Modified LAMPOON-procedure for transapical mitral valve replacement

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Background

Transcatheter, transapical mitral valve replacement (TMVR) using the Tendyne© device (Abbott Laboratories, Abbott Park, Illinois, USA) is a novel technique to treat severe mitral regurgitation without the use of cardiopulmonary bypass or sternotomy, which can be advantageous for older patients with multiple comorbidities. A potential complication of TMVR includes the dynamic obstruction of the left ventricular outflow tract (LVOT) by the native anterior mitral valve leaflet, which may result in systolic anterior motion. Anatomical characteristics that are associated with a dynamic obstruction are identified during the (pre)screening process. These patients are not eligible for TMVR. Up to 31.7% of (pre)screening failures are due to the fear of LVOT occlusion.

Procedure rationale

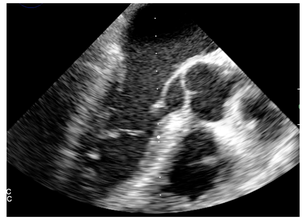
The LAMPOON procedure (Laceration of the Anterior Mitral leaflet to Prevent Outflow ObstructioN) is a transcatheter electrosurgical technique to split the anterior leaflet prior to TMVR. This procedure enables the treatment with TMVR in patients who were previously regarded ineligible based on the risk for LVOT obstruction.

However, the LAMPOON procedure, which is executed via a transseptal approach, is time consuming and technically challenging. Hereby, we present the case of an 81-year-old male who successfully underwent a modified LAMPOON procedure via an apical access prior Tendyne© implantation. This novel approach appears to be time-saving and technically feasible.

Case report

- 81-year-old male patient admitted with dyspnea (NYHA class III)
- Comorbidities: coronary heart disease, paroxysmal atrial fibrillation, diabetes, arterial hypertension, radical nephrectomy following a kidney tumor and a pacemaker implantation due to an intermittent second/third degree atrioventricular block
- Echocardiography showed severe mitral valve regurgitation (MR) caused by prolapse and flail leaflet of the segment P2
- Due to patient frailty and comorbidities, conventional surgery was not an option

Screen fail the Tendyne© valve implantation due to predicted LVOT obstruction from SAM, based on the long anterior leaflet length.



In literature, the LAMPOON procedure has been performed using transfemoral approach[1]

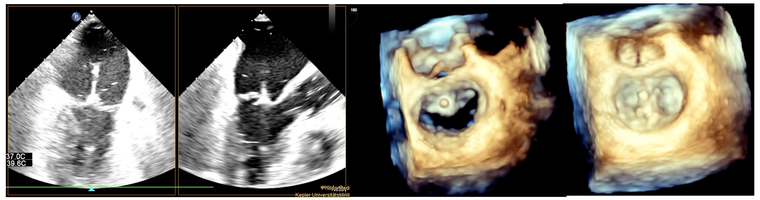
We report a new approach using the same apical access as for the Tendyne© device.

Procedural details

We started with the preparation of the cutting wire, which was adapted from the BASILICA procedure[2]. Firstly, all devices were flushed with a 5% dextrose solution, as it is non-ionic. We then denuded an Astato XS 20 0.014'' (Asahii-Intecc, Tokyo, Japan) wire at 150 cm over a distance of 5-7 mm with a scalpel and formed a V-shape using a scalpel as a fulcrum, so the denuded part of the wire faced the inner curvature of the V. The distal end of the wire was also denuded with a scalpel.

We then loaded an insulating PiggyBack Wire Converter (Teleflex, Morrisville, NC, USA) from the distal wire end just before the V-shape. The wire was then inserted into a 4F-Berenstein catheter. Two 8 French sheaths (25 cm) were placed in the left chamber through the transapical access, facing the mitral valve. The catheter containing the wire tip was then positioned between the anterior leaflet of the mitral valve and the LVOT. The wire tip was then snared with an Amplatz GooseNeck Snare Kit 25 mm (EV3, Plymouth, MN, USA), which was inserted through the second sheath through the mitral valve.

Under fluoroscopy guidance we pulled on the wire until the inverted V-shape was located in the left atrium. A torque device was loaded on both wire ends to secure wire control during leaflet laceration. An electrocautery pencil was clamped on the distal, denuded end of the wire.

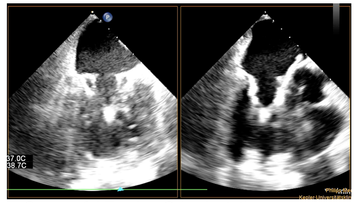


Puncture of the anterior mitral leaflet before the laceration

Under fluoroscopy and TOE guidance we slowly pulled on both wire ends and applied bursts of electrocautery at 80-100 Watts in order to perform leaflet laceration. Once the V-shape was located in the left ventricle and laceration success was confirmed by TOE, the wire, catheter and sheaths were removed and the operation was completed with successful implantation of the Tendyne© device.

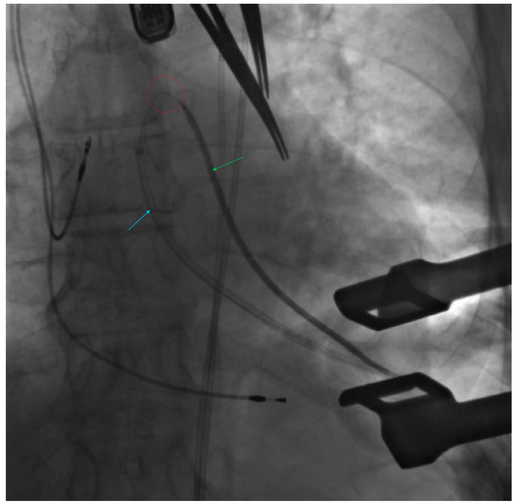


Laceration of the anterior mitral leaflet



Successful Tendyne© implantation

Laceration overview



Red circle: Astato wire with the V shape on the denuded part
Green arrow: sheath with the insulating PiggyBack
Blue arrow: sheath with the snared wire tip

Take home message

A concomitant LAMPOON procedure and Tendyne © implantation using an apical access only is a possible alternative for older patients with multiple comorbidities not eligible for open heart surgery and who risk a LVOT obstruction from a simple transcatheter , transapical mitral valve replacement .

In our experience the modified LAMPOON procedure via an apical access is not only technically feasible but also a much faster and less complex approach in comparison to the already established transfemoral method.

References

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