INTRODUCTION
Dextrocardia makes fluoroscopy-guided transcatheter procedures challenging; specially Percutaneous Transvenous Mitral Commissurotomy (PTMC), where the unusual cardiac anatomy considerably increases the risk of complications during transseptal puncture and entry into left ventricular cavity.\(^1\) Although, PTMC has become the standard of care for selected patients with rheumatic mitral stenosis (MS), there are only a few reports on successful PTMC in atypical cardiac anatomy. This particular case was peculiar in that Closed Mitral Valvotomy (CMV) had already been done and now PTMC was being performed in the same patient for relief of restenosis. Literature search did not show any reported case with this peculiar combination of therapeutic challenges.

CASE REPORT
A 30-year-old woman having situs inversus, dextrocardia and severe rheumatic mitral restenosis was referred to AFIC/NIHD for commissurotomy. A Closed Mitral Valvotomy (CMV) for severe mitral stenosis had already been done 8 years earlier, and her symptoms had reappeared. She was evaluated with transthoracic and transesophageal echocardiography and found to have a mitral valve area of 0.6 cm\(^2\), dextrocardia along with atrioventricular (AV) and ventriculo-atricular (VA) concordance was demonstrated. Successful percutaneous transvenous mitral commissurotomy (PTMC) was done. Transseptal catheterization was done via the left femoral vein. Pigtail catheter was placed in the non-coronary aortic sinus; interatrial septal puncture was done with the transseptal needle rotated to a 7 O’clock position. There were no procedural complications. Reduction in trans-mitral pressure gradient on cardiac catheterization data, and standard echocardiographic parameters confirmed a successful procedure. PTMC can be accomplished safely in patients with this unusual cardiac anatomy with a few modifications in the standard technique, even if surgical treatment has already been carried out.

ABSTRACT
A woman, aged 30 years with situs inversus, dextrocardia and severe rheumatic mitral restenosis was referred to AFIC/NIHD for commissurotomy. A Closed Mitral Valvotomy (CMV) for severe mitral stenosis had already been done 8 years earlier, and her symptoms had reappeared. She was evaluated with transthoracic and transesophageal echocardiography and found to have a mitral valve area of 0.6 cm\(^2\) with pliable leaflets and no mitral regurgitation. She had an MGH score of 6 and her pulmonary artery pressure was 100 mmHg. Presence of dextrocardia, AV and VA concordance was demonstrated. PTMC was performed using a 24 mm Inoue balloon under local anaesthesia.

Both groins were prepared for vascular access, however, the left femoral artery and vein were cannulated with a 5F arterial and 6F venous sheaths. A 5F pigtail catheter was passed retrograde into the aorta and taken to the left ventricle where pressures were recorded and then an LV cine angiogram was performed in an LAO 40 projection. No mitral regurgitation was seen. The pigtail catheter was then withdrawn and parked in the aortic root on top of the aortic valve. A 0.032” guide wire was then passed up the femoral vein into the IVC and up into the left sided SVC via the left sided ‘right atrium’. An 8 F Mullins sheath was passed up on the guide wire, into the left SVC. A curved Brockenbrough needle was passed up into the sheath stopping just short of the tip.

For septal puncture, the patient was imaged in LAO 40\(^\circ\) projection. The Brockenbrough needle was oriented to 9 O’clock position in the SVC. Septal descent was done by withdrawing the needle and the sheath in tandem into the heart with the needle pointer in 7-8 O’clock position. The needle was withdrawn into the heart upto the level of the pigtail, and then further one disc space. The puncture point was chosen to be the point one disc space below the horizontal line stretching across the lower level of the pigtail; and the point was roughly midway between the posterior wall of the LA and the

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imaginary line drawn vertically from the pigtail catheter’s shaft. After engaging the interatrial septum, we gently crossed it with just the needle tip, and changed the projection to RAO 45° and squirted a bit of contrast into the LA; firstly, to document the correct entry into the LA and secondly to fathom the depth of the LA. Mullin sheath was gently pushed halfway down the available depth while keeping the needle tip within the sheath. Then, the needle was withdrawn and the sheath left in situ. A ‘loopy’ wire was then passed through the sheath and the latter was withdrawn leaving the loopy wire inside. The 14F dilator was then used to dilate the puncture site (Figure 1). For withdrawing this balloon while still keeping the wire in the LA, the balloon shaft was cut 20 cm from the proximal hub and removed it without any hassle. The maneuverability of the balloon was remarkably improved in opening up the mitral valve after a single dilatation (Figure 3). The final area after the ballooning was 1.86 cm² by 2D and 3D echocardiography. No MR was documented by check LV angiogram.

**DISCUSSION**

There are only a few reported cases of PTMC in patients with dextrocardia and situs inversus. Whether, this reflects the tendency to avoid transseptal puncture and PTMC in these technically difficult cases, thus referring them to cardiac surgeons for mitral valve replacement is open to speculation.

In general, transseptal catheterization is considered a technical challenge in anatomically malpositioned hearts, as it is fraught with a higher risk of cardiac perforation. Over time various modifications of the standard Inoue technique have evolved and are being used by different operators to suit the needs of these patients with uncharacteristic cardiac anatomy. The problem has been addressed in pregnancy with successful PTMC in anatomically challenging hearts. Transseptal catheterization is performed from the left groin to reduce the puncture needle angulations at the confluence of the iliac veins to the left-sided inferior vena cava. The catheter placed in the non-coronary aortic sinus marks the antero-superior limit of the IAS. Septal descent is done by rotating the external indicator of the needle at the 7 O’clock position. Entry into the LA, and its depth can be confirmed by squinting contrast into the left atrium. This also aids in confirming the limits of the interatrial septum. Levophase pulmonary angiography has been used for IAS delineation in a patient with isolated dextrocardia and normal atrial situs. Transesophageal and intracardiac echo are important adjunctive pathfinders for the interventionist cases as complex as this. The transjugular approach is thought to overcome many of the technical problems encountered with the transfemoral route in cases with anatomical alterations. Despite the challenging anatomy, PTMC has been demonstrated to be a safe and feasible option for MS in patients with unusual cardiac anatomy.

Pertinent to this particular case, the increase in mitral valve area with PTMC is inversely related to the presence of previous surgical mitral commissurotomy. PTMC can produce a good outcome in this group of patients. The mean mitral valve area in 102 patients with previous surgical commissurotomy was 1.7±0.1 cm² compared with a valve area of 2.0±0.1 cm² in patients without previous surgical commissurotomy. In this group of patients, an echocardiographic score of 8 was again the most important predictor of a successful hemodynamic immediate outcome.

**REFERENCES**


