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## CARDIOVASCULAR FLASHLIGHT

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## Boomerang-shaped heart in isolated dextroversion

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A 46-year-old female with recurrent syncope and sinus arrest documented on an implanted loop recorder was referred for implantation of pacemaker. Initial attempts at lead deployment were unsuccessful due to an abnormal cardiac anatomy so cardiac magnetic resonance (CMR) examination was obtained to define the anatomy. Cardiac magnetic resonance revealed dextrocardia with the apices of both ventricles positioned in the right hemithorax. The liver, lung, and spleen demonstrated visceral situs solitus. Modified four-chamber CMR (Panels A–E) revealed atrial situs solitus with the morphological right ventricle to the right and posterior to the morphological left ventricle, the pulmonic valve located to the right and anterior to the aortic valve (normal relationship; D-loop), concordant atrioventricular relationships, and no other associated defects on CMR. This constellation of dextrocardia, situs solitus, D-loop, normal atrioventricular, and ventriculo-arterial relationships is known as dextroversion. This case is fascinating because of orientation: both ventricles have bases oriented along the coronal plane, and curve steeply towards the right where their apices are located. This creates an overall 'boomerang' shape to the heart.

In the early gestation, the apex of foetal hearts with D-loop and situs solitus is located in the right hemithorax. Failure of migration of the cardiac apex from right to left results in dextroversion. Dextroversion has a reported incidence of ~1 in 30 000. Ninety per cent of dextroversion is associated with serious congenital heart defects; isolated dextroversion in the absence of any cardiac defects is a rare phenomenon. To our knowledge, an association between dextroversion and sinus node dysfunction has not been reported.

*Panel A.* Implanted loop recording revealing sinus arrest. Horizontal bar indicates time scale. Longest pause was ~8 s.

*Panel B.* Electrocardiogram of the patient before pacemaker placement shows sinus rhythm with normal P-wave morphology, but rightwardly directed QRS forces resulting in a tall R-wave in V1 and loss of R-wave amplitude across the precordial leads.

*Panel C.* Steady-state free precession cardiac magnetic resonance in the modified four-chamber view revealing dextrocardia, D-loop, atrial situs solitus, and steeply curved, 'boomerang'-shaped heart. LA, left atrium; LV, left ventricle; RA, right atrium; RVa, right ventricular apex; \*, tricuspid valve.

*Panel D.* Anterior–posterior chest radiograph demonstrates placement of pacemaker with right atrial (RA-L) and right ventricular leads (RV-L).

*Panel E.* Lateral chest radiograph reveals the right atrial lead to be posterior and inferior to the right ventricular lead, the tip of which is in the right ventricular outlet which was the most stable location.

