ORIGINAL ARTICLES

TRANSCATHETER AORTIC - VALVE IMPLANTATION (TAVI) – AN EXPERIENCE AT ARMED FORCES INSTITUTE OF CARDIOLOGY

Abdul Hameed Siddiqui, Sohail Aziz, Ghulam Rasool Maken, Ali Nawaz Khan, Farhan Tuyyab, Mohsin Saif, Tahir Iqbal, Javeria Kamran, Anam Fatima Janjua, Imran Ahmed*

Armed Forces Institute of Cardiology/National Institute of Heart Disease (AFIC/NIHD)/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Ahad Rofeda General Hospital, Ahad Rafidah, Saudi Arabia

ABSTRACT

Objective: To share our experience of percutaneous trans-catheter aortic valve implantation TAVI in patients with severe symptomatic aortic stenosis.

Study Design: A retrospective cross sectional study.

Place and Duration of Study: Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD) Rawalpindi, from Mar 2015 to Aug 2019.

Methodology: Sixteen patients have undergone transcatheter aortic valve implantation since 2015 in the institute. Base line blood chemistry including creatinine clearance, ultrasonography abdomen, carotid Doppler, CXR, HRCT chest was done in all cases as part of the protocol. All patients under went procedure through trans-femoral route. Valve structure and peripheral vasculature for suitability of the procedure was assessed by computerized coronary tomographic angiography (CCTA) with TAVI protocol. Procedure was carried out under general anesthesia in all patients except one.

Results: Sixteen patients underwent the procedure successfully with reduction of the mean gradients immediately after valve implantation to less than 15mmHg recorded in the cath lab angiographically subsequently complemented by echocardiography. There were 2 deaths during the index hospitalization. Both occurred in the cath lab, one death was due to development of severe acute aortic regurgitation and second was due to acute coronary obstruction. Four patients died in next three months during follow up. One patient required permanent pacemaker because of development of left bundle branch block and second degree atrio-ventricular (AV) block post procedure.

Conclusion: Transcatheter aortic valve implantation in patients with severe symptomatic aortic stenosis is a very effective and safe procedure and reasonable alternative to surgical valve replacement in high operative risk individuals.

Keywords: Computerized coronary tomographic angiography (CCTA), Transcatheter aortic-valve implantation (TAVI).

INTRODUCTION

The role of transcatheter aortic-valve implantation TAVI in the treatment of patients with severe, symptomatic aortic stenosis has evolved on the basis of evidence from clinical trials[1-5]. Previous randomized trials of TAVI with both balloon-expandable and self expanding valves[6-10]. showed that, in patients who were at intermediate or high risk for death with surgery, TAVI was either superior or non-inferior to standard the rapies, including surgical aortic valve replacement. These results led to an expansion of guideline recommendations for TAVI[11-14]. Moreover, technological enhancements and procedural simplification have contributed to increased use of TAVI, Such that more patients now undergo TAVI than isolated surgery for aortic valve replacement globally[14]. However, most patients with severe aortic stenosis are at low surgical risk[15], and there is now sufficient evidence regarding the comparison of TAVI with surgery in such patients also[16,17]. In the study, We present data of our patients who have undergone this procedure in Armed Forces Institute of Cardiology in last three years. The patients included low to inter-

Correspondence: Dr Abdul Hameed Siddiqui, Department of Cardiology, AFIC/NIHD, Rawalpindi Pakistan
Email: drahsahs@gmail.com

mediate to high risk patients based upon Society of Thoracic Surgeons (STS) and (euro-II) scoring systems.

METHODOLOGY

Sixteen patients so far have undergone transcatheter aortic valve implantation since 2015 in this institute. Before proceeding with the procedure, informed consent was obtained along with Heart Team discussion which included cardiothoracic surgeon, cardiac anaesthetist, a clinical cardiologist and an interventional cardiologist.

Baseline transthoracic echocardiography was recorded in all patients and transoesophageal in selected cases. Base line blood chemistry including creatinine clearance, ultrasonography abdomen, and carotid doppler, CXR, HRCT chest (in selected cases) was done in all cases as part of the protocol. Mean age of the patients was 72.4 ± 8.53 years. There were fourteen males (87.5%) and two females (12.5%). All patients under went procedure through transfemoral route. Risk scoring used was based on Society of thoracic surgeons (STS) and (euro-II) scoring system widely used internationally in all centers with high volume of this procedure. Valve structure and peripheral vasculature for suitability of the procedure was assessed by computerized coronary tomographic angiography (CCTA) with TAVI protocol. In nine patients aortic valve was trileaflet (56.2%) and in remaining seven it was bicuspid (43.8%). Mean gradient across the valve was 58.8 ± 13.30. As far as symptomtology was concerned 9 patients (56.3%) presented with angina/dysnoea NYHA III, 6 patients with syncope (37.5%) and one (6.3%) had heart failure that was stabilized first before the procedure. Two patients had undergone previous coronary artery bypass surgery. Procedure was carried out under general anesthesia in all patients except one in whom conscious sedation was used because of severe chronic obstructive pulmonary disease. Three patients underwent coronary revascularization before valve implantation. Balloon expandable edwards sapien valve (By Edwards Life-sciences Irvine CA) was implanted in two patients and self-expandable core valve/Evolut R (by Medtronic Inc) in fourteen patients. Femoral access was obtained through direct ultrasound and angiographic guidance and Proglide was used as sealing device after implantation of the valve for vascular closure along with manual compression.

RESULTS

From Mar 2015 through Aug 2019, 16 patients underwent procedure. Mean age of the patients was 72.4 ± 8.53 years. There were fourteen males (87.5%) and two females (12.5%). All patients under went procedure through transfemoral route. Risk scoring used was based on Society of Thoracic surgeons (STS) and (euro-II) scoring system widely used internationally in all centers with high volume of this procedure. Valve structure and peripheral vasculature for suitability of the procedure was assessed by computerized coronary tomographic angiography (CCTA) with TAVI protocol. In nine patients

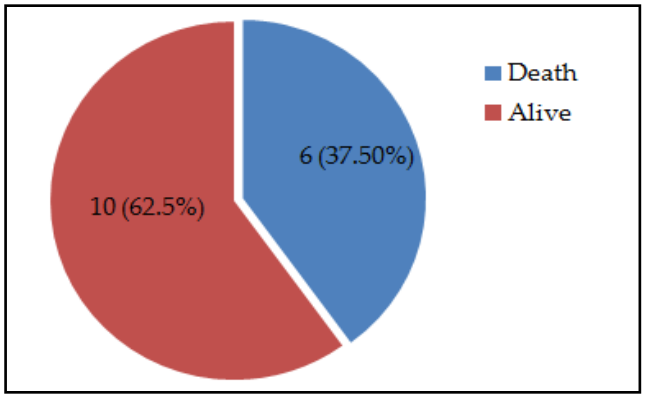

Figure-1: Frequency distribution of TAVI outcome.

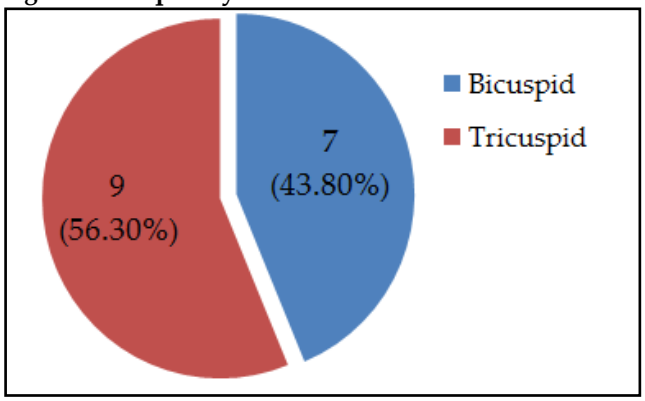

Figure-2: Frequency distribution of types of valves involved.

aortic valve was trileaflet (56.2%) and in remaining seven it was bicuspid (43.8%).

Mean gradient across the valve was 58.8 ± 13.30 (table-II). As far as symptomtology was concerned 9 patients (56.3%) presented with angina/dysnoea NYHA III, 6 patients with syncope (37.5%) and one (6.3%) had heart failure that was stabilized first before the procedure. Two patients had undergone previous coronary artery bypass surgery. There were 2 deaths during the index hospitalization. One death was due to development of severe acute aortic regurgitation and second was due to acute coronary obstruction. Four patients died in next three months during follow up (fig-1). Mean gradient across the valve after the procedure was lessthan 15mm.

Table-I: Demographic parameters of patients underwent TAVI procedure (n=16).

Variables	Frequency	Percentages
Age Mean ± SD	72.437 ± 8.53 years	
Gender		
Male	142	87.5
Female		12.5
Age group		
<60 years	2	13.4
60-69 years	4	26.7
70-79 years	8	53.3
80-89 years	2	13.3
NYHA Class		
II	1	6.7
III	5	33.3
IV	1	6.7
Hypertension	4	26.7
Diabetes Mellitus	2	13.3
Syncope	4	26.7
Angina	9	56.3
Heart Failure	1	6.3

Table-II: Echocardiogram and computed tomographic Angiography findings during the post processing done before (TAVI).

Parameters	Values (Mean ± SD)
Av-annular size	22.52 ± 4.02
AV mean gradient	55.34 ± 7.02
Av peak gradient mmHg (highest)	89 ± 14.7
Aortic_Annulus_Average	24.03 ± 2.53
Aortic_Annulus_Perimeter	78.7 ± 9.09
Aortic_Annulus_Area	418.78 ± 123.11
LVOT_average	23.76 ± 2.46
Sinotubular_junction_average	25.14 ± 2.61
Ascending_Aorta_avg	30.83 ± 6.36
Angles_Annular	47.57 ± 12.9
Angles_Aortic_Arc	62.56 ± 4.35
MV gradient	58.87± 13.30

Hg recorded Echocardiographically. One patient required permanent pacemaker because of development of left bundle branch block post procedure. Nine patients are in follow up with significant improvement in symptoms.

DISCUSSION

Valve replacement is the only effective treatment for adults with severe, symptomatic aortic stenosis. The ideal prosthetic valve would be associated with minimal risk and discomfort at implantation with Hemodynamics similar to those of a normal valve, not requiring anticoagulation and durable for the patient's lifetime. This goal is about to be achieved, as evidenced by sequential randomized clinical trials of transcatheter aortic-valve implantation TAVI, Initially in patients at prohibitive or high estimated risk for death with surgical aortic-valve replacement, then in patients at intermediate risk, and now in patients at low risk, defined as a risk of less than 3 to 4%[1-4].

Because of these considerations, current guidelines recommend the use of a mechanical valve in adults younger than 50 years of age, unless long-term anticoagulation is contraindicated or declined by the patient[14-16]. Among adults 50 to 70 years of age, long-term outcomes are similar with mechanical and biologic valves. The risk of bleeding and thrombosis associated with mechanical valves is balanced against the risk of valve deterioration and reintervention associated with bioprosthetic valves. In most patients older than 70 years of age, the use of a bioprosthetic valve is appropriate. In this group of patients, TAVI is likely to become the preferred option over surgery. Robust data as regards durability of the transcatheter bioprosthetic valve beyond 5 years are not yet available, so caution is needed in

selecting valve for young patients. Aorticvalve hemodynamics were sub-stantially improved in both the TAVI group and the surgery group and probably contributed to the reduction in symptoms and improvement in health-related outcomes that was observed in randomized trials. Similar findings were observed in our case series though the numbers are small which a limitation in our study[17-20].

CONCLUSION

Transcatheter aortic valve implantation in patients with severe symptomatic aortic stenosis is a reasonable alternative to surgical replacement with almost similar outcome when compared in terms of symptomatic improvement, long term survival, stroke incidence, bleeding complications and rhythm disturbace.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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