

Flip Your Perspective: Dextrocardia and its Effect on Monitoring and Management

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ABSTRACT

Dextrocardia is a rare congenital disorder characterized by an anatomically flipped heart that is positioned in the right instead of the left side of the thorax. Anatomical variants, such as this, are vital to be aware of as they can alter patient monitoring and management. In this case report, we describe a patient with dextrocardia whose anatomy affected intraoperative monitoring while undergoing a successful aortic valve replacement surgery.

KEYWORDS: dextrocardia, SAVR, cardiothoracic surgery

ABBREVIATIONS: Transthoracic echocardiography (TTE), Transesophageal echocardiography (TEE), Electrocardiogram (EKG), Computed tomography (CT), Focused Assessment with Sonography in Trauma (FAST), Superior Vena Cava (SVC).

INTRODUCTION

Dextrocardia is a rare congenital disorder characterized by an anatomically flipped heart, with its apex pointing towards the right side of the chest cavity. The incidence is 1 in 100 births with approximately 1 in 1,000 of these cases having dextrocardia and situs inversus – the reversal of organ positions in the chest and abdomen.¹ In this case report, we describe a patient with known dextrocardia with situs inversus and its effect on intraoperative monitoring during an aortic valve replacement surgery.

CASE PRESENTATION

A 54-year-old Caucasian male presented to Rhode Island Hospital for a Surgical Aortic Valve Replacement (SAVR) for severe aortic stenosis. His past medical history included dextrocardia with situs inversus, which was discovered three years prior during a routine TTE. Over the preceding year, the patient began experiencing worsening shortness of breath with exertion. Initial work-up included a chest X-ray which showed a flipped cardiac silhouette with the apex of

the heart at the right 5th intercostal space and a gastric air bubble located under the right diaphragm (**Figure 1A**). An EKG was performed and noted to have right-axis deviation, inverted p-waves and a negative QRS complex in leads I and aVL, and poor R-wave progression (**Figure 2**). The initial interpretation read “Right and left arm leads reversed”. After not being able to tolerate an exercise stress test, a TTE examination revealed the presence of severe aortic stenosis and the patient was referred for a SAVR.

On the day of surgery, prior to the induction of anesthesia, the telemetry limb leads were applied in reverse orientation. During the operation, a TEE probe was utilized to provide real-time images of the heart. Due to the patient’s dextrocardia, the mid-esophageal four chamber view of the heart was obtained at 180 degrees of omniplane instead of 0 degrees. Following a successful aortic valve replacement, the patient was transferred to the cardiothoracic intensive care unit for further post-operative care. The patient recovered well and was discharged home on post-operative day 8.

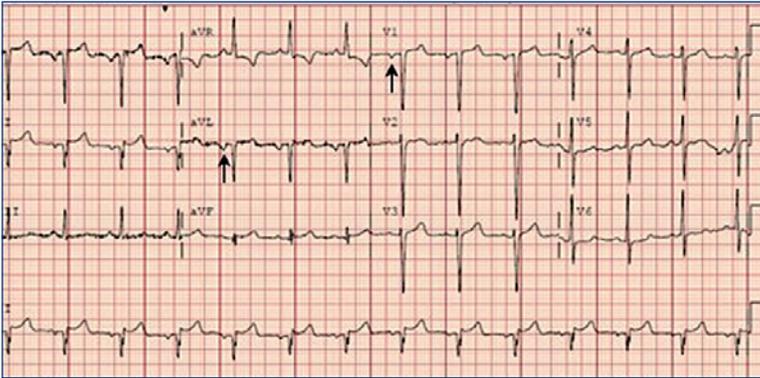
Figure 1. (A) A chest x-ray with a flipped cardiac silhouette and a gastric air bubble on the right side, compared side-by-side with **(B)** a normal chest x-ray.



DISCUSSION

Dextrocardia is a generally benign anatomical variant. The provider’s first clue to consider dextrocardia is often physical examination. Cardiac sounds are heard on the right side of the chest and the maximum cardiac impulse is palpated at the right midclavicular line.² An abnormal EKG can also

Figure 2. A 12 lead EKG demonstrating right axis deviation and poor R-wave progression, which is frequently seen in patients with dextrocardia.



tip off a provider. Characteristic EKG findings in dextrocardia include right-axis deviation and poor R-wave progression which causes the EKG software to interpret these findings as “limb leads reversed”.³ Reversal of the limb leads and reorientation of the precordial leads to the right chest will resolve the cardiac axis and R-wave progression abnormalities, respectively.⁴

The mirrored anatomy in dextrocardia with situs inversus has implications for patient monitoring and management. Our patient had a CT scan showing the SVC on the left side of the thorax. In this case, it may be beneficial to use the left internal jugular vein as opposed to the right for pulmonary artery (PA) catheter placement. During placement of a PA catheter, the tip typically wedges in the pulmonary artery around the 45–55 cm markings on the catheter. In a patient with dextrocardia, the PA catheter may have to be advanced further than normal for proper placement.⁵ In a trauma patient with situs inversus, sonographic imaging during a FAST exam would require pointing the transducer towards the left upper quadrant of the abdomen to visualize Morison’s pouch and towards the right upper quadrant to see the spleen.⁶

This case emphasizes that routine studies may result in insidious findings suggestive of dextrocardia and how anatomical variants can impact your medical management and technique.

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