

CT appearance of isolated dextroversion

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Abstract We present the multidetector CT appearance of a case of isolated dextroversion. Dextroversion is a rare anomaly characterized by extreme right-sided rotation of the heart resulting in dextrocardia with the left ventricle anterior and to the left of the right ventricle. The diagnosis is easily made with ECG-gated multidetector CT.

Keywords Dextroversion · Dextrocardia · Computed tomography

Introduction

Dextroversion (dextrocardia with situs solitus) is a rare anomaly characterized by an apparent rotation of the heart into the right hemithorax. While dextroversion is usually associated with complex congenital cardiac malformations, we present an unusual case of isolated dextroversion

in an adult patient. The diagnosis is easily established with ECG-gated cardiac CT.

Case presentation

A 42-year-old female with a medical history significant for heavy alcohol use presented to her physician complaining of dyspnea on exertion. A chest radiograph (Fig. 1) showed dextrocardia



Fig. 1 Chest radiograph demonstrates dextrocardia with the stomach bubble beneath the left diaphragm suggesting dextrocardia with normal situs of the abdominal organs

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with normal situs of the abdominal organs. For evaluation of the heart morphology, ECG-gated multislice cardiac CT was performed (Fig. 2). The study showed that the heart was located in the right hemithorax with the cardiac apex pointing to the right. The right atrium was posterior and to the right of the left atrium. The morphologic right ventricle was posterior, slightly superior and to the right of the morphologic left ventricle. The ventricular situs was D-loop (noninverted). Atrioventricular and ventriculoarterial alignments were concordant. The infundibulum of the

right ventricle passed anterior to the aorta so the pulmonic valve maintained its normal relationship to the aortic valve (anterior, superior and slightly to the left). There was visceral situs solitus with the spleen on the left and the liver on the right. There was no evidence of other congenital cardiac malformations such as polysplenia, aberrant pulmonary venous return or septal defects. The findings were diagnostic of isolated dextroversion. The left atrium and left ventricle were dilated and subsequent workup with echocardiography revealed diffuse hypokinesis of the left

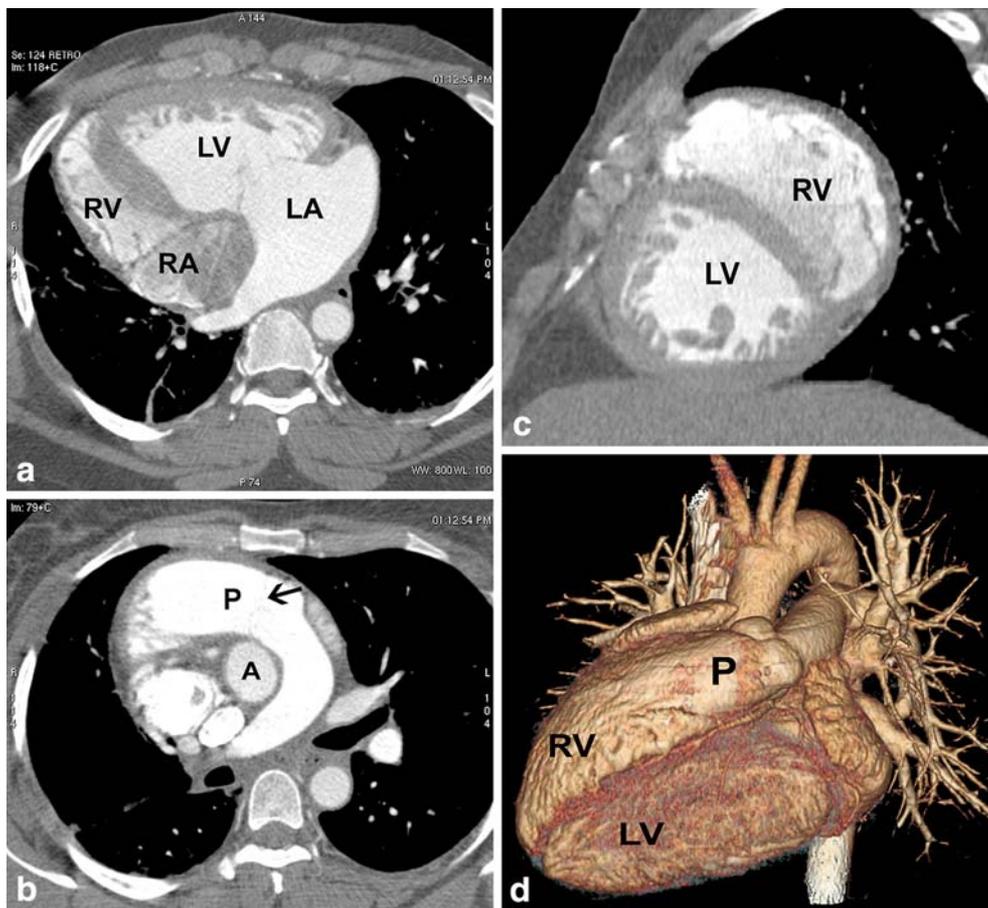


Fig. 2 Images from ECG-gated cardiac CT. **(a)** Axial CT image shows that the cardiac apex is in the right hemithorax with the left ventricle (LV) in a substernal location anterior to the right ventricle (RV). The left ventricle and left atrium (LA) remain to the left of the right ventricle and right atrium (RA) respectively. **(b)** Axial CT image at a more superior level demonstrates that the pulmonary outflow tract of the right ventricle (P) passes anterior to the aorta (A) so the pulmonic valve

(arrow) remains anterior to the aortic root. **(c)** Reformatted CT image in the short axis plane relative to the cardiac chambers shows that most of the right ventricle (RV) is posterior and superior to the left ventricle (LV). **(d)** Volume-rendered image in an anterior view provides a three dimensional perspective of the locations of the right ventricle (RV), left ventricle (LV) and pulmonary outflow tract of the right ventricle (P)

ventricle with decreased ejection fraction. This was attributed to alcoholic cardiomyopathy.

Discussion

When confronted with a case of a right-sided heart one must first distinguish between dextroposition and dextrocardia. In dextroposition the heart is displaced into the right hemithorax due to extrinsic factors such as right pneumonectomy or hypoplasia of the right lung. In dextrocardia the heart is located in the right hemithorax due to inherent cardiac malposition. In such cases the cardiac apex is in the right hemithorax and often points toward the right [1].

The most common cause of dextrocardia is situs inversus where the thoracic and abdominal viscera are in mirror image positions relative to their normal state. The vast majority of such patients are otherwise normal without associated congenital cardiac malformations. Dextroversion is the second most common type of dextrocardia representing extreme right-sided cardiac rotation relative to normal. In the most common variety of dextroversion (as the case presented here) a D-ventricular loop is formed with the apex pointing to the right but the apex of the primitive heart fails to migrate from the right into the left hemithorax. Although the right atrium and right ventricle remain to the right, they are located posterior to the corresponding left sided chambers. It is as if, looking from below, the normal heart is rotated counterclockwise to the patient's right on an axis passing through the right atrium. In the less common form of dextroversion, an

L-ventricular loop forms (with the apex pointing to the left) and the primitive heart migrates into the right thoracic cavity. These patients have corrected transposition [1, 2]. In all forms of dextroversion there is a 90% incidence of additional cardiac malformations including corrected transposition, anomalous pulmonary venous return, tetralogy of Fallot and septal defects [3]. Isolated dextroversion, without other associated congenital cardiac deformities (as in the case presented here) is exceedingly rare. Such patients are usually asymptomatic and discovery of the condition can be delayed until adulthood when patients present with symptoms of an acquired heart disease [4, 5]. With multislice ECG-gated cardiac CT, the diagnosis of isolated dextroversion is straightforward.

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