an atrialized portion of the right ventricle, and tricuspid regurgitation. The clinical severity of the malformation is inversely proportional to the size of the functional right ventricle and is directly related to the magnitude of the tricuspid regurgitation, the development of atrial arrhythmias, and the presence of associated malformations. These include patent foramen ovale or atrial septal defect in 50% of patients and a lower prevalence of ventricular septal defect, pulmonic stenosis, coarctation of the aorta, mitral valvular prolapse, and right-sided accessory pathways. Depending on these features, the outcome ranges from death in the neonatal period to asymptom-

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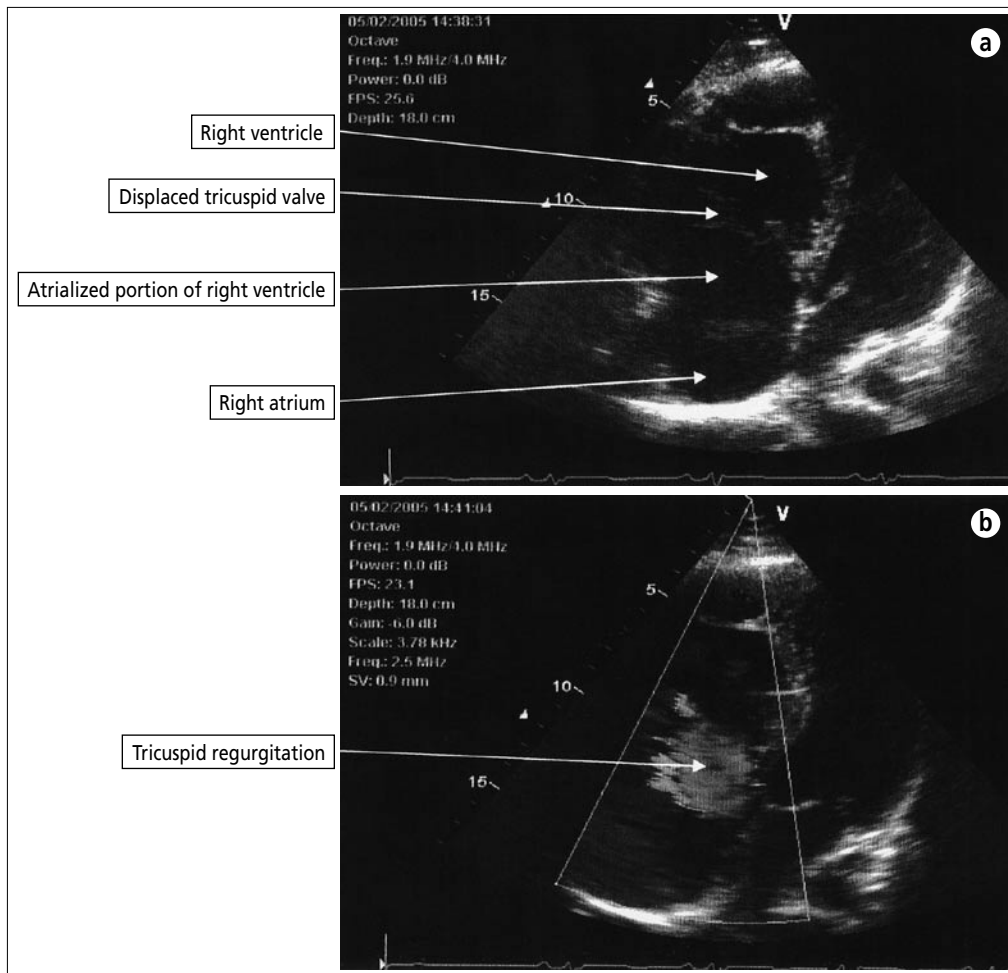


Figure 2. Apical 4-chamber echocardiographic views showing (a) the apically displaced tricuspid valve and the atrialized portion of the right ventricle and (b) tricuspid regurgitation on the color Doppler study. Despite the apical displacement of the tricuspid valve, the functional right ventricle is of adequate size, which probably explains the patient's lack of cardiac symptoms.

atic survival into middle age and rarely into the eighth decade. Symptoms eventually occur in virtually all patients and consist of dyspnea, fatigue, palpitations, and cyanosis. Death may be sudden (2).

In addition to large P waves and atypical right bundle branch block, common electrocardiographic features of Ebstein's anomaly include a long P-R interval, inferior or anterior Q waves, and the Wolff-Parkinson-White pattern of ventricular preexcitation via a right-sided accessory pathway. Atrial fibrillation, atrial flutter, and/or other supraventricular tachycardias occur in many patients, including those without an accessory pathway. In the absence of an accessory pathway, left axis deviation of the QRS complex, as seen in this patient's electrocardiogram, is unusual but has been described (1, 2).

Each encounter with a patient provides an opportunity not only to address the chief complaint but also to diagnose other conditions. The latter often have more eventual importance than the former (4).

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