

89. Under-Deployed Transcatheter Aortic Valve With Occlusion of Dominant Left Coronary System and AR; Chimney-in-Chimney Stenting and Post-Dilatation Bailout

Pandula Athauda-arachchi, Durdans Heart Centre, Durdans Hospital, Colombo, Sri Lanka, Faculty of Medicine, General Sir John Kothelawala Defence University, Ratmalana, Colombo, Sri Lanka

Body

Clinical Presentation and Investigations: A 78 year old lady had presented with 4 month history of worsening shortness of breath and pre-syncope with an ejection systolic murmur and was found to have critical aortic stenosis (Peak Gradient >120 mmHg, AVA<0.5 sqcm) , with a small annulus and LVOT(<18mm) and mild-moderate aortic regurgitation with preserved LV systolic function (EF>50%). ECG showed pre-existing right bundle branch block but no evidence 2nd or 3rd degree heart block on monitoring despite history of pre-syncope. Coronary angiogram demonstrated a left dominant coronary system with no significant obstructive disease. Patient was referred for cardiothoracic surgical opinion for surgical Aortic valve replacement, but intermittent cognitive/ behavioral issues, diabetes, reduced mobility and refusal by patient and family resulted in consideration for TAVI. Her calculated Euroscore II (mortality) for root enlargement and a SAVR was 10.99%.

The CT of aorta confirmed the difficult anatomy for TAVI, with a small annulus of 16x19.6 mm and a low coronary height to dominant left main of 7mm and small left coronary sinus(21.8mm), with a potential for left-main occlusion. Area (251.4sqmm) derived annular diameter was 17.9mm. Common femoral arteries were small (6.8mm). TAVR in hospital mortality risk was calculated at 2.17%. A further multidisciplinary discussion was offered and following this patient and family decision for TAVR was finally honored.

Interventions: Transfemoral TAVI with a Balloon expandable MyVal 20mm device (smallest available device) with trans-radial coronary protection was performed under local anaesthesia. Valve crossing was difficult as well as retaining of a Amplatz Extra stiff wire due to small LVOT and 'whipping effect' with AR. A Lundequist wire gave better support and a 16mm Balloon was used for pre-dilatation, which surprisingly did not demonstrate any tendency for coronary occlusion by native valve leaflets. Despite this, a coronary guidewire and a 4x12 mm Xience DES was parked as a precaution in the LAD. The 20mm valve was deployed with 2cc less in the navigator system, under rapid pacing. However, the TAVI valve failed to expand fully with severe drop in pressures , AR, and slow flow in left main culminating in cardiac arrest. CPR was promptly commenced and the waiting stent in LAD was deployed in ostium of left main as a 'Chimney stent'. This resulted in stabilization of situation. A root angiogram showed torrential AR and a decision was made to recross and post dilate the device with the navigator system with 2 cc extra volume. The concern was that the chimney may collapse on post dilatation against the shallow sinus. The initial coronary guidewire which had unfortunately come off to the aorta during the resuscitation attempt now had to be recrossed quickly through the ostial LM stent, avoiding any TAVI or coronary stent struts. An additional 4x8 mm DES was parked beyond the previous stent and the optimal post dilatation of TAVI device achieved with only a trace of residual AR. Due to the concern of compromise of the previous coronary stent in this limited space, a 'chimney-in-chimney' stenting was performed with another 4x8 mm DES, post dilated to 4.5mm, to fully expand the struts and maintain left

main access and patency with better radial strengthening of the proximal portion of the chimney. The femoral access was sealed with Proglide percutaneous sutures. Patient made an uneventful recovery.

Discussion: Potential for occlusion of low lying left main during TAVI in native aortic stenosis could be anticipated (to an extent) based on the findings on a CT aorta (1). Performance of a BASILICA procedure (2) or selection of new generation supra-annular aortic valves that grasp the native valve leaflets (3) may reduce the incidence of acute coronary occlusion, but the availability of these options are varied in different countries. Whether the pre-dilatation may or may not show the tendency for coronary occlusion, provision of coronary protection with wire/stent could be life-saving practice, but it may be difficult to implement in narrow anatomies with small annuli and small sinuses. When the TAVI devices may not fully expand and complications such as left main occlusion and a cardiac arrest occurs, rapid restoration of left main flow with chimney (4) stenting is paramount and subsequent optimization of the TAVI prosthesis is mandatory. In narrow coronary sinuses, there is always a risk of the chimney stent becoming deformed or occluded, with poor outcomes perioperatively.

We described our case where “chimney-in-chimney” stenting had to be performed following post dilatation of the TAVI device to optimize the left main blood supply. To our knowledge , this situation of chimney-in-chimney stenting has only very rarely been described in literature, but could be vital to augment radial strength of the chimney in narrow anatomies in emergency situations as per our case.

Follow-up: Patient had substantial reduction of her trans aortic gradients down to 28 mmHg (Peak) and 14 mmHg(mean) with only a trace of residual paravalvular AR. The pre-existing conduction disturbance with intermittent brief episodes of heart block persisted, hence a backup permanent pacemaker was implanted. There was no chest pain /ischaemia or LV dysfunction noted at one week. Patient remains on long term dual antiplatelet therapy.

Conclusion: Suboptimal deployment of a TAVI device in a narrow aortic annulus with close proximity to leftmain origin could present a challenge in balancing patient safety from complications and optimization of device parameters. Pre dilatation test of aortic valve did not appear to predict potential of complications experienced in this TAVI procedure. Chimney stenting or chimney-in-chimney stenting of left main could be lifesaving in this instance but careful follow-up of patients will be required in due course.

