Case report: Buddy wire technique to facilitate atrial septal crossing during transcatheter transseptal mitral valve implantation

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Background
Transcatheter mitral valve-in-valve implantation (MVIV) has emerged as a viable treatment option in patients at high risk for surgery. Occasionally, despite appropriate puncture location and adequate dilation, difficulty is encountered in advancing the transcatheter heart valve across interatrial septum.

Case summary
We describe a case of a 79-year-old woman with severe chronic obstructive pulmonary disease (COPD), prior surgical bioprosthetic aortic and mitral valve replacement implanted in 2007, atrial fibrillation, and Group II pulmonary hypertension who presented with progressively worsening heart failure symptoms secondary to severe bioprosthetic mitral valve stenosis and moderate-severe mitral regurgitation. Her symptoms had worsened over several months, with multiple admissions at other institutions for treatment of both COPD exacerbation and heart failure. Transoesophageal echocardiogram demonstrated preserved ejection fraction, normal functioning aortic valve, and dysfunctional mitral prosthesis with severe stenosis (mean gradient 13 mmHg) and moderate-severe regurgitation. After a multi-disciplinary heart team discussion, the patient underwent a transcatheter MVIV implantation. During the case, inability in advancing the transcatheter heart valve (THV) across interatrial septum despite adequate septal balloon pre-dilation was successfully managed with the support of a stiff ‘buddy wire’ anchored in the left upper pulmonary vein using the same septal puncture. The patient tolerated the procedure well and was discharged home.

Discussion
Operators should be aware of potential strategies to advance the THV when difficulty is encountered in crossing the atrial septum despite adequate septal preparation. One such strategy is the use of stiff ‘buddy wire’ for support which avoids the need for more aggressive septal dilatation.

Keywords
Case report • Mitral valve disease • Percutaneous intervention • Percutaneous valve therapy • Structural heart disease intervention • Transcatheter valve intervention

Learning points
- Transcatheter transseptal mitral valve-in-valve interventions are gaining momentum as a treatment alternative to open surgical treatment in patients at high surgical risk.
- Procedural challenges include the inability to advance the transcatheter heart valve across the atrial septum despite adequate transseptal puncture location, as well as other technical challenges described in the case.
- Using a stiff ‘buddy wire’ for support can allow for avoidance of creation of a second transseptal puncture when the first puncture site is in the proper location.

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Introduction

Transcatheter mitral valve-in-valve (MVIV) implantation has emerged as a viable treatment option in patients at high risk for surgery. Appropriate transseptal puncture location and balloon dilation of the transseptal puncture site are critical for positioning the percutaneous mitral valve. Transseptal puncture in the infero-posterior aspect of the fossa ovalis followed by balloon dilation of the transseptal puncture site provides a favourable trajectory for advancing the transcatheter heart valve (THV). Sometimes, despite appropriate puncture location and adequate dilation, the difficulty is encountered in advancing the THV through the interatrial septum, especially in patients with prior transseptal approach for mitral valve surgery. We describe a case of transcatheter MVIV implantation, where inability in advancing the THV across interatrial septum despite adequate septal balloon pre-dilation was successfully managed with the support of a stiff ‘buddy wire’ anchored in the left upper pulmonary vein using the same septal puncture.

Timeline

| Day   | Event                                                                                     |
|-------|-------------------------------------------------------------------------------------------|
| Day 1 | A 79-year-old female with a history of bioprosthetic mitral and aortic valve replacements admitted for acute decompensated heart failure. |
| Day 2 | Transthoracic and transoesophageal echocardiograms revealed severe bioprosthetic mitral valve stenosis and moderate to severe regurgitation. |
| Day 3 | Multi-disciplinary heart team discussion regarding the best treatment option for the patient |
| Days 4–7 | Medical optimization of heart failure prior to the planned intervention                     |
| Day 8  | Successful transfemoral transcatheter mitral valve-in-valve replacement with a 23 mm SAPIEN S3 transcatheter heart valve |
| Day 12 | Hospital discharge to home after an uncomplicated post-operative course                     |

Case presentation

A 79-year-old female with severe COPD, prior surgical aortic (19 mm Carpentier-Edwards®) and mitral valve replacement (25 mm Hancock™), persistent atrial fibrillation, Group II pulmonary hypertension; presented with progressively worsening heart failure symptoms secondary to severe bioprosthetic mitral valve stenosis and moderate-severe mitral regurgitation. Physical examination revealed normal systemic blood pressure (116/62 mmHg), normal heart rate (85 b.p.m.). She was a thin, elderly female with moderate increased normal systemic blood pressure (116/62 mmHg), normal heart rate (85 b.p.m.). She was a thin, elderly female with moderate increased normal systemic blood pressure (116/62 mmHg), normal heart rate (85 b.p.m.).

Discussion

Transcatheter transcatheter MVIV interventions are gaining momentum as a treatment alternative to open surgical treatment in patients at high surgical risk. There are, however, several procedural challenges including the inability to advance the THV across the atrial septum. This can be encountered due to the presence of a thickened fibrotic septum due to previous catheter procedures, prior surgical intervention, improper transseptal puncture location, inadequate septal dilation, or lack of wire support.

Operators should be aware of potential strategies to advance the THV when difficulty is encountered in crossing the atrial septum despite adequate septal preparation. One such strategy is the use of stiff...
‘buddy wire’ for support. The stiff buddy wire can be placed from the contralateral femoral vein into the left upper pulmonary vein, across the same septal puncture site as the THV. Others have previously described using buddy wires to advance THVs across the interatrial septum, involving the creation of separate transseptal puncture.3 Our approach is simpler and avoids the need for a separate transseptal puncture. We used a whole wire supported by multipurpose catheter to re-cross the previously dilated interatrial septum. The whole wire was then placed in the left upper pulmonary vein and exchanged for a stiff wire such as an Amplatz super-stiff wire. The buddy wire stretches open the interatrial septal puncture and allows for easier advancement of the THV. Once the valve is across the interatrial septum and positioned across the mitral valve; the stiff wire is removed and replaced with a temporary pacing wire for rapid pacing to complete deployment of THV in the mitral position. At our institution, this strategy is becoming our default approach to facilitate THV septal crossing rather than deferring to a more aggressive balloon septal dilatation.

With the expansion of transcatheter transseptal MVIV interventions, operators should be aware of potential techniques to advance the THV across difficult to cross interatrial septum. Stiff ‘buddy wire’ support is one such technique, which can facilitate advancement of THV, without risking the removal of the valve from the body.

**Lead author biography**

Dr Hussam Suradi is an interventional cardiologist at Rush University Medical Center in Chicago, USA. He is the Director of Structural Hybrid Lab and Co-Director of Cardiac Catheterization Labs. Dr Suradi’s clinical practice specializes in interventional cardiology, with a focus on catheter-based therapy of valvular and structural heart disease.

**Supplementary material**

Supplementary material is available at European Heart Journal - Case Reports online.

**Slide sets**: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

**Consent**: The author’s confirm that written consent for submission and publication of this case report including image(s) and
associated text has been obtained from the patient in line with COPE guidelines.

Conflict of interest: none declared.

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