

Mitral Balloon Valvuloplasty via Transapical Access: an Option in Extreme Situations

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Abstract - Mitral balloon valvuloplasty was first described in 1984 by Inoue. The procedure is routinely performed through femoral vein puncture and the mitral valve catheterization is through a transeptal puncture. We report a challenging situation where it has been performed a mitral balloon valvuloplasty using the transapical access in reason of patient's contra-indication to mitral valve surgery associated to technical difficulties to perform mitral balloon valvuloplasty via transeptal access.

Index Terms – Mitral valve; Rheumatic Heart Disease; Mitral Valve Stenosis

Mitral stenosis (MS) consists in the resistance to transmittal blood flow due to thickening and immobility of the valvular leaflets, essentially as result of rheumatic fever sequelae and the choice between mitral valve surgery (MVS) or mitral balloon valvuloplasty (MBV) depends of patient's clinical status, valvular anatomy and the expertise of the interventional team.¹ This case report describes a challenging situation where it has been performed a MBV using the transapical access in reason of patient's contra-indication to MVS associated to technical difficulties to perform MBV via transeptal access.

Case Report

A 68-year-old female patient with MS and a prior surgery (mitral commissurotomy 25 years ago) has been admitted in New York Heart Association (NYHA) Functional Class II/III. Her medical historic includes: systemic arterial hypertension, type 2 diabetes under oral drugs control, dyslipidemia, current every day smoker, grade III obesity (Body Mass Index 39kg/m²), permanent atrial fibrillation (AF) over anticoagulation regimen with warfarin and a massive abdominal epigastric hernia (already in follow up together the general surgery team). She has remained asymptomatic until three years ago when she presented orthopnea and she correlated the symptoms with increased protrusion of the hernia during dorsal decubitus.

Transthoracic echodopplercardiogram (TTE) revealed a left atrium diameter of 57mm, left ventricular dimensions of 58x41mm and a preserved left ventricular function (left ventricular ejection fraction of 55%). The systolic excursion of the lateral tricuspid valve annulus measured by M mode was estimated at 14mm. TTE demonstrated a severe mitral stenosis with a mean gradient of 8.0mmHg and mitral valve area estimated at 0.9 cm² (Figure 1) with Wilkins score 9 (thickening: 2, calcification: 2, mobility: 3, subvalvar apparatus: 2), major grade tricuspid regurgitation and pulmonary arterial systolic pressure of 40mmHg. Patient presented bradycardia and worsening of symptoms with dyspnea at rest (NYHA functional class IV). Electrocardiogram showed an AF rhythm and a total atrioventricular block. After clinical adjustments, a permanent ventricular pacemaker implantation was performed without concerns. Coronary angiography was performed without obstructive lesions.

Despite the unfavorable anatomy a MBV was indicated in reason of the high surgical risk. A transesophageal echodopplercardiogram (TEE) was made in an attempt to perform mitral balloon valvuloplasty and confirmed the previous findings of MS without presence of left atrial thrombus and absence of moderate / major mitral insufficiency. The procedure was tried through a transeptal puncture and left atrial catheterization, and manometry was performed. An attempt was made to go through the interatrial septum with Inoue balloon without success, even after several maneuvers. The dilatation of the interatrial septum with balloon was performed and a new attempt was made to go through the interatrial septum with the Inoue balloon, once unsuccessful. Patient returned to the intensive care unit and remained in functional class IV dyspnea.

The Heart Team joined and it has proposed to perform the MBV via transapical access, since there was failure of clinical treatment, anatomic and technical impossibility to perform via transeptal access and high surgical risk. A 40mm left anterolateral thoracotomy was performed for the procedure (MBV via transapical access). An Inoue 24 mm balloon and 28mm balloon were used for dilatation of the valve (Figure 2), without concerns. The mitral area measured by 3-dimensional TEE increased to 1.5 cm² with trivial mitral regurgitation. The patient presented with significant improvement of signs and symptoms of heart failure and was transferred to a general surgery outpatient clinic to schedule hernia repair.

Discussion

Mitral balloon valvuloplasty was first described in 1984 by Inoue², with low perioperative morbimortality and good postoperative improvements in the mean transmitral gradients and the left atrium pressure. The procedure is routinely performed through femoral vein puncture and the mitral valve catheterization is through a transeptal puncture and ballooning of the stenotic valve. The rate of complications (stroke, cardiac tamponade and moderate to severe mitral regurgitation) is less than 1%, depending on the experience of the interventional cardiologist¹.

MBV is recommended for symptomatic patients with severe MS (mitral valve area \leq 1.5 cm²) and favorable valve morphology in the absence of left atrial thrombus or moderate-to-severe mitral regurgitation³. The outcomes from MBV are variable and highly dependent on the valve morphology and a careful evaluation of the anatomy of the mitral valve is essential to determine the feasibility and safety of the procedure⁴.

Kar et al⁵ described the first MBV via transapical route as “bridge” to a left ventricular assist device (LVAD) implantation in a high surgical risk decompensated patient with end-stage ischemic cardiomyopathy, severe peripheral arterial disease, porcelain aorta, and severe mitral and aortic disease.

Our patient had a prior MVS and presented several comorbidities, poor NYHA functional class, a high surgical risk and unfavorable mitral valve anatomy to MBV. However, after the *Heart Team* discussion, MBV was performed with a good clinical result. In agreement with ACC/AHA Guidelines³, MBV may be considered for severely symptomatic patients (NYHA class III-IV) with severe MS who have a suboptimal valve anatomy and who are not candidates for surgery or at high risk for surgery.

The procedure was carried out in view of the refractoriness of the clinical treatment and the technical unfeasibility to perform the MBV through transeptal route, in addition to a high surgical postoperative risk due to comorbidities and bulky abdominal hernia. The description of the procedure aims to implement a new surgical technique that can be used in cases with contraindications to conventional procedures already proposed.

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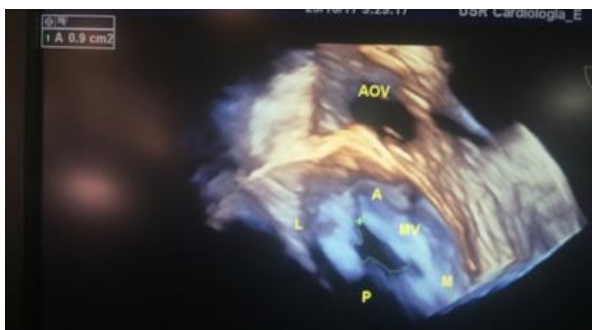


Figure 1. A 3-dimensional transesophageal echodopplercardiogram showing the mitral valve stenosis (planimetry mitral valve area of 0.9cm²).

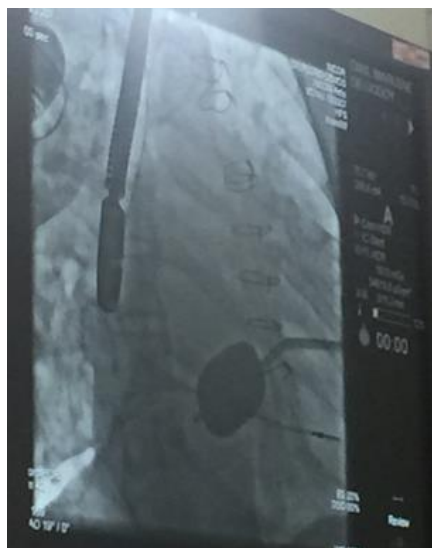


Figure 2. The intraoperative radioscropy view of the Inoue 28 Balloon via transapical access just in time of mitral valve dilatation.