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Case Report

Triple vessel percutaneous coronary intervention in a patient with situs inversus dextrocardia using a transradial approach

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ABSTRACT

Situs inversus dextrocardia is a challenging situation for an interventional cardiologist. This report presents a rare case where multivessel percutaneous coronary intervention was performed in a single sitting using transradial approach. The challenges encountered in the procedure and clues to successful outcome are discussed.

1. Introduction

Situs inversus dextrocardia is a rare congenital anomaly characterized by a mirror image position of the heart and abdominal viscera to the right side. The estimated incidence is 1:8000 to 1:10,000 live births.[1] These individuals usually have structurally normal hearts, normal longevity and coronary artery disease frequency similar to the general population.[2]

There are isolated reports of coronary angiography (CAG) and percutaneous coronary intervention (PCI) in these patients.[3–8] This communication describes a case of situs inversus dextrocardia presenting with unstable angina who underwent single stage multivessel PCI using transradial approach.

2. Case report

A 70-year-hypertensive male presented to a nursing home with precordial pain, perspiration and uneasiness of 6–8 h duration. Physical examination revealed right-sided apex beat with normal first and second heart sounds and no murmurs. Relevant blood investigations showed hemoglobin 14.3 gm%,

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Fig. 1 – (a) A standard 12-lead ECG showing negative P wave in lead I and aVL, positive R wave in lead aVR, prominent S wave in left sided chest leads and a prominent R wave in right sided chest leads suggestive of dextrocardia. (b) A ECG of standard limb leads and right-sided chest leads suggestive of dextrocardia.

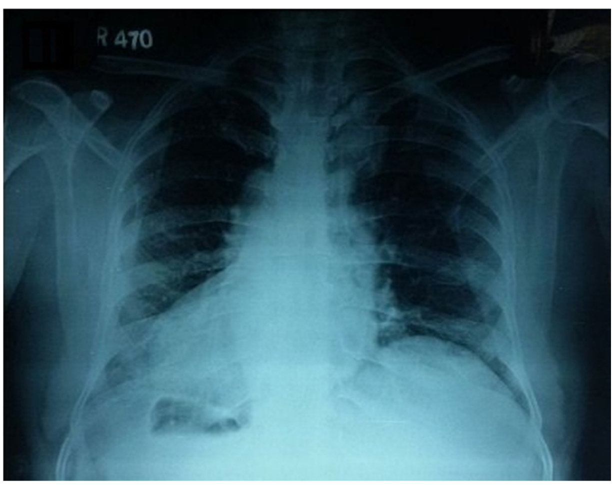

Fig. 2 – Chest skiagram PA view showing major cardiac mass as well as stomach bubble on right side consistent with situs inversus dextrocardia.

total leukocyte count 7600/mm^3, serum creatinine 1.1 mg/dl, CPK-MB 34 U/L (normal up to 24 U/L) and negative Troponin-T. A standard 12 lead electrocardiogram (ECG) (Fig. 1a) revealed sinus rhythm, negative P wave in lead I and aVL, positive R wave in lead aVR, prominent S wave in left sided chest leads and a prominent R wave in right sided chest leads suggestive of dextrocardia. There was a minor ST segment elevation in leads I, II, aVF with q waves in inferior leads and T wave inversion in lead aVR. ECG of standard limb leads and right sided chest leads was consistent with dextrocardia (Fig. 1b). Chest skiagram PA view revealed major cardiac mass, aortic arch and stomach bubble on right side (Fig. 2). Ultrasonography of abdomen revealed inversion of abdominal viscera with liver and gall bladder on left and spleen on right side. Echocardiography using subcostal and right parasternal approach confirmed situs inversus dextrocardia and revealed inferior wall hypokinesia with left ventricular ejection fraction (LVEF) of 45%. Initial medical management included dual antiplatelet agents, aspirin and clopidogrel, atorvastatin, nitrates, and low molecular weight heparin. After 5 days of medical therapy, patient was referred to our center for invasive management.

CAG using right transradial access with 5F tiger catheter (Terumo Corporation, Somerset, New Jersey, USA) revealed a dominant right coronary artery (RCA) with proximal long segment lesion with maximum 80% stenosis and a plaque at posterior left ventricular (PLV) branch (Fig. 3a). Cannulation of left coronary ostia was difficult and was achieved using Judkins left 4 cm (JL 4) diagnostic catheter. There was a proximal segment plaque and a 80% stenosis in the mid

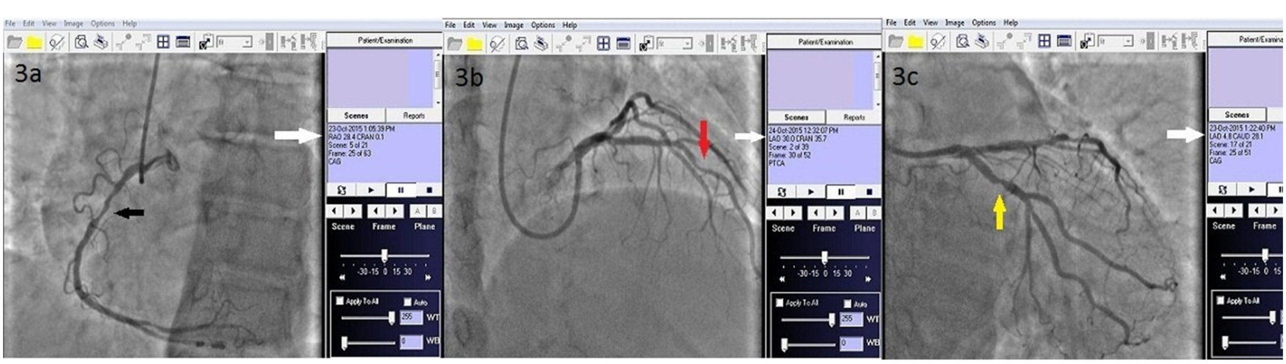

Fig. 3 – Diagnostic coronary angiogram: (a) RAO view (white arrow) of right coronary artery showing proximal long segment lesion with maximum 80% stenosis (black arrow) which simulates conventional LAO view; (b) LAO cranial view (white arrow) showing 80% stenosis in mid portion of left anterior descending artery and (red arrow) which simulates conventional RAO cranial view; (c) LAO caudal view (white arrow) showing 80% stenosis in proximal left circumflex artery (yellow arrow) which simulates conventional RAO caudal view.

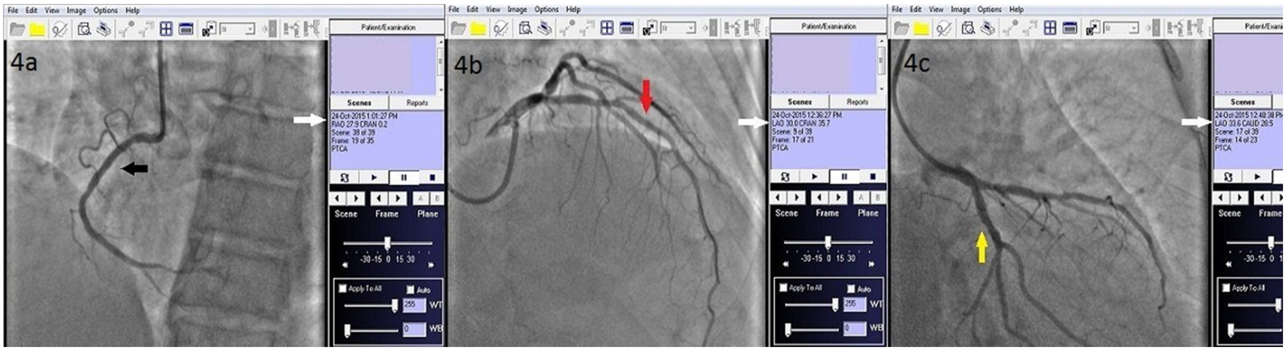

Fig. 4 – Post-PCI coronary angiogram showing well deployed stents in (a) right coronary artery (black arrow) in RAO view, (b) left anterior descending artery (red arrow) in LAO view and (c) left circumflex artery (yellow arrow) in LAO view.

segment of the left anterior descending (LAD) artery and a proximal segment 80% stenosis in the left circumflex (LCx) artery (Fig. 3b,c). Revascularization options were discussed with the family and multivessel percutaneous revascularization was preferred by them.

Prasugrel was substituted for clopidogrel and 60 mg loading dose was administered. Multivessel percutaneous revascularization was performed using a 6 Fr extra back-up (EBU3) guiding catheter (Medtronic, Inc.; Minneapolis, MN) and a 0.014 in. Whisper MS guide wire (Abbott vascular, Abbott Park, IL, USA). Direct stenting of LAD (2.5 mm × 12 mm sirolimus eluting vactaflex stent, SMT, Gujarat, India), LCx (2.75 mm × 12 mm vactaflex stent) and RCA (3 mm × 24 mm vactaflex stent) was performed with post-dilatation of LCx stent using 16 atmosphere pressure. There was no residual stenosis, no dissection and good flow in all vessels (Fig. 4a–c). Patient had an uneventful recovery and was discharged after 48 hours on evidence based medication.

3. Discussion

Cardiac catheterization, angiography, and interventional procedures are challenging in situs inversus dextrocardia due to its rarity and variation in anatomic orientation of heart and great vessels. The challenges involve angiographic evaluation, catheter selection, and manipulation.

CAG and PCI in dextrocardia have been performed safely from femoral,[3,4] right[5–7] and left[8] radial approaches. Trans-radial coronary interventions have emerged as a safe and effective alternative with comparable results to those of trans-femoral approach with negligible rate of major vascular complications.[9,10] Right radial approach is preferred access in our center, and the same was utilized successfully for multivessel PCI in this complex case. Left radial approach may be advantageous in view of mirror image aortic arch branching pattern.[7]

The portions of coronary ostia relative to the sinuses and to the aortic arch are a mirror image of the normal in situs inversus dextrocardia. Modification in angiographic image acquisition is necessary for achieving selective cannulation of coronaries and interpretation of images to avoid potential errors.

The use of mirror image views[3] and double inversion technique[7,11] has been described. In mirror image views there is right-left image reversal. Mirror image views with minor angle modifications enabled us to achieve optimal coronary images. In this approach, catheters can be passed using the standard technique, except that the catheters are rotated in the opposite direction when compared to patients with normal cardiac anatomy. Counterclockwise rotation was utilized to cannulate the ostium of the RCA.

In double inversion technique, there is artificial reversal of visualization of responses of catheters and coronary wires to normal manipulation. The images acquired simulate normal coronary anatomy and make the interpretation easy and avoid error.[7,11]

Moreyra et al.[12] who first reported trans-femoral PCI in dextrocardia, found multipurpose catheters superior to Judkins catheters. On the contrary, Judkins catheter was found to be useful in some reports.[3,4] For transradial angiography, use of different catheters such as Judkins[4] and Optitorque[7] has been described. In this case, cannulation of RCA ostium in RAO 30 view was performed using a 5 Fr tiger catheter with gentle counterclockwise rotation. Left coronary ostia cannulation was feasible with a JL4 catheter in RAO 60 view after tiger catheter failed to cannulate it.

Transradial PCI in situs inversus dextrocardia has been reported for STEMI[7], double[13] and single[14] vessel disease using extra support (ECR), Judkins, AL2, guide catheters respectively. Transradial rotablation has also been described in situs inversus dextrocardia with STEMI.[15] FFR (Fractional flow reserve) was not used in the present case as coronary lesions were thought to be hemodynamically significant. A 6F EBU guide catheter was used successfully for cannulation of left and then right coronary ostia using the same technique and views as in diagnostic catheterization. Prior to using EBU guide catheter, Judkins right 4 (JR 4) guide catheter was attempted without success for cannulating RCA. RCA origin was probably odd and successful cannulation was possible with EBU. Subsequent procedure was performed without any difficulty. This report extends the use of transradial technique for multivessel PCI in situs inversus dextrocardia.

The case is reported to highlight a successful single stage multivessel PCI in situs inversus dextrocardia using a transradial approach. To the best of our knowledge this is the first case in literature of single stage triple vessel PCI in situs inversus dextrocardia using transradial approach.

Angiographic image inversion and opposite direction catheter rotation facilitated cannulation of coronaries using standard preshaped catheters.

Conflicts of interest

The authors have none to declare.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ihj.2016.03.005.

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