

Mirror Mirror on the Wall—A Case of Dextrocardia with Situs Inversus

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Abstract

Introduction: Dextrocardia with situs inversus is a rare congenital defect that causes reversal of the thoracic and abdominal organs and vessels. In regards to cardiac anatomy, the apex of the heart is right sided and the coronary ostia are reversed in patients with situs inversus and dextrocardia. Given the reversal of normal anatomic structures, successful coronary angiography requires several adjustments to engage the vessel and interpret the angiography.

Case report: This is a 67 year-old male with a history of dextrocardia with situs inversus and severe aortic stenosis who presented with dyspnea and orthopnea. Echocardiography confirmed critical aortic stenosis. He was referred for valve replacement and underwent coronary angiography. A non-standard counter-clockwise technique was required to engage the right coronary artery and a double inversion technique was utilized to aid in interpretation of the angiogram.

Conclusion: Dextrocardia with situs inversus is a rare congenital defect and when not associated with Kartagener's carries a normal life expectancy. Therefore it is not unusual that patient's will need coronary angiography. Several technical modifications are needed for successful angiography.

has been described previously as the Double-Inversion technique. This technique was first described by Goel et al. and combines right to left reversal of the image during acquisition using the "horizontal sweep reserve" button on the machine plus a degree-to-degree reversal in the desired RAO/LAO angulations keeping the cranial/caudal tilts the same [3].

Case Report

The patient is a 67-year-old male with a history of dextrocardia situs inversus, severe aortic stenosis, and atrial fibrillation who presented with dyspnea and orthopnea. Echocardiography confirmed a heavily calcified valve and severe aortic stenosis with a mean trans-valvular gradient of 52 mmHg, peak velocity of 4.5 m/s, dimensionless index of 0.19, and an aortic valve area of 0.68 cm². Given his symptomatic severe aortic stenosis, he was evaluated for valve replacement and underwent a preoperative coronary angiography. During angiography, his right coronary artery initially was difficult to engage with the standard clockwise rotation; however, it was successfully engaged with a counterclockwise rotation with a 6F JR4 catheter. The left main coronary artery, on the other hand, was easily engaged with a 6F JL4 catheter in a clockwise technique. Prone imaging format was used to record most images for easier interpretation. Coronary angiography demonstrated non-obstructive coronary artery disease, situs inversus, and right-sided aortic arch.

Discussion

Dextrocardia is a rare condition leading to the transposition of the heart in the right thoracic cavity with the apex pointing to the right side. When dextrocardia is not associated with Kartagener's syndrome, the condition carries a normal life expectancy [4,5]. Therefore, it is not unusual for patients to live up to ages where senile aortic stenosis is encountered. The first cardiac catheterization in a patient with dextrocardia first occurred in 1973 by Hynes et al. [2]. Since then, few have reported trans-femoral or trans-radial catheterization procedures.

Introduction

Dextrocardia with situs inversus is a rare congenital defect in which the apex of the heart is on the right side of the body. The incidence of dextrocardia with situs inversus is estimated to be around 1:8,000 to 1:10,000 [1]. The prevalence of coronary artery disease in patients with dextrocardia is similar to that in the general population [2]. Coronary angiography in patients with dextrocardia presents several challenges including how to engage the vessels, as well as, angiographic interpretation. Here, we present a patient with dextrocardia and critical aortic stenosis that had coronary angiography performed using what

Given the anatomic variance with reversed coronary ostia, several modifications are needed for successful angiography in patients with dextrocardia: proper catheter selection, catheter manipulation for successful cannulation, and mirror image angiographic angulation. Currently, there is no consensus on specific imaging catheters. Moreyra et al. reported that regular coronary catheters (Judkins) are difficult to engage the coronary ostia and recommend wider, nontraditional catheters [4]. Others, specifically Kakouros et al. have reported that the coronary ostia can successfully be cannulated with Judkins catheters with opposite-direction catheter rotations (i.e. anticlockwise rotation in the ascending aorta for the right coronary artery) [5]. Mirror image angiographic angulation involves reversing the required right anterior oblique/left anterior oblique angles but keeping the cranial/caudal tilts the same [6]. Other angiographers used a double-inversion technique, which normalizes all angiographic pictures to the standard conventional pictures as seen in a normally located heart using the “horizontal sweep reserve” button on the machine.

In our case, the right coronary ostium was successfully engaged with a Judkin’s catheter using a counter-clockwise torqueing technique as described by Kakouros et al. Coronary angiography using modern Philips equipment involved changing the acquisition parameters to prone orientation (Figure 1). This resulted in acquiring “mirror” images in a “regular format”, making interpretation easier. Engagement of the left coronary was easily performed with a 6F JL4 catheter. Right coronary artery engagement did require a counterclockwise rotation of JR4 catheter rather than standard clockwise rotation (Figures 2-4).

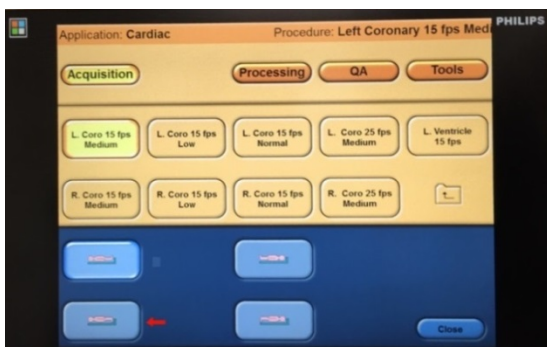


Figure 1: Screenshot from the Phillip’s monitor touch screen. The acquisition parameters were changed to the prone position which allowed “mirror” images in a “regular format” to be acquired, making interpretation easier.

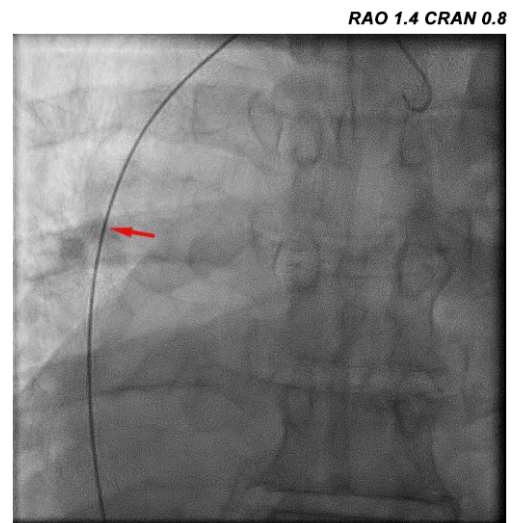


Figure 2: Coronary Angiography demonstrating right sided aortic arch.

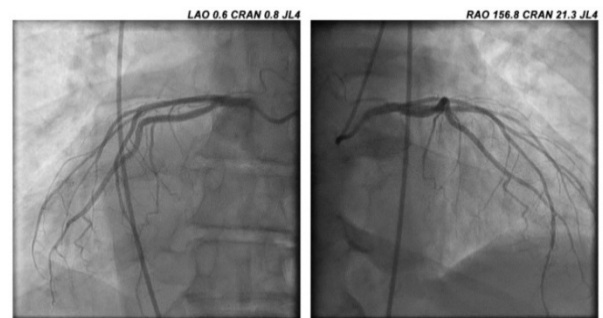


Figure 3: The left coronary ostium was engaged successfully with the Judkin’s Left catheter. The frame on the left has the image in actual orientation while the one on the right has the image that is “normalized” using double inversion technique.

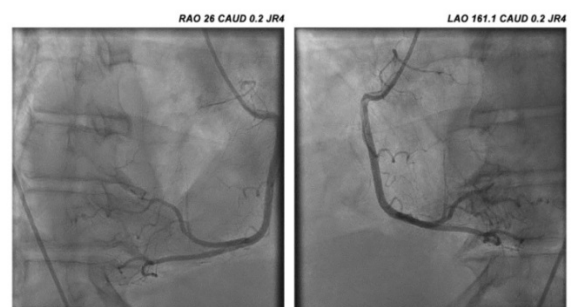


Figure 4: The right coronary ostium was engaged successfully with a Judkin’s catheter using a counter-clockwise torqueing technique. The frame on the left has the image in actual orientation while the one on the right has the image that is “normalized” using double inversion technique.

Conclusion

Dextrocardia with situs inversus is a rare congenital defect and when not associated with Kartagener's carries a normal life expectancy. Therefore it is not unusual that patient's will need coronary angiography. Several technical modifications are needed for successful angiography, including a non-standard counter-clockwise technique to engage the Right Coronary artery, as well as the Double-Inversion technique.

References

1. Kalyan MV, Rajasekhar D, Vanajakshamma V, Vidyasagar A, Naresh K (2015) Primary percutaneous coronary intervention for acute myocardial infarction in a patient with situs inversus dextrocardia. *J Indian Col Cardiol* 5(4): 316.
2. Hynes KM, Gau GT, Titus JL (1973) Coronary heart disease in situs inversus totalis. *Am J Cardiol* 31(5): 666-669.
3. Goel PK (2005) Double-Inversion Technique for Coronary Angiography Viewing in Dextrocardia. *Catheter Cardiovasc Interv* 66(2): 281-285.
4. Moreyra AE, Saviano GJ, Kostis JB (1987) Percutaneous transluminal coronary angioplasty in situs inversus. *Cathet Cardiovasc Diagn* 13: 114-116.
5. Kakouros N, Patel SJ, Redwood S, Wasan BS (2010) Triple-vessel percutaneous coronary revascularization in situs inversus dextrocardia. *Cardiol Res Pract* 2010: 606327.
6. Jauhar R, Gianos E, Kashifuddin B, Roethel M, Kaplan BM (2005) Primary angioplasty in a patient with dextrocardia. *J Interv Cardiol* 18: 127-130.