ISSN: 2476-230X

Research Article

Cardiology: Open Access

Transcatheter Aortic Valve Implantation (TAVI) Versus Surgical Aortic Valve Replacement (SAVR): A Retrospective Analysis from a Tertiary Care Hospital

Muhammad Ammad Khan*, Ghanwa Alam

Frontier Medical & Dental College Abbottabad, Pakistan

***Corresponding author**
Muhammad Ammad Khan, Frontier Medical & Dental College Abbottabad, Pakistan.

Submitted: 20 Jul 2022; **Accepted:** 28 Jul 2022; **Published:** 06 Aug 2022

Citation: *Muhammad Ammad Khan, Ghanwa Alam (2022). Transcatheter Aortic Valve Implantation (TAVI) Versus Surgical Aortic Valve Replacement (SAVR): A Retrospective Analysis from a Tertiary Care Hospital. Cardio Open, 7(3): 271-274.*

Abstract

Objective: *To compare the post-operative complication rate in Transcatheter Aortic Valve Implantation [TAVI] vs Surgical Aortic Valve Replacement [SAVR] within one week of the operation.*

Methods: *This is a retrospective cohort study in which two separate cohorts of patients would be included. The first group is of patients who undergo traditional open-heart surgery at our hospital for valve replacement, whereas the other cohort would be of patients who undergo valve replacement procedure using TAVI. Records of all the patients who underwent TAVI and SAVI in the last 5 years preceding the survey and fulfilling our inclusion criteria would be included in our study using purposive sampling method until the desired sample size is achieved. The inclusion criteria include patients who underwent primary valve replacement surgery at our institute through either of these procedures, patients who remained admitted in the hospital for at least one week and whose medical records are readily available at the hospital.*

Results: *A higher Postoperative Complication Rate observed with SAVR compared with TAVI. The Myocardial Infarction, Acute kidney failure and Stroke reported higher after SAVR compared to TAVI.*

Conclusion: *TAVI is a safer and more reliable procedure for Patients suffering from Aortic Stenosis.*

Keywords: Aortic Stenosis, Transcatheter Aortic Valve Implantation (TAVI), Surgical Aortic Valve Replacement (SAVR)

Introduction

The most prevalent heart valve disease, aortic valve stenosis, is a leading cause of morbidity and mortality globally. The aortic valve (AV) is located between the left ventricle and the aorta, which is a main systemic blood channel that supplies blood to all bodily organs and tissues. Left ventricular enlargement, as well as the accompanying symptoms of exertion dyspnea, chest discomfort, and possibly syncope, might occur. The severity of the problem determined by a number of echocardiographic parameters, including Aortic Stenosis jet velocity, mean transvalvular pressure gradient, and AV area by continuity equation, in addition to the extent of these clinical symptoms.

Aortic valve replacement is the ultimate treatment for severe Aortic Stenosis. The defective heart valve replaced with a new, functional valve, which can be constructed of mechanical or bio prosthetic material. Surgical AVR has long been the gold standard of therapy for severe, symptomatic AS, and it is recommended by US and European standards. It has been demonstrated to improve symptoms and increase survival rates. Transcatheter aortic valve implantation (TAVI), commonly known as Trans catheter aortic valve replacement is a less invasive method to AVR that has lately gained popularity. Both techniques used to provide sufficient hemodynamic parameters, symptom alleviation, and increased survival.

A thorough sternotomy or minimally invasive surgical incisions are two surgical techniques to AVR that have shown equivalent results. The femoral artery is the standard route for TAVI. Alternative access locations are used in some groups, such as patients with severe peripheral artery disease. The Trans subclavian artery and, less typically, the Trans carotid or transcaval methods are among them. The advantage of such techniques is that they allow access in a less invasive manner, without having to open the chest cavity, which makes them a desirable option for old, frail patients who are at high surgical risk. The Trans apical and direct Trans aortic methods are two more common alternate access locations. SAVR is now being tested in comparison to TAVI in different populations, indicating a rising trend toward less invasive techniques.

There has been a lot of interest and growth in TAVR because of the shifting patient profile and the degree of comorbidities. In patients with AS, TAVR is a less intrusive and morbid technique to AVR that has recently been investigated in comparison to medicinal treatment and SAVR. The first TAVR investigations in-

cluded inoperable and high-risk patients, as determined by their STS-PROM scores. When compared to medical therapy, TAVR resulted in higher survival, a lower risk of repeat hospitalization, and a lower rate of cardiac symptoms (25.2 percent vs 58 percent after one year; all P.05). In high-risk patients TAVR compared to SAVR lead to a somewhat improved survival at 1 year (75.8% vs 73.2%; P =.44).

In recent years, minimally invasive aortic surgery has established itself as a viable alternative to traditional sternotomy in the operational management of aortic disease; however it is only available at a few cardiac surgery centers and in locations where TAVR is not available. MAVR is associated with better clinical results especially in high-risk elderly patients. Previously published findings from a 10-year study of 552 matched pairs, finding that MAVR patients had shorter ventilation times, shorter ICU stays, and shorter LOS, but no differences in short- or long-term survival or the need for operative intervention.

While TAVR appears to offer a demonstrable benefit in terms of reducing acute kidney injury and the need for blood transfusions, and it is linked to a higher risk of permanent pacemaker installation, moderate-to-severe paravalvular regurgitation, and vascular problems. Furthermore, there is a lack of long-term data on the TAVR valve's longevity, which is cause for concern. Daubert et al. recently looked at the long-term performance of TAVR valves in terms of hemodynamic and valvular profile in patients who had previously participated in the PARTNER I trial and found no change in AV area, total transvalvular or paravalvular aortic regurgitation, or total transvalvular or paravalvular aortic regurgitation over 5 years [8]. Despite these results suggesting that valve performance and cardiac hemodynamics are stable after implantation of TAVR valves, valve durability is still unknown and has to be cautiously indicated in the young low-risk population.

In Pakistan, Ali Ammar and colleagues led the first study to judge the safety and effacy outcomes following TAVI. His study included 100 consecutive patients with severe Aortic Stenosis undergoing TAVI. Sixty-three (63.0%) patients were males, and the mean age was 67.38 ± 10.73 years. Atrioventricular blockages were reported in 22% of instances, with major vascular access site problems occurring in 14% of cases. Patients' symptoms were significantly different before and after the operation. During their stay in the hospital, eight individuals (8%) died. At the one-month follow-up, 76 percent of patients had no restrictions on their physical activity.

Objective

To compare the post-operative complication rate in Transcatheter Aortic Valve Implantation [TAVI] vs Surgical Aortic Valve Replacement [SAVR] within one week of the operation.

Methods

Study Type: Two separate cohorts of patients would be included in this retrospective cohort study. The first group is of patients who undergo traditional open-heart surgery at our hospital for valve replacement, whereas the other cohort would be of patients who undergo valve replacement procedure using TAVI.

Study Location: The study was conducted at a medical hospital based in Peshawar. The departments of cardiology were requested to allow requisition of data from both surgical procedures.

Sampling Technique: Records of all the patients who underwent TAVI and SAVI in the last 5 years preceding the survey and fulfilling our inclusion were included in our study using purposive sampling method until the desired sample size is achieved.

Study Population: All the patients who underwent Transcatheter Aortic Valve Implantation [TAVI] and Surgical Aortic Valve Replacement [SAVR] in the last 5 years preceding the survey at the hospital in Peshawar.

Inclusion Criteria

The inclusion criteria include:

1. Patients who underwent primary valve replacement surgery at our institute through either of these procedures.
2. Patients who remained admitted in the hospital for at least one week.
3. Patients whose medical records are readily available at the hospital.

Exclusion Criteria

1. Any patient with secondary valvular surgeries, by either means will not be included in the study.
2. Also patients with incomplete medical records will be excluded.
3. Any patient who was discharged before completing one week.

Study Duration: The total duration of this study, following ERC review will be approximately 6 months.

Sample Size: Using open epi, with a two-sided confidence interval of 95%, power of 80%, ratio of controls to cases 1.0, percent of controls exposed 40, and an odds ratio of 2.0, the calculated sample size is 268 (134 each cohort). Adjusting for a 10% attrition rate due to incomplete files, the sample size then turns out to be 295.

Data Collection: After getting, a clearance from the Ethics and Review Committee of the Hospital at Peshawar, ICD-10 coding for open-heart surgery, and TAVI and valve replacement would be used to identify patients. Following identification, a request form would be made to the HIMS department to pull out charts for the patients. A structured proforma would be used to extract the data of relevance from the files.

Data Analysis: The data analysis would be carried out on IBM SPSS Version 26. Mean and S.D will be calculated for continuous variables while frequencies and proportions will be reported for categorical variables. Chi-square test at 5% level of significance will be applied to compare the patient demographics, (including gender, co-morbidities, BMI, work, and NYHA classification of heart dysfunction) between the two groups. Moreover, in case of continuous variables (e.g. age) independent sample t-test is applied. Cross tabs would be done to find association between variables such as NYHA classification and type of surgery, between ejection fraction (and other cardiac markers)

to the surgery time, and between surgery type and associated post-operative complications (such as bleeding, ICU admission, infections), morbidities, and mortalities to identify any statistical significance. Incidence of post-operative complication rate (within 1 week of surgery) will be calculated for both the procedures separately using the below formula.

Number of patients who developed complications within one postoperative week multiply by 100 divided by total number of patients who underwent there procedure.

Ethical Considerations: An exemption review would be applied for in the Ethics and Review Committee of the Frontier Medical & Dental College Abbottabad. Data recorded digitally would be kept in password protected files, the password of which would be kept in secrecy, and available only to the principal investigator and those who he/she authorizes for use. Any patient identifier, including name, and MR number would be removed from all patient accounts entered in the proforma.

Result

Based on a cohort of 200 patients (100 in each group), a higher Postoperative Complication Rate was observed with SAVR compared with TAVI (39.0% vs 13.0%, respectively). Among SAVR patients, the most common complications were postoperative bleeding (51.2%), infection (30.7%) and cardiac tamponade (17.9%). Patients who underwent TAVI had higher incidence of other postoperative complications, which were vascular complications (53.8%) and need for pacemaker implantation (46.1%). On comparison the two groups did show significant differences in the mortality rate (SAVR = 15.0% & TAVI = 4.0%).

Discussion

Previously, SAVR was the sole effective treatment, however after TAVI invention; TAVI became associate choice for patients with severe symptomatic aortic stenosis who were considered inoperable or in patients at high risk for surgical complications. To the most effective of our information, TAVI reported with a lower postoperative complication rate than SAVR. Compared with SAVR, TAVI reduced the incidences of surgical hemorrhage, cardiac arrhythmia, Infection and tamponade however increased the incidences of major vascular complication, paravalvular leak, and need for pacemaker implantation. The incidences of myocardial infarction, acute kidney disease and Stroke were reported higher after SAVR compared to TAVI. Furthermore, Patients who underwent TAVI reported shorter hospital stay and a healthy recovery profile compared to SAVR.

Limitations

Retrospective nature is the main limitation to this study. Secondly, long-term outcomes were not studied because long-term data is limited. Thirdly, the comparatively small size of the study cohorts might have an effect on the liableness of these results. Fourthly, the high value of TAVI was a substantial reason that created many patients opt to bear typical surgery, even though they were appropriate candidates for TAVI.

Table 1

Variable	SAVR Group (n=100)	TAVI Group (n=100)
Median Age (y)	61.2	60.7
Sex (M)	70	54
Median BMI	25.2	21.4
NYHA (III/IV)	86	95
Median Length of ICU Stay (days)	6.3	3.5

ICU, intensive care unit; NYHA, New York Heart Association

Conclusion

TAVI has Low Postoperative Complication Rate and Mortality Rate compared to SAVR .Our Data confirm that TAVI is a safer and more reliable procedure for Patients suffering from Aortic Stenosis [1-10].

Authors Contribution

Muhammad Ammad Khan wrote the paper, collected the data and data analysis. Ghanwa Alam wrote the paper and collected the data.

References

1. Bhatia, N., Basra, S. S., Skolnick, A. H., & Wenger, N. K. (2016). Aortic valve disease in the older adult. Journal of Geriatric Cardiology: JGC, 13(12), 941.
2. Maganti, K., Rigolin, V. H., Sarano, M. E., & Bonow, R. O. (2010, May). Valvular heart disease: diagnosis and management. In Mayo Clinic Proceedings (Vol. 85, No. 5, pp. 483-500). Elsevier.
3. Hirji, S. A., Funamoto, M., Lee, J., Del Val, F. R., Kolkailah, A. A., McGurk, S., ... & Kaneko, T. (2018). Minimally invasive versus full sternotomy aortic valve replacement in low-risk patients: Which will stand against trans catheter aortic valve replacement? Surgery, 164(2), 282-287.
4. Leon, M. B., Smith, C. R., Mack, M., Miller, D. C., Moses, J. W.,…. & PARTNER Trial Investigators. (2010). Transcatheter aortic-valve implantation for aortic stenosis in patients who cannot undergo surgery. New England Journal of Medicine, 363(17), 1597-1607.
5. Kolkailah, A. A., Hirji, S. A., Ejiofor, J. I., Ramirez Del Val, F., Lee, J., Norman, A. V., ... & Kaneko, T. (2018). Novel fast-track recovery protocol for alternative access transcatheter aortic valve replacement: application to non-femoral approaches. Interactive CardioVascular and Thoracic Surgery, 26(6), 938-943.
6. Grover, F. L., Vemulapalli, S., Carroll, J. D., Edwards, F. H., Mack, M. J., Thourani, V. H., ... & STS/ACC TVT Registry. (2017). 2016 annual report of the Society of Thoracic Surgeons/American College of Cardiology transcatheter valve therapy registry. Journal of the American College of Cardiology, 69(10), 1215-1230.
7. Elmaraezy, A., Ismail, A., Abushouk, A. I., Eltoomy, M., Saad, S., Negida, A., ... & AlSafadi, A. M. (2017). Efficacy and safety of transcatheter aortic valve replacement in aortic stenosis patients at low to moderate surgical risk: a comprehensive meta-analysis. BMC Cardiovascular Disorders, 17(1), 1-11.

8. Daubert, M. A., Weissman, N. J., Hahn, R. T., Pibarot, P., Parvataneni, R., Mack, M. J., ... & Douglas, P. S. (2017). Long-term valve performance of TAVR and SAVR: a report from the PARTNER I trial. JACC: Cardiovascular Imaging, 10(1), 15-25.
9. Ammar, A., Rizvi, S. N. H., Saghir, T., Khan, N., Akhtar, P., Mengal, N., ... & Qamar, N. (2020). Pakistan Following Foot Prints of Developed World in Structural Interventions: Experience of Transcatheter Aortic Valve Implantation Reported First Time. Cureus, 12(11): e11497.
10. https://www.openepi.com/SampleSize/SSPropor.htm