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COMMENTARY

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Cusp overlap technique for self-expanding valves: Refining technique defining outcomes

Ashok Seth FRCP, MSCAI, DSc[1] | Manik Chopra MBBS, MD, DM[2]

[1]Escorts Heart Institute & Research Centre, New Delhi, India

[2]Narayana Multispeciality Hospital, Ahmedabad, Gujarat, India

Correspondence: Ashok Seth, FRCP, MSCAI, DSc, Fortis Escorts Heart Institute, Asian Pacific Society of Interventional Cardiology, New Delhi, India.
Email: ashok.seth@fortishealthcare.com

As Transcatheter Valve implantation (TAVI) expands to lower risk and therefore relatively younger patients, new onset conduction abnormalities following the procedure requiring permanent pacemaker implantation (PPI), are of major concern because these events are associated with adverse long-term prognosis.[1] Despite improvements in valve technology of the two commonly used genre of Transcatheter Heart Valves (THV), the PPI rates with self-expanding (SEV) Medtronic Evolut platform remain substantially higher than the balloon expandable (BEV) Sapien 3 platform. Furthermore, deeper implantation depth in relationship to annulus is also associated with higher PPI rates because of greater chances of impinging on the bundle of HIS and the left bundle. Thus, it is logical that shallower and predictable deployment could help in decreasing the relative high rates of PPI. The implantation of THV has been traditionally performed in the coplanar 3 cusp view (CPV). While this has worked reasonably well for predictable deployment of BEV, but this has not been the case for SEV. Firstly, after crossing the native annulus with the SEV delivery catheter, it is recommended to remove the parallax from the marker band of delivery catheter before unsheathing and deployment. But then the alignment of the THV with the three cusps is lost. Furthermore, as the catheter sits in the outer curve in the left anterior oblique projection, the depth of the valve below the annulus is an approximation. Once the SEV has been unsheathed and before final release a reassessment of depth involves a removing the parallax from the valve frame; thus, assessment of optimal depth of implantation is often difficult and clearly requires larger experience and longer learning curve. On the other hand, the cusp-overlap view (COV) technique involves overlapping of the right and the left cusp, thereby isolating the noncoronary cusp which is the lowermost hinge point on the annulus. Based on the CT scan derived S curve, this is usually a Right anterior oblique caudal projection. This view opens up and demarcates the noncoronary cusp-right coronary cusp commissure which is the most important landmark in relationship to the membranous septum and the conduction system. Other advantages of COV are that parallax of both the aortic annulus and the THV is automatically removed thereby coplanar alignment becomes inherent to the technique. Additionally, the left ventricular outflow tract is elongated which leads to more accurate assessment of depth of valve implantation in relationship to noncoronary sinus optimally at 2–5 mm below it.[2] In addition, with shallow deployment, better hemodynamics and less paravalvular leak (PVL) rates are also expected. Numerous small retrospective observational studies report a decrease in PPI rates by achieving shallower implantation of SEV using COV technique without compromising on safety concerns like valve dislodgement, increased PVL or need for a second valve. Yet there are no large or prospective published randomized studies till date.

In this issue of the journal Pompeu Sá et al have reported a metanalysis of studies comparing COV to CPV in TAVI with SEV.[3] In the absence of any randomized data comparing the two techniques, this analysis is important in defining the optimal technique of SEV implantation. Eleven studies, eligible for inclusion in the metanalysis included 1464 patients in COV group which was compared to 1743 patients in CPV group. It is appropriate to point out that in all studies, the SEV evaluated was Medtronic Evolut platform; all studies were non-randomized and 8 of the 11 studies were retrospective. At 30 days, COV technique resulted in lower rates of PPI to single digits and shallower implantation depth when compared to CPV technique, without any adverse effect on safety outcomes including PVL, valve dislocation, need for second THV, 30 days mortality, stroke or coronary occlusion. The interim analysis of the larger prospective non randomized multicentre OPTIMIZE-PRO study also demonstrates a substantial lowering of PPI rates to <10%.[4] On occasions, COV is difficult to achieve due to patient habitus like extreme obesity in which fluoroscopic image quality is decreased in extreme RAO caudal angulations and a less RAO caudal angulation along the S curve called the near COV may need to be considered.[2]

Another observation which needs amplification is that in most of the retrospective analysis, when experienced TAVI operators who had been performing CPV technique for years transferred to COV technique, there was a substantial decrease in PPI implantation rates in the first year itself.

This implies that COV technique also has a shorter learning curve and enables more precise, predictable and shallow deployment of the SEV with safety even during early experience. COV technique has additional advantages; the procedure is logical, intuitive, and less complex with well-defined landmarks and technical steps to enable more predictable deployment. It allows better assessment of the wire position in the left ventricle, visualization of maximum constraint of THV (as it represents the short axis of the aortic annulus) and most importantly the possibility of checking and adjusting for commissural alignment with different THVs.[5] Hence, it is logical that COV technique should be the technique of choice to learn and master for optimal implantation of SEV valve especially for all fresh and early career TAVI operators.

It is relevant to note that all studies in this Pompeu Sá et al. metanalysis were related to the Medtronic Evolut platform. Hence, this study should be extrapolated to other SEVs or BEVs with caution as every THV behaves differently during deployment. COV technique can also be used for BEV deployment and early experience suggests that it is feasible and safe.[5]

In conclusion, COV technique achieves a more precise predictable and shallower implantation of SEV to achieve lower PPI rates without compromising safety. We do not believe a randomized trial between techniques of SEV valve implantation is warranted because both CPV and COV techniques are safe and effective. This metanalysis however is persuasive enough for most experienced operators to shift from CPV to COV technique and for all fresh TAVI operators to understand and learn the best practices of COV technique and thereby provide better outcomes to the patients.

CONFLICT OF INTEREST STATEMENT

Dr. Ashok Seth: Proctor and Structural Heart Global Advisory Board, Medtronic; Proctor and Scientific Advisor, Meril Lifesciences.

Dr. Manik Chopra: Proctor for Myval THV, Meril Lifesciences; Proctor for Evolut platform THV, Medtronic; Proctor for Hydra THV, SMT; Proctor for Portico and Navitor THV, Abbott; Consultant for Boston Scientific; Consultant for Pie Medical Imaging.

ORCID

Ashok Seth http://orcid.org/0000-0001-6883-0287

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