Transcatheter Aortic Valve Replacement for Severe Aortic Stenosis Patients Undergoing Chronic Dialysis

Aortic stenosis (AS) is common in patients with end-stage renal disease and the rate of progression is faster than in patients without end-stage renal disease. While aortic valve replacement (AVR) is the gold-standard approach for patients with symptomatic severe AS, surgical AVR (SAVR) carries considerable risks, which are maximized in elderly patients and in those with significant comorbidities. Indeed, patients with chronic dialysis undergoing SAVR have poor short- and long-term outcomes (1). Transcatheter aortic valve replacement (TAVR) has emerged as a therapeutic option for high- and prohibitive-risk patients (2). However, dialysis patients were excluded from previous clinical trials, largely limiting the understanding of this novel therapy in this particular patient subset (2). We report, therefore, the outcomes of TAVR in patients with chronic dialysis from the large multicenter Italian OBSERVANT (OBservational Study of Effectiveness of AVR—TAVI procedures for severe Aortic steNosis Treatment) Registry, the results of which have been partly published elsewhere (3).

Between December 2010 and June 2012, a total of 7,618 consecutive patients with severe AS undergoing either TAVR (n = 1,911) or SAVR (n = 5,707) at 95 Italian centers were prospectively enrolled in the OBSERVANT Registry. The Local Ethics Committee of the principal investigation site approved the registry. The patients gave consent to use their data for scientific purposes and in an anonymous form. Patient eligibility criteria, registry design, and data collection modalities have been previously described (3). All outcomes were adjudicated through a linkage with administrative databases. Throughout the study period, TAVR was performed in 44 dialysis patients (2.3% of TAVR population). Baseline and follow-up characteristics are listed in **Table 1**. Mean age was 77.9 ± 6.8 years of age, patients were commonly men (74.1%), severely symptomatic (New York Heart Association functional class III/IV, 70.5%), and frail (Geriatric Status Scale 2 to 3, 31.8%). The median logistic EuroSCORE I was 13.3% (interquartile range [IQR]: 8.4% to 26.3%). Moreover, a certain amount of patients had prior cardiac intervention such as cardiac surgery (18.2%), percutaneous coronary intervention (36.4%), and balloon aortic valvuloplasty (18.2%). Mean left ventricular ejection fraction was 48.2 ± 12.9%. Pulmonary hypertension (i.e., estimated pulmonary artery systolic pressure >60 mm Hg) and moderate/severe mitral regurgitation were frequently observed (22.7% and 36.4%, respectively). Approach sites were 77.3% transfemoral, 9.1% transaxillary, and 11.4% transapical and most of the cases were performed under local anesthesia (68.2%). In terms of device selection, 63.6% received the third-generation self-expanding transcatheter heart valve (THV) (CoreValve ReValving System, Medtronic Inc., Minneapolis, Minnesota) and 36.4% the balloon-expandable THVs (Edwards Sapien XT, Edwards Lifesciences, Irvine, California). The distribution of implanted valve sizes was 23 mm (3.6%), 26 mm (28.6%), 29 mm (53.6%), and 31 mm (14.3%) for the self-expanding valves, and 23 mm

TABLE 1 Baseline and Post-Procedural Characteristics (n = 44)

Clinical variables	
Age, yrs	77.9 ± 6.8
Female	7 (15.9)
Diabetes mellitus	10 (22.7)
COPD	13 (29.5)
Prior myocardial infarction	8 (18.2)
Neurological dysfunction	4 (9.1)
PVD	19 (43.2)
Prior cardiac surgery	8 (18.2)
Porcelain aorta	7 (15.9)
Prior PCI	16 (36.4)
Prior balloon aortic valvuloplasty	8 (18.2)
Critical preoperative state	5 (11.4)
NYHA functional class III/IV	31 (70.5)
Frailty score 2-3	14 (31.8)
Logistic EuroSCORE I	13.3 (8.4–26.3)
Post-procedure	
Permanent pacemaker implantation	9 (20.5)
Myocardial infarction	0 (0)
Major vascular complications	0 (0)
Stroke	0 (0)
Transfusions	11 (26.2)
Number of units	2.1 ± 1.7
Infections	1 (2.3)
In-hospital mortality	2 (4.5)
Follow-up	
30-day mortality	4 (9.1)
1-year mortality	15 (34.1)
1-year MACCE	16 (36.4)
1-year rehospitalization	21 (47.7)

Values are mean ± SD, n (%), or median (interquartile range).

COPD = chronic obstructive pulmonary disease; MACCE = major adverse cardiac and cerebrovascular event(s); NYHA = New York Heart Association; PCI = percutaneous coronary intervention; PVD = peripheral vascular disease.

(31.3%), 26 mm (37.5%), and 29 mm (31.3%) for the balloon-expanding valves. Two self-expanding valves were implanted in 1 patient (2.3%). The mean sheath size was 18.8 ± 2.1-F.

After the procedure, the mean aortic valve gradient was reduced from 46.8 ± 13.0 mm Hg at baseline to 9.3 ± 4.0 mm Hg (Δ37.4 ± 12.3 mm Hg; $p < 0.001$ for paired echocardiograms), whereas moderate/severe paravalvular regurgitation and new permanent pacemaker implantation were observed in 12.2% and 20.5% of the patients, respectively. The median length of intensive care unit and hospital stays was relatively short (2.0 [IQR: 1.0 to 4.0] days and 6.0 [IQR: 5.0 to 8.0] days, respectively). In-hospital and 30-day mortality was 4.5% and 9.1%, respectively. The median follow-up was 503 days (IQR: 155 to 808 days), and no patient was lost to follow-up. One-year mortality was 34.1%. One-year rates of major adverse cardiac and cerebrovascular event and rehospitalization were 36.4% and 47.7%, respectively.

To our knowledge, this is the largest multicenter report on the results of early and mid-term outcome of TAVR in chronic dialysis patients. The 30-day mortality of 9.1% in our study is comparable with the 30-day mortality of 7.6% and 9.7% in the overall population in the Transcatheter Valve Therapy Registries (Sapien THV), as well as in the FRANCE-2 registry (both Sapien and CoreValve THV), respectively (4,5); therefore, considering the severe comorbidity and frailty of our patients, our results further support performing TAVR in this complex setting. In addition, shorter intensive care unit and hospital stays would be a great advantage for these high-risk and frail patients. Highly calcified aorta (i.e., porcelain aorta) and iliofemoral vessels are major concerns in patients with chronic dialysis. In this study, however, neither stroke nor major vascular complications (i.e., need of surgical or endovascular intervention) occurred in the TAVR group. Conversely, 1-year mortality in our study was higher than that in the FRANCE-2 registry (34.1% vs. 24%), demonstrating the high cardiovascular risk profile in this subgroup. While a large sample size was initially included, the relatively limited number of dialysis patients precluded definitive conclusions. Our initial findings, as well as the most appropriate therapy (i.e., TAVR or SAVR) for severe AS patients with dialysis warrant future investigation.

In conclusion, our preliminary experience utilizing data from a large multicenter registry suggests in a mid-term follow-up, favorable safety, and efficacy of TAVR in patients with severe AS and chronic dialysis.

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Trimethylamine-*N*-Oxide and Heart Failure

The new study by Tang et al. (1) demonstrating an inverse correlation of serum levels of trimethylamine-*N*-oxide (TMAO) with survival in patients with heart failure (HF) is intriguing and thought provoking. Similar findings have been published recently by Norwegian researchers.

In our judgment, TMAO is more likely to be a marker than a mediator in this relationship. Fish,