

Percutaneous Closure of Septal Mitral Paravalvular Leakage in A Young Patient

Gabriel Fernández Yáñez¹, Reyes Álvarez José Miguel^{1*}, Marco Alejandro Solórzano Vázquez¹, Germán Ramón Bautista López¹, Antonio Olvera López², Jorge Francisco Acuña Valerio¹, Faviola Muñoz Castillo¹, José Humberto Guerrero González³

¹Cardiology Department, IMSS UMAE NO. 1 CMNB, Blvd. Adolfo López Mateos SN, Los Paraísos, 37320 León, Gto., Mexico;

²Médica Campestre, Manantial 106, Futurama Monterrey, 37180 León, Gto., Mexico;

³Echocardiography Department, Unidad de Alta Especialidad del Bajío, IMSS; and Hospital Aranda de la Parra, León, Guanajuato, México

*Correspondence: Reyes Álvarez José Miguel; jmiguel.realv@gmail.com

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ABSTRACT

Paravalvular leaks are a well-recognized major complication after prosthetic valves implantation, it affects from 6% to 15% of patients after valve replacement. Percutaneous closure is an alternative to solve this problem, it has shown some advantages such a lower incidence of complications with a success rate of 87%, this case demonstrates the feasibility of an uncommon approach using a single right femoral venous access and a deflectable sheath to perform a transseptal puncture in order to place a purpose specific occluder for closing a paravalvular leak in a mitral mechanic prosthesis valve implanted via open thoracotomy

Introduction

Paravalvular leakage (PVL), defined as abnormal retrograde flow between the suture ring and the native valve ring, is a well-recognized complication of prosthetic valves, affecting 6% to 15% of implanted valve prostheses [1]. They are more frequent in mechanical valves than in biological prostheses. Conditions of tissue friability due to any cause, such as infections or calcification, can lead to its formation with different degrees of regurgitation [2]. Several surgical factors are associated with its formation including prosthesis in mitral position, use of continuous suture in mitral position, and use of sutures without pledgets [3]. The presence of clinically relevant PVL requiring repair occurs in 1-5% of patients with Prosthetic valves [4]. Patients with mild regurgitation are frequently asymptomatic, however with a more severe regurgitation flow they can develop signs and symptoms of congestive heart failure, even with small regurgitation volumes, in the presence of non-compliant atria and ventricles, symptoms can be developed. It can also present with hemolytic anemia

or a mixed presentation, with signs and symptoms of hemolysis including fatigue, jaundice, choloria, and petechiae [5]. The most important diagnostic tool is echocardiography, an adequate image can be a challenge, transthoracic echocardiography frequently cannot establish between PVL and prosthetic dysfunction secondary to degenerative changes, so transesophageal echocardiography is crucial to determine hemodynamically meaningful leaks, 3D echocardiography is very useful to assess the size, shape and even guide percutaneous repair [6]. Significant PVL can be treated either surgically or percutaneously, the classic treatment has been surgical reintervention, with lower mortality compared to conservative treatment, but it is associated with high morbidity and periprocedural mortality, besides high rate of residual leaks or recurrence, the mortality described after surgical reintervention is high, 10-15% and increases with the number of previous reinterventions [7]. Percutaneous closure is a therapeutic alternative that has shown reduce the severity of the leak and the symptoms, with a variable success rate and low

risk of complications, where success rates of 87% have been achieved [8]. Depending on the location, morphology, number, size and trajectory as well as the technique and devices used [9]. Complications related with percutaneous repair of PVL are reported at low rates, in fact major adverse events rate such as death or emergency surgery or stroke at 30 days are 5.6% in some case series [10].

Case Presentation

We present the case of a 45-year-old male with diagnosis of mitral valve prolapse due to myxomatous disease causing severe insufficiency, no other underlying comorbidities, a double disc mechanical mitral valve implant was performed via open thoracotomy in September 2019, continuing with good evolution until November 2020, he presented with dyspnea and NYHA functional class II, a transesophageal echocardiogram was performed where a severe paraseptal mitral paravalvular leak was observed (Figures 1, 2 & 3), located between 2 and 3 O'clock of the surgeon's view, oval morphology, 8×3 mm in size, therefore proceeds to perform percutaneous closure under general anesthesia and use of intraoperative 2D/3D transesophageal echocardiography, through a transeptal antegrade venous approach through the fossa ovalis with Agilis 8.5 Fr sheath (St Jude) and 98 cm BRK puncture needle, the defect is crossed with telescope technique (Using a multipurpose catheter 5 Fr 125 cm, multipurpose guide catheter 7 Fr 100 cm, and Agilis 82 cm) placing Vascular Plug IIIR device 10×5 mm (Figure 4). Corroborating successful result with 3D echocardiography, fluoroscopy time 18 minutes.

The patient was discharged the next day without any reported complication during the procedure or in the next 24 hrs, furthermore any complication

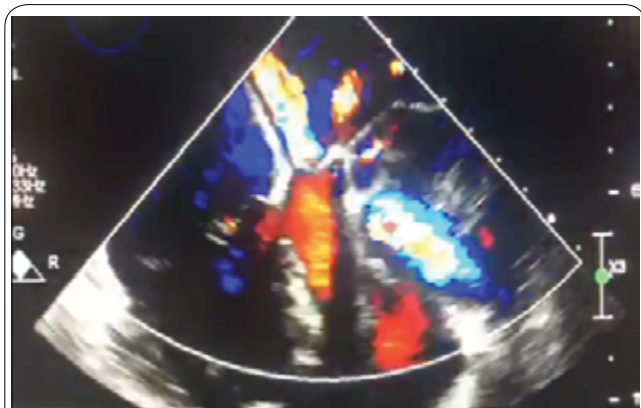


Figure 1: Transesophageal echocardiogram with severe paraseptal mitral paravalvular leak.

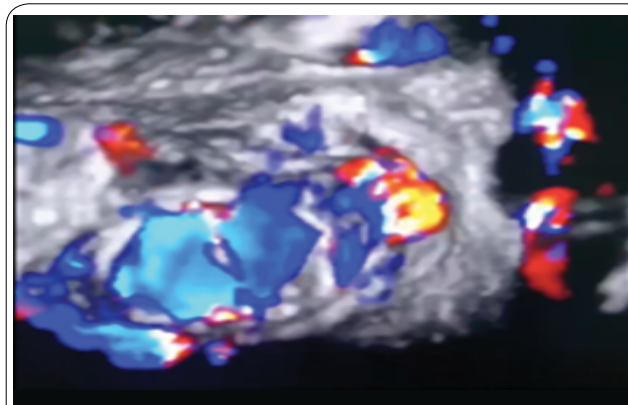


Figure 2: 3D Transesophageal echocardiogram with severe paraseptal mitral paravalvular leak.

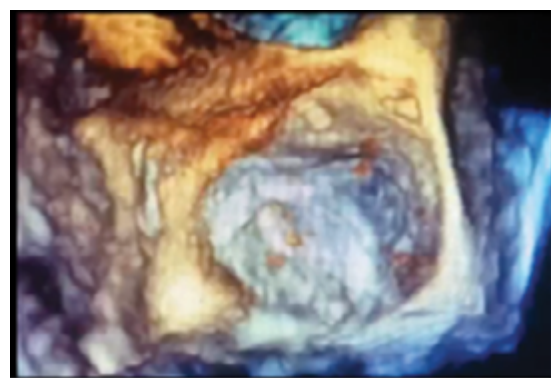


Figure 2: 3D Transesophageal echocardiogram with severe paraseptal mitral paravalvular leak.

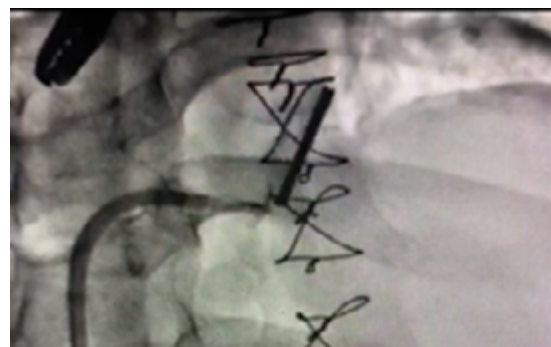


Figure 4: Placing Vascular Plug III device 10×5 mm.

were reported in the following 30 days after the procedure [Figures 5 & 6].

Discussion

Percutaneous closure of mitral paravalvular leakage is a procedure that requires multivascular transeptal or transapical approaches, long fluoroscopy times, and a variable success rate in low-volume centers, nevertheless the complications rate are lower in comparison with surgical

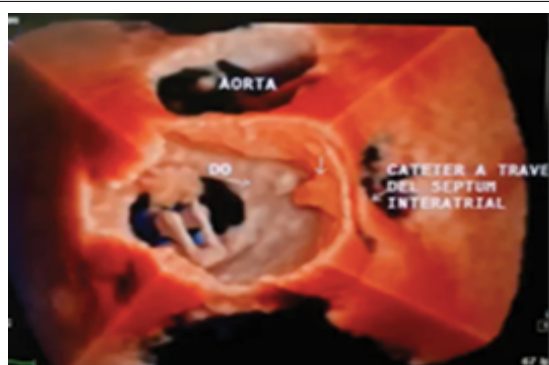


Figure 5: 3D reconstruction performed with transesophageal echodiagram imaging .

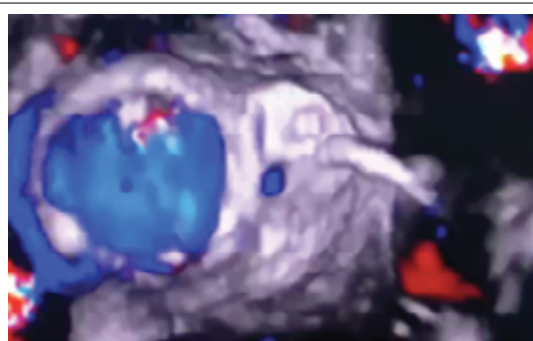


Figure 6: Post-Procedural Transesophageal Echodiagram .

approach [5]. The advent of multimodal imaging, particularly intraoperative 3D transesophageal echocardiography, as well as the use of deflectable catheters; allows the operator to develop the ability to identify intracardiac structures near the defect and navigate in three-dimensional spaces with greater precision [11]. At this time there are a considerable amount of information available about the different techniques employed to perform a PVL percutaneous closure, but not many about a transseptal puncture through de Fossa ovalis without the use of intracardiac echocardiography, in this case, we use the transesophageal echocardiogram to guide the procedure, replacing the intracardiac echo. This may reduce the incidence of complications and procedure time due to transseptal puncture, and could increase the success rate even in complex anatomies without the need of an intracardiac echo or even transapical approaches or vascular loops (arteriovenous, venovenous, etc.).

Conclusions

This case demonstrates the feasibility of a single femoral venous access and the use of a deflectable sheath as the first line to cross the defect in a short period of time with a transesophageal echocardiogram guiding the procedure. The telescope technique reduces catheter exchanges and adds the necessary support to cross even small defects. The decision of performing percutaneous VS surgical repair were based on the low complications rate in the available data, besides the experience of the center, the poor prognosis in patients with a second open thoracotomy and the patient's decision. We believe that the technique employed could help to improve the procedural time, recovery time and even could help lowering the rate of complications related with multiple femoral punctures.

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