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Is it now time for TAVI to be the default treatment for all patients with severe aortic stenosis?

Jonathan Hinton

Take Home Messages

- Recently published data demonstrate that TAVI valves are durable in the medium term and at least as good as SAVR
- Two studies of low risk patients randomised to TAVI or SAVR show that TAVI is at least as good as SAVR in the short term
- Further longer term follow up data are required before TAVI becomes the default treatment for most patients with severe AS

Background

In the seventeen years since the first transcather aortic valve implantation (TAVI), more than three hundred thousand patients have benefitted from the procedure both in terms of increased life expectancy and quality of life (1-5). Currently international guidelines recommend TAVI for patients considered by the heart team to be at prohibitive or high surgical risk and those intermediate risk patients in whom there are specific features that favour TAVI (6-8). Following these guidelines, further evidence has developed to support the use of TAVI in the general intermediate surgical risk population (5, 9-11). Is it possible that the indications for TAVI will continue to expand so that TAVI will become the default treatment for severe aortic stenosis with surgical aortic valve replacement (SAVR) reserved for specific cases?

Low risk populations

The data thus far demonstrate that TAVI is a valuable treatment for patients at high and intermediate surgical risk but until recently there has been little evidence in low risk patients. The NOTION trial randomised all comers (although the majority were low risk (82.1% has Society of Thoracic Surgery risk (STS) score <4%)) with severe aortic stenosis to either TAVI (139 patients (all self-expanding valves)) or SAVR (135 patients) (12). This study demonstrated no significant differences in all cause mortality at 30-days, one and six years (5, 12). Furthermore the German Aortic Valve Registry (GARY)

of low risk patients (all patients had a STS score of <4% with a mean score of 2.11%) compared the one year outcomes of patients treated with SAVR (14487) and TAVI (6052) using a propensity score analysis (13). In hospital and 30-day mortality was higher amongst TAVI patients compared with SAVR (in hospital survival 98.5% vs 97.3%, 30-day survival 98.1% vs 97.1%)(13). Importantly however one year survival rates did not differ (90.0% vs 91.2% p=0.158) (13). Whilst these studies suggest that TAVI may offer a viable alternative to SAVR in low risk patients, more data are needed to answer this question.

Two recently reported studies have addressed this question. Firstly the Evolut Low risk trial randomised 1403 patients to either TAVI (self-expanding) or SAVR. These patients had a mean age of 74 years and STS score of 1.9%. At two years there was no difference in the primary end point (a composite of death or disabling stroke) between the two groups (5.7% in the TAVI group vs 6.7% in the SAVR group P>0.999 for non-inferiority) (14). At thirty days there was however a significant difference in the need for permanent pacemaker (17.4% TAVI vs 6.1% SAVR). Interestingly at one year the mean aortic valve gradients were lower in the TAVI group but the rate of moderate or severe AR was higher (14).

The PARTNER 3 trial randomised 1000 patients with a mean STS score of 1.9% and age of 73.4 years to TAVI (using the balloon expandable SAPIEN 3 valve) or SAVR. At one year the primary end point (a composite of death from any cause, stroke and rehospitalisation) was significantly lower in the TAVI group (8.5% vs 15.1% p = 0.001) (15). Interestingly the risk of death or disabling stroke at one year (the same endpoint as in the Evolut low risk study) was also significantly lower amongst TAVI patients (1.0% vs 2.9% HR 0.34 (95% CI 0.12-0.97) (15). Length of hospitalisation was 4 days shorter with TAVI (3 days vs 7 days p<0.001) and unlike in the Evolut low risk study there was no difference in the need for permanent pacemaker implantation (15).

These trials highlight the benefits of the less invasive nature of TAVI whilst also demonstrating that it is at least as effective as SAVR in low risk patients in the short term. However as TAVI moves into the low risk population, the importance of the durability of the result is paramount because of the increased life expectancy of this low risk group.

TAVI valve durability

There was a suggestion from early data that around half of TAVI valves would experience significant deterioration at 8 years (16). However the five year follow up of the PARTNER cohorts demonstrated no structural valve deterioration requiring surgical intervention (17, 18). Whilst these data are reassuring the number of patients at risk was small and as such further data are required to evaluate the durability of TAVI valves. Two studies, NOTION and the UK TAVI registry have now published their longer term outcomes.

The UK TAVI registry evaluated the long term follow up of 241 patients treated with TAVI (64% self-expanding) between 2007 and 2011 in whom echocardiographic data was available from baseline and at least four and a half years after the procedure (19). The median follow up was 5.8 years (range 5 – 10 years). Importantly the majority (90.9%) of this population did not suffer from any form of structural valve deterioration (SVD) (19). Only one patient developed severe SVD and that was after 5 years and four months. Moderate SVD was noted in 8.7% of patients (57% due to aortic regurgitation, 43% due to increased valvular gradients) (19).

In NOTION, five year follow up was available for all surviving patients (98 TAVR & 97 SAVR), with fifty of each group having data available at six years. Similar to the UK TAVI registry the rate of moderate or severe SVD was low in the TAVI group (4.8%) at six years and this was better than that seen in the SAVR group (24.0%, $p<0.001$) (12). TAVI patients had more para-valvular leak and less patient prosthesis mismatch when compared with SAVR (12). Furthermore there was no significant difference in all cause mortality at six years (TAVI 42.5% compared with SAVR 37.7% $p = 0.58$) (12). Importantly the majority of these patients were at low surgical risk (82.1% had STS score <4%) (12).

It is important to note that the European definition of SVD, used in both NOTION and the UK TAVI registry, is likely to overestimate the rate of SVD because its criteria would include a patient with a raised gradient as a result of patient prosthesis mismatch without evidence of progression of these gradients (20). As a result it has been suggested that the true incidence of SVD in both the UK TAVI registry and NOTION is likely to be much lower (around half that reported in these studies) (20). Overall these data are very reassuring and demonstrate that TAVI valves have good durability out to

six years. Further longer term data are still required before TAVI can be recommended for younger low risk patients (20).

Conclusion

These recent data demonstrate that at one year TAVI is at least as effective as SAVR in low risk patients, with all the benefits that a less invasive procedure offers. Furthermore there is now good evidence that TAVI provides a durable result in the medium term. Whilst TAVI now provides a viable alternative to SAVR in low risk patients further long term follow up is required before TAVI becomes the default option for most patients with severe AS.

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