Editorial

Aortic valve replacement after bypass surgery: surgical (SAVR) or transcatheter (TAVR)

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Provenance: This is an invited Editorial commissioned by Section Editor Xue-Feng Leng (Department of Cardiothoracic Surgery, the Affiliated Hospital of Chengdu University, Chengdu, China).

Comment on: Reinöhl J, Kaier K, Reinecke H, *et al.* Transcatheter Aortic Valve Replacement: The New Standard in Patients With Previous Coronary Bypass Grafting? JACC Cardiovasc Interv 2016;9:2137-43.

Submitted Jul 24, 2017. Accepted for publication Aug 10, 2017.

doi: 10.21037/jtd.2017.08.76

View this article at: http://dx.doi.org/10.21037/jtd.2017.08.76

The situation where a patient who has undergone bypass surgery then develops significant aortic valve disease sometime during their subsequent lifetime is common. Previously the treatment choices were medical management or surgical reoperation for aortic valve replacement (SAVR). Medical treatment has been shown to have severe limitations for patients with aortic stenosis with a clinical picture of increasing disability and a projected life expectancy of roughly a 50% 2–3 years survival for symptomatic patients. On the other hand, reoperation has had its own risks, particularly for an aging group of patients. Within the last decade, catheter-borne aortic valve replacement (TAVR) has provided another option for such patients. Randomized trials of TAVR *vs*. SAVR in high and medium risk patients have included substantial numbers of patients having had previous coronary artery bypass graft surgery (CABG). The trial with the longest follow-up, Partner-1, has shown little difference at 1-and 5-year follow-up intervals for the entire patient group, although for the patient sub-group with previous CABG or PCI there was a trend toward improved survival in the SAVR arm (P=0.10) at 5 years after randomization (1,2). Despite these data, the less-invasive nature of TAVR has led to the suggestion that it is the treatment of choice for patients with previous bypass surgery because of the advanced age of many patients with previous CABG and the desire to avoid the technical challenges associated with reoperation in the face of patent bypass grafts.

However, there are a number of issues that constitute relative disadvantages to TAVR, at least at this writing. One such disadvantage is the risk of stroke, some of which may be caused by aortic trauma, but most of which are thought to be caused by the dilation of the aortic valve prior to the insertion of the aortic valve device (1). Many such strokes are not major or life-threatening, and progress is being made in the development of protection devices that promise to decrease these risks. But at present they represent an unpleasant complication at best. The second is an inability to treat in the most effective way many issues related to the patient's coronary artery disease. This is a very complex issue as intracoronary stenting is often available as an alternative anatomic form of treatment. However, the randomized trials of PCI *vs.* surgery have repeatedly shown stenting to be a less effective treatment of life-threatening coronary artery disease than CABG, with the possible exception of simple left main stenosis. The reason for this difference may be the principle that stenting treats a shorter segment of a coronary artery than CABG does and thus is not as effective a protection against the progression of coronary disease in the rest of the coronary vessel as is CABG. This ability to treat the patient's coronary artery disease with bypass grafting at SAVR may account for the apparent superiority of SAVR to TAVR in the 1 year survival and the trend toward superior five year survival in the PARTNER trial (1,2). On the other hand, reoperation for bypass surgery has only been shown to prolong life expectancy in situations where the left anterior descending (LAD) coronary artery is stenotic and without an effective

bypass graft. If a patent internal thoracic artery (ITA) to the LAD is present there are currently no data to support the contention that CABG prolongs survival for that subgroup (3).

The third disadvantage of TAVR, and an important one, is that there is very limited information concerning the longevity of TAVR valves, whereas the information regarding the longevity of SAVR valves is robust and favorable. The information regarding the longevity of TAVR valves is not extensive, but what we have is encouraging, at least for a while. We now know that intrinsic TAVR valve failure is not common within five years of the procedure. Further, we know from the Partner-1 trial of a high-risk subset that approximately 25% of the candidates for either TAVR or SAVR did not survive the first year after the procedure, indicating that for demonstrably high-risk patients, valve longevity is not the most important issue. However, many patients who are candidates for AVR following successful bypass surgery are not at a particularly high procedure-related risk for SAVR and have a favorable life-expectancy following operation. Thus, for such patients valve longevity is important. And current data indicate that if patients are more than 60 years of age at the time of SAVR and receive modern biologic valves that the likelihood of reoperation for structural valve failure in the aortic position is less than 50% out to twenty years after surgery (4).

Regardless of the long-term benefits of SAVR, for reoperation to appeal to both physician and patient there must be a high degree of confidence that those operations can be carried out very safely, despite the increased complexity of a reoperation. There is ample evidence that this is possible, but probably not by every surgeon in every institution. Reoperations of any kind are not generic, and with decreasing numbers of reoperations, particularly reoperations for coronary disease, fewer surgeons have an extensive experience.

Therefore, at the present time the following approach would seem to make sense. Prior to treatment patients should be seen by a Heart Team that includes both cardiovascular surgeons and interventional cardiologists and the patient's procedure related risk calculated using the Society of Thoracic Surgeons criteria. For patients with previous coronary surgery and a predicted operative mortality of 8% or greater with SAVR (the high-risk group in Partner-1), TAVR would seem a logical approach as long as serious coronary stenosis are not present. The presence of life-threatening coronary disease warrants at least the consideration of SAVR. For patients in the mid-range of risk (4–8%), TAVR would seem to be indicated in the absence of severe three-vessel native coronary and graft disease, SAVR being used for patients with aortic stenosis combined with serious coronary or graft disease, usually meaning that no ITA graft is functioning. For patients in the lower range of operative risk (<4%), who commonly have a predicted life expectancy of greater than ten years, SAVR would seem the most prudent approach, particularly in the face of severe coronary stenoses involving major coronary vessels that lend themselves to bypass grafting. Those reoperations should be carried out by surgeons with substantial experience with coronary and aortic valve reoperations and at institutions where such procedures are common.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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Cite this article as: Lytle BW. Aortic valve replacement after bypass surgery: surgical (SAVR) or transcatheter (TAVR). J Thorac Dis 2017;9(9):2714-2715. doi: 10.21037/jtd.2017.08.76

