

# Case Report describing Balloon Dilatation as a Treatment for Intraprothetic Regurgitation following implantation of a SAPIEN-3 Transcatheter Aortic Valve

NIKHIL PAL<sup>1</sup>, Prof. Derek P Chew<sup>1</sup>, and AJAY SINHAL<sup>1</sup>

<sup>1</sup>Flinders Medical Centre

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## Abstract

Intraprothetic regurgitation (IR) is a rare but devastating complication of transcatheter aortic valve implantation (TAVI). We describe the successful treatment of moderate intraprothetic regurgitation in a 89 year old woman, who had been treated for severe aortic stenosis using a 23mm SAPIEN-3 valve.

**Consent:** Informed patient consent has been obtained to publish this manuscript and the original consent form has been retained with the institution

## Key Clinical Message

Intraprothetic regurgitation is a rare but potentially devastating complication of TAVI, where balloon dilatation could provide a potential treatment option for these patients.

## Introduction

Intraprothetic regurgitation following Edwards SAPIEN-3 valve has been previously reported, with severe outcome on occasions.(1) There have been algorithms described to salvage this complication,(2) now adding to this algorithm we describe balloon dilatation as an alternative treatment strategy.

## Case presentation

A 89 year female presented with a 10 week history of increasing shortness of breath (SOB) (NYHA III), bilateral ankle odema and occasional paroxysmal nocturnal dyspnoea (PND). Her past medical history was that of atrial fibrillation (AF), hyperlipidemia and hypothyroidism. Her ECG showed left ventricular hypertrophy and rate controlled AF. Chest X-ray revealed cardiomegaly, with bilateral pleural effusions. Her renal functions were normal with an eGFR of 58 and pro BNP measured at 9183. She then had an echocardiogram (ECHO), which diagnosed her to have severe aortic stenosis, with a mean gradient of 53 mmHg and valve area of 0.95 cm<sup>2</sup>. The Left and Right Ventricular function was preserved. Patient had mild aortic regurgitation, mild-moderate mitral regurgitation and moderate tricuspid regurgitation with estimated pulmonary artery pressure of 50 mmHg. She was then admitted and treated for congestive cardiac failure with intravenous furosemide, which resulted in the resolution of her symptoms.

Coronary angiogram and a TAVI CT were then performed as a workup before patient's case was discussed in the multidisciplinary meeting. Coronary angiogram revealed mild coronary artery disease. TAVI CT findings were those of an annulus area of 428 mm<sup>2</sup> and annulus perimeter of 75 mm, with appropriate left and right coronary heights. The above findings were discussed in the TAVI multidisciplinary meeting, and

considering patients age it was decided that percutaneous approach using TAVI was better than surgery to treat patients aortic stenosis.

TAVI was performed via the right femoral artery approach. Balloon aortic valvuloplasty was performed using a 20x40 mm Edwards balloon. Based on CT sizing 23 SAPIEN-3 valve (Edwards Lifesciences, Irvine, California) was implanted with rapid pacing at 180 beats per minute. Post valve deployment ECHO confirmed trivial para-valvular and moderate central aortic regurgitation (AR), with restricted movement of the non-coronary cusp leaflet (Figure 1 and 2; Video 1 and 2). The presence of moderate central AR was confirmed on the aortogram as well (Video 3). The central AR persisted despite different manipulation techniques, such as removal of the wire that was placed in the left ventricle to deploy the valve and repeat crossing of the valve using a pigtail catheter, thus attempting to dislodge the stuck leaflet. We then decided to perform repeat balloon valvuloplasty using the 23x40 mm Edwards balloon, which was overfilled by 2mm. This maneuver was considered, as it could potentially relieve the restricted movement of the leaflet, by mechanically dislodging the leaflet. After performing the valvuloplasty, the central AR resolved with restored normal movement of the restricted leaflet, this was confirmed on ECHO and aortogram (Figure 3 and 4; Video 4, 5 and 6).

## Discussion

This case demonstrates the successful percutaneous treatment of moderate central AR present following implantation of an Edwards SAPIEN-3 valve, secondary to the restricted movement of a valve leaflet. With increasing use of TAVR for the treatment of severe aortic stenosis, there have been recent case reports of severe central AR post valve implantation.(3-5) The incidence of moderate-severe AR reported in the recent PARTNER 3 trial was 0.8% and  $\leq 0.2\%$  in the FRANCE-2 registry (French Aortic National Corevalve and Edwards).(6, 7) The usual mechanisms causing this prosthetic aortic insufficiency is malfunction secondary to either a stuck leaflet to an overhanging calcified spicule or native valve leaflet, or an undersized valve, or due to post-dilatation with an excessively large balloon which damages the integrity of the valve and leaflets get stuck.(2, 3, 5) The current advocated approach to treat the problem is by trying maneuvers such as inserting the pigtail catheter to dislodge the stuck leaflet or by removing the stiff LV guidewire wire; but if these fail then a new valve has to be implanted. We present this case report describing the treatment of moderate AR post TAVR, which has been resolved by performing balloon valvuloplasty.

We ascertain that the mechanism which helps to restore the function of a restricted valve leaflet by performing valvuloplasty, is by either dislodging the leaflet from a calcified spicule or an overhanging native valve leaflet which is protruding through the valve stent, or by stretching the valve to its normal size, which could have been under-expanded in the first instance and valvuloplasty restores its normal mechanical function. We thus suggest that to the existing module of treatment options for moderate central AR post TAVR, secondary to restricted leaflet movement, balloon valvuloplasty should be considered as an alternative treatment strategy.

## Conclusion

Central AR post TAVR, if moderate to severe can have debilitating consequences.(1) There are very few treatment options if the above occurs, with a new prosthetic valve implantation remaining as the last resort strategy. This case report for the first time describes the successful treatment of moderate central AR post TAVR by performing a balloon valvuloplasty; this strategy requires further validation with more case registries.

## Acknowledgements

None

## Competing interests

None

## Funding

Not applicable

## Authors Contribution

Nikhil Pal: contributed to the clinical case, compiled all the information and wrote the manuscript.

Derek Chew: supervisor during the case, contributed and reviewed the manuscript

Ajay Sinhal: supervisor during the case, contributed and reviewed the manuscript

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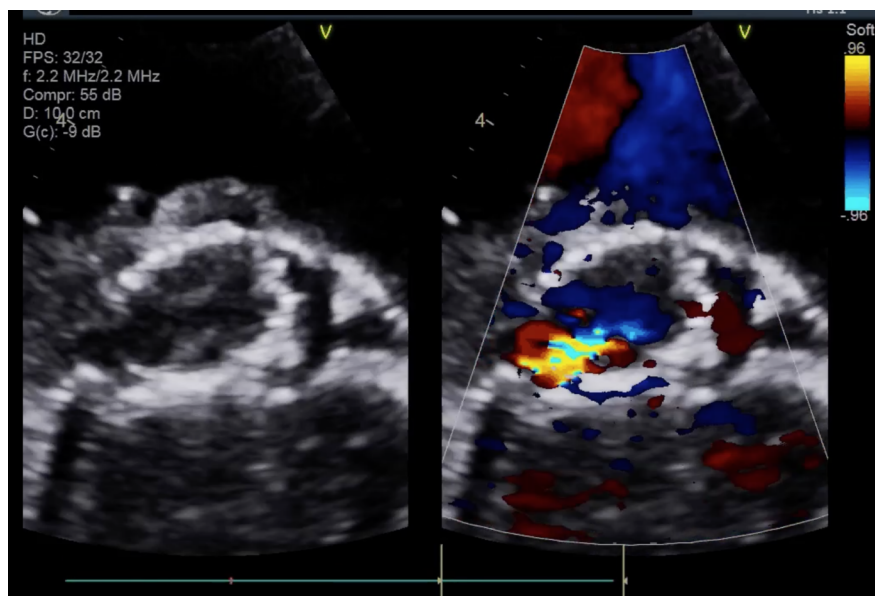


Figure 1: Transthoracic Echocardiogram in parasternal short axis view post TAVI, demonstrating a moderate jet of valvular regurgitation.

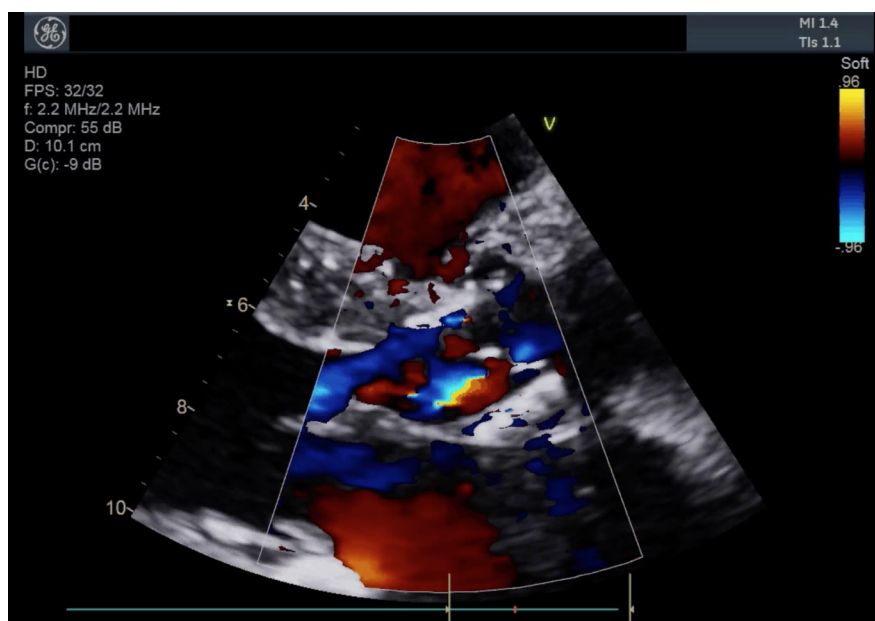


Figure 2: Transthoracic Echocardiogram in parasternal long axis view post TAVI, demonstrating a moderate jet of valvular regurgitation.

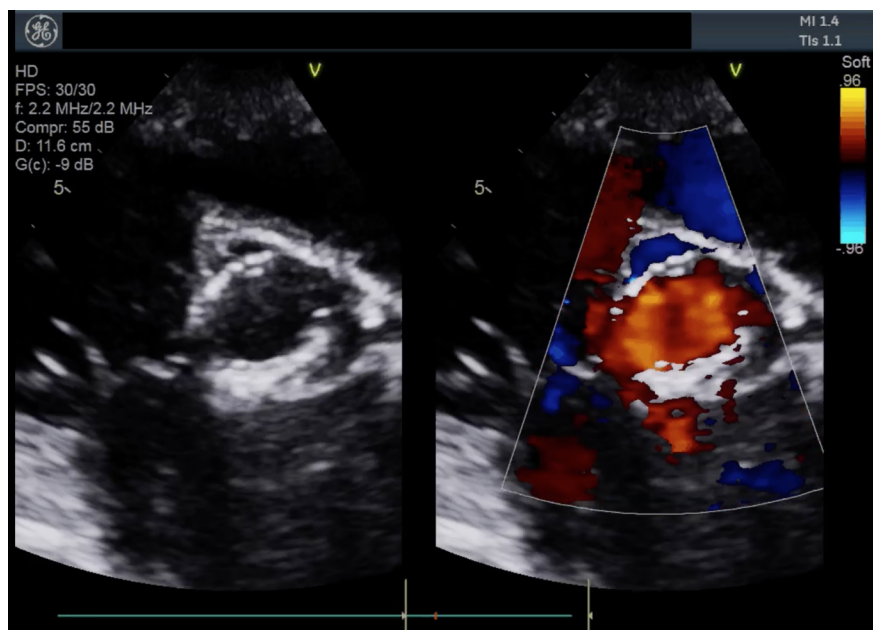


Figure 3: Transthoracic Echocardiogram in parasternal short axis view post balloon valvuloplasty of the prosthetic aortic valve demonstrating the resolution of valvular regurgitation.

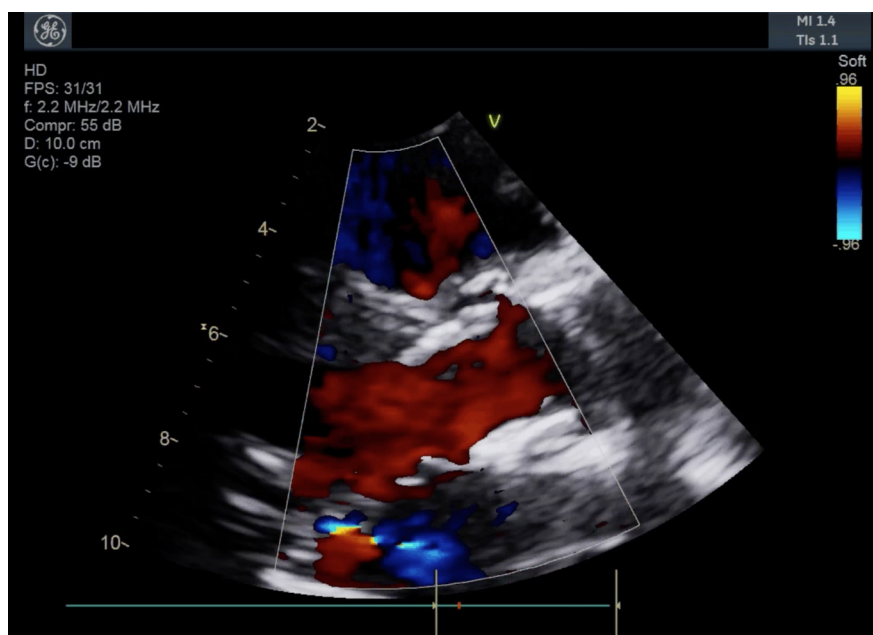


Figure 4: Transthoracic Echocardiogram in parasternal long axis view post balloon valvuloplasty of the prosthetic aortic valve demonstrating the resolution of valvular regurgitation.

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Video 1.mov available at <https://authorea.com/users/338460/articles/464462-case-report->

[describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve](https://doi.org/10.22541/au.159355903.33885722)

**Video 1:** Transthoracic Echocardiogram in short axis view post TAVI, demonstrating a moderate jet of central valvular leak and trivial paravalvular leak at at the 11 o'clock position, secondary to a non-mobile / restricted non-coronary cusp of the prosthetic valve.

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Video 2.mov available at <https://authorea.com/users/338460/articles/464462-case-report-describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve>

**Video 2:** Transthoracic Echocardiogram in long axis view post TAVI, demonstrating a moderate jet of central valvular leak and trivial paravalvular leak.

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Video 3.mp4 available at <https://authorea.com/users/338460/articles/464462-case-report-describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve>

**Video 3:** Aortic angiogram demonstrating moderate central aortic regurgitation post TAVI.

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Video 4.mov available at <https://authorea.com/users/338460/articles/464462-case-report-describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve>

**Video 4:** Transthoracic Echocardiogram in short axis view post balloon valvuloplasty of the prosthetic valve, demonstrating complete resolution of the moderate jet of central valvular leak, with full movement of the restricted non-coronary cusp leaflet. There is still a presence of trivial paravalvular leak at the 11 o'clock position.

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Video 5.avi available at <https://authorea.com/users/338460/articles/464462-case-report-describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve>

**Video 5:** Transthoracic Echocardiogram in long axis view post balloon valvuloplasty of the prosthetic valve, demonstrating complete resolution of the moderate jet of central valvular leak.

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Video 6.mp4 available at <https://authorea.com/users/338460/articles/464462-case-report-describing-balloon-dilatation-as-a-treatment-for-intraprothetic-regurgitation-following-implantation-of-a-sapien-3-transcatheter-aortic-valve>

**Video 6:** Aortic angiogram demonstrating complete resolution of the moderate aortic regurgitation post balloon valvuloplasty of the prosthetic valve.