JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 7, NO. 11, 2014

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jcin.2014.06.012

EDITORIAL COMMENT

Outcomes After Transfemoral Transcatheter Aortic Valve Replacement*

Martyn Thomas, MD

The PARTNER (Placement of AoRTic TraNscathetER Valve) transcatheter aortic valve replacement (TAVR) trials were pivotal to the development of TAVR throughout the world. Whereas TAVR was propagated in Europe by "heart teams" and the availability of CE-marked TAVR devices, the Food and Drug Administration in the United States mandated randomized clinical trials (RCTs) of TAVR versus medical therapy in inoperable patients (PARTNER 1B [1]) and TAVR versus surgical aortic valve replacement in high-risk surgical patients (PARTNER 1A [2]). Following completion of the PARTNER randomized trials, the Food and Drug Administration allowed a nonrandomized continued access (NRCA) registry including >1,000 patients including a newer generation transfemoral (TF) delivery system and greater access to a non-TF (transapical) vascular access.

SEE PAGE 1245

The paper by Fearon et al. (3) in this issue of *JACC: Cardiovascular Interventions* compares the outcome of, specifically, TF TAVR in the PARTNER randomized trials and TF patients in the NRCA registry. Despite a change in delivery system, the 23- and 26-mm Edwards Sapien valves required a 22- or 24-F sheath throughout both of these studies. The major finding of the study was that the 1-year mortality was significantly lower in the NRCA (19% vs. 25.3%, $p = 0.009$), and there were also lower rates of major vascular complications (8% vs. 15.7%, $p < 0.0001$) and major bleeding (6.8% vs. 15.3%, $p < 0.0001$). Thirty-day complications such as death and stroke were the same for both the RCTs and the NRCA registry.

It would have been disappointing if the NRCA results were not better than those of the PARTNER RCTs. Patients were enrolled into the RCTs between May 2007 and August 2009, whereas patients were enrolled into the NRCA between September 2009 and January 2012. Much has been learned about the TAVR procedure and patient selection between 2007 and 2009. The procedure duration was significantly shorter in the NRCA patients (117.6 vs. 145.1 min, $p < 0.0001$), demonstrating this learning curve. A better understanding of the procedure is also reflected in the reduction in major vascular complications and major bleeding in the NRCA patients. Equally, the patients in the NRCA registry were lower risk (reflected in the STS and Logistic EuroSCORE: 10.86 vs. 11.58, $p = 004$, and 24.25 vs. 28.14, $p < 0.0001$, respectively) because of lower comorbidities, and this is the likely reason for the lower 1-year mortality. Whereas the breakdown of patients in the RCT patients is clear (58% from the high-risk patients and 42% from the inoperable patients), this is not stated for the NRCA patients. It would be interesting to know whether these percentages have changed with time.

It is well known that the measurement of risk for TAVR patients is difficult. Neither the STS or logistic EuroSCORE are ideal, but these are the scores currently in use. Although they are poor at estimating absolute risk, they do categorize risk, that is, high, intermediate, or low. These risk measures appear to better estimate risks of mortality at 1 year than 30 days. It is interesting to look at these risk measures in the PARTNER RCTs, the CoreValve U.S. Pivotal trials, and the NRCA registry, and assess the potential impact on 1-year mortality. The first trials performed were PARTNER 1A and 1B. Despite the patients in 1B being considered inoperable, their risk

*Editorials published in *JACC: Cardiovascular Interventions* reflect the views of the authors and do not necessarily represent the views of *JACC: Cardiovascular Interventions* or the American College of Cardiology.

Dr. Thomas is a consultant to and an advisory board member of Edwards Lifesciences.

values were numerically lower than the high-risk 1A patients: STS and logistic EuroSCORE were 11.2% and 26.4% versus 11.8% and 29.3%, respectively. However the clinical judgment of the physicians appears correct in that the 1-year mortality was 30.7% in the inoperable patients compared with 24.2% in the high-risk surgical patients. These measures of risk were numerically lower in the High Risk and Extreme Risk CoreValve U.S. Pivotal trials (4,5); STS and logistic EuroSCORE were 7.3% and 17.6% in the High Risk and 10.3% and 22.7% in the Extreme Risk trials, respectively. The resulting mortalities at 1 year were 14.2% in the high-risk TAVR patients and 25.5% in the extreme-risk patients. The NRCA patients appear to occupy a middle ground with an STS of 10.86 and a logistic EuroSCORE of 24.25. The resultant 1-year mortality was lower than the PARTNER trials at 19%. These figures suggest that one of the strongest indicators of 1-year survival in TAVR patients (although not an absolute estimate) is the original STS and logistic EuroSCORE.

It is interesting to compare the results of the NRCA registry with recent European registries. The Edwards Sapien valve (Edwards Lifesciences, Irvine, California) is a first-generation TAVR device. In Europe, there are 1-year systematic registry outcomes data on the second-generation Sapien (the SOURCE XT registry using the Sapien XT valve) (6) and similar 30-day data from the third-generation Sapien 3 European CE Mark Registry (7). For the TF patients in the SOURCE XT registry, the 30-day mortality was 4.2% and 1-year mortality was 15%. The NRCA mortalities of 4.3% at 30 days and 19% at 1 year compare favorably with these results. The 30-day mortality for the TF patients in the Sapien 3 Registry was very low at 2.1% with a stroke rate of only 1%. The stroke rate in the NRCA registry was 3.7%. These data suggest that improved device design can result in improved 30-day outcomes, including reduced stroke rates.

Finally, it is interesting to compare the results of the NRCA registry patients with the surgical aortic valve replacement patients in the PARTNER 1A trial and speculate whether these results may be different if the trial was repeated after centers had gained more experience. The 1-year mortality of the surgical arm in the PARTNER 1A trial was 26.8%. The 1-year mortality of 19% in the NRCA registry would reflect a 29% reduction in mortality compared with this historical control group. This, of course, is merely speculation but might suggest that improved results of TAVR with time and experience would result in a different result of a high-risk surgical trial, as recently demonstrated in the CoreValve Pivotal Trial High-Risk study (4).

Overall, these data suggest that improved patient selection, advances in device technology, and increased experience with the TAVR procedure will result in improved patient outcomes both at 30 days and at 1 year.

REPRINT REQUESTS AND CORRESPONDENCE: Dr. Martyn Thomas, Cardiovascular Services, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH, United Kingdom. E-mail: MTTWINS@aol.com.

REFERENCES

1. Leon MB, Smith CR, Mack M, et al. Transcatheter aortic-valve implantation for aortic stenosis in patients who cannot undergo surgery. N Engl J Med 2010;363:1597–607.

2. Smith CR, Leon MB, Mack MJ, et al. Transcatheter versus surgical aortic-valve replacement in high-risk patients. N Engl J Med 2011;364:2187–98.

3. Fearon WF, Kodali S, Doshi D, et al. Outcomes after transfemoral transcatheter aortic valve replacement: a comparison of the randomized PARTNER (Placement of AoRTic TraNscathetER Valves) trial with the NRCA (Nonrandomized Continued Access) registry. J Am Coll Cardiol Intv 2014;7:1245–51.

4. Adams DH, Popma JJ, Reardon MJ, et al. Transcatheter aortic-valve replacement with a self-expanding prosthesis. N Engl J Med 2014;370:790–8.

5. Popma JJ, Adams DH, Reardon MJ, et al. Transcatheter aortic valve replacement using a self-expanding bioprosthesis in patients with severe aortic stenosis at extreme risk for surgery. J Am Coll Cardiol 2014;63:1972–81.

6. Windecker S. SOURCE XT 1 Year Data. Presented at: EuroPCR, Paris; 2013.

7. Webb J. 30 Outcomes from the Sapien 3 Trial. Presented at: EuroPCR, Paris; 2014.

KEY WORDS aortic stenosis, PARTNER, transcatheter aortic valve replacement, transfemoral