Degenerative Aortic stenosis (AS) is one of the most common valvular heart disease in elderly, which if left untreated has very low 5 year survival rate of 18%\(^1\). Number of trials led to the initial approval of TAVR for high risk and inoperable patients, which has further expanded to include low surgical risk cases.

Present study included a total of 23 patients, who underwent TAVR between year 2017 until October 2020, and were subsequently followed up over a period of one year. Patients’ pre-procedural, procedural and post procedural characteristics were obtained including the symptomatic status, electrocardiogram, Echocardiography parameters, CT parameters, hemodynamic data and coronary angiogram.

Age of presentation ranged from 60 to 88 years. 88.7% of patients had either STS or Euroscore2 score of >4%. Mean AS gradient obtained on echocardiography was \(46 \pm 19.8\) mm Hg, while as per hemodynamic data peak to peak gradient was \(49.2 \pm 31\) mm Hg and mean pressure gradient was \(46.3 \pm 28\) mm Hg. Severe Aortic regurgitation (AR) was seen in 4 (17.4%) patients. 3 (13%) patients had bicuspid aortic valve, 1 (4.3%) had native valve pure aortic regurgitation, 3 (13%) had degenerated aortic bioprosthesis and 1 (4.3%) had low flow low gradient severe AS (Tables 1 and 2).

16 (69.9%) patients underwent TAVR using self-expanding 3rd generation Evolute R, while balloon expandable valve was used in rest, including Edward Sapien 3 in 2 (8.7%) and MyVal in 5 (21.7%). All cases were done in general anesthesia using femoral access. None of the patient had significant gradient or aortic regurgitation post valve implantation. Post TAVR mean AR index was 0.43. Post TAVR complete heart block (CHB) developed in 2 (8.7%) patients, both with baseline right bundle branch block, and subsequently underwent permanent pacemaker implantation during the initial hospital stay. Access site complications were seen in 6 (26.6%), of which 2 (8.7%) patients needed surgical intervention. Stroke was seen in 3 (13%) patients during the initial hospital stay, but had only transient symptoms with no residual weakness (Tables 3 and 4).

At the end of one year there was no mortality. 4 (17.3%) patients had re-hospitalization due to heart failure. Other complications included prosthetic valve mismatch in 2 (8.6%) and prosthetic valve leaflet thrombosis in 2 (8.6%). One (4.3%) patient during follow-up had holter documented long sinus pause of 6.8 s for which pacemaker implantation was done. 1 (4.3%) patient with low flow low gradient AS, severe left ventricular dysfunction and documented tachy-brady syndrome underwent left bundle branch optimized CRT. By end of one year the cumulative MACE, which included mortality or heart failure hospitalization or ACS or CVA, was seen in 30% (Figs. 1 and 2).

The principal finding in our study was no mortality upto 1 year followup. This was in contrast to 13.9% observed from US TAVI registry\(^2\) and corresponding Indian study with all cause mortality of 8%\(^3\). Present study showed stroke rate of 13% which was quite high compared to other major studies as data from TVT registry report stroke rate of 2.5% at 30 days and 4.1% at 1 year and zero case from the Indian study\(^4\).

In this study TAVR was found to be an effective alternative for severe AS patients with no mortality up to 1 year follow-up. The MACE events were mainly contributed by increased heart failure hospitalization and stroke rate.
Table 1
Baseline demographics.

| AGE (YEARS) | 60-88 (74) |
|------------|------------|
| Gender     | Male - 16 (69%) |
|            | Female - 7 (30.4%) |
| Body mass index BMI (kg/m²) | 25.5 (± 3.96) |
| Frailty    | 6 (26.1%) |
| Diabetes   | 8 (34.8%) |
| Hypertension | 18 (78.3%) |
| Dyslipidemia | 12 (52.1%) |
| Chronic obstructive airway disease | 10 (43.5%) |
| Stroke     | 1 (4.3%) |
| Peripheral arterial disease | 4 (17.4%) |
| Chronic kidney disease | 2 (8.7%) |
| Porcelain aorta | 2 (8.7%) |
| Previous myocardial infarction | 6 (26.1%) |
| Previous PCI | 3 (13%) |
| Previous CABG | 7 (30.4%) |
| Previous balloon aortic valvuloplasty | 0% |
| Previous aortic valve replacement | 3 (13%) |
| Previous mitral valve replacement | 1 (4.3%) |
| Previous radiation | 1 (4.3%) |
| Syncope/Presyncope | 3 (13%) |
| NYHA        | IV - 9 (39.1%) |
|            | III - 9 (39.1%) |
|            | II - 5 (21.7%) |
| Hemoglobin (GM/DL) | 12.45 (9.8–15.9) |
| Creatinine (MG/DL) | 1.1 (0.54–1.55) |
| NT PROBNP (PG/ML) | 3050 (342–20000) |
| Euro score 2 | 7.6 ± 5.24 (2.5–19.59) |
| STS Score   | 5.5 ± 1.88 (3–9.65) |

Table 2
Hemodynamic data at baseline.

| Characteristic                  | Value |
|--------------------------------|-------|
| Left ventricle systolic pressure (mm Hg) | 170 ± 31 (120–220) |
| Left ventricle end diastolic pressure (mm Hg) | 19.8 ± 9.6 (6–48) |
| Aortic systolic pressure (mm Hg) | 119.3 ± 22.36 (90–164) |
| Aortic diastolic pressure (mm Hg) | 49.1 ± 15.5 (30–70) |
| Peak to peak pressure gradient (mm Hg) | 49.2 ± 31 (0–139) |
| Mean pressure gradient (mm Hg) | 46.3 ± 28 (0–120) |
| Aortic regurgitation            | None - 9 (39.2%) |
|                                | Mild - 7 (30.4%) |
|                                | Moderate - 3 (13.0%) |
|                                | Severe - 4 (17.4%) |

Table 3
Procedural characteristics and post TAVR outcomes.

| Characteristic                  | Value |
|--------------------------------|-------|
| Age (Years)                    | 60-88 (74) |
| Gender                         | Male - 16 (69%) |
|                                | Female - 7 (30.4%) |
| Body mass index BMI (kg/m²)    | 25.5 (± 3.96) |
| Frailty                        | 6 (26.1%) |
| Diabetes                       | 8 (34.8%) |
| Hypertension                   | 18 (78.3%) |
| Dyslipidemia                   | 12 (52.1%) |
| Chronic obstructive airway disease | 10 (43.5%) |
| Stroke                         | 1 (4.3%) |
| Peripheral arterial disease    | 4 (17.4%) |
| Chronic kidney disease         | 2 (8.7%) |
| Porcelain aorta                | 2 (8.7%) |
| Previous myocardial infarction | 6 (26.1%) |
| Previous PCI                   | 3 (13%) |
| Previous CABG                  | 7 (30.4%) |
| Previous balloon aortic valvuloplasty | 0% |
| Previous aortic valve replacement | 3 (13%) |
| Previous mitral valve replacement | 1 (4.3%) |
| Previous radiation             | 1 (4.3%) |
| Syncope/Presyncope             | 3 (13%) |
| NYHA                           | IV - 9 (39.1%) |
|                                | III - 9 (39.1%) |
|                                | II - 5 (21.7%) |
| Hemoglobin (GM/DL)             | 12.45 (9.8–15.9) |
| Creatinine (MG/DL)             | 1.1 (0.54–1.55) |
| NT PROBNP (PG/ML)              | 3050 (342–20000) |
| Euro score 2                   | 7.6 ± 5.24 (2.5–19.59) |
| STS Score                      | 5.5 ± 1.88 (3–9.65) |

Table 4
Post TAVR outcomes during followup.

| Characteristics                  | 1 month followup | 1 year followup |
|----------------------------------|------------------|-----------------|
| NYHA                             |                  |                 |
| I                                | 14 (60.9%)       | 11 (47.8%)      |
| II                               | 8 (34.8%)        | 9 (39.1%)       |
| III                              | 0                | 0               |
| IV                               | 1 (4.3%)         | 3 (13%)         |
| Ejection fraction (%)            | 58.56 ± 11 (30–73) | 60.33 ± 10 (32–80) |
| Prosthetic valve gradient (mmHg) | 6.6 (0–45)       | 9.5 (0–37)      |
| Aortic regurgitation             |                  |                 |
| None                             | 10 (43.5%)       | 11 (47.8%)      |
| Trivial                          | 10 (43.5%)       | 9 (39.1%)       |
| Mild                             | 3 (13%)          | 3 (13%)         |
| Moderate                         | 0                | 0               |
| Acute coronary event             | 0                | 0               |
| Cerebro vascular accident        | 0                | 0               |
| Patient prosthesist mismatch     | 2 (8.7%)         | 0               |
| Valve leaflet thrombosis         | 0                | 2 (8.7%)        |
| Arrhythmia                       |                  |                 |
| Sick sinus syndrome              | 0                | 2 (8.7%)        |
| Heart failure admission          | 1 (4.3%)         | 3 (13%)         |
| Other complications              |                  |                 |
| Foot gangrene-limb amputation    | 0                | 1 (4.3%)        |
| Mortality                        | 0                | 0               |
| Drug compliance                  | 23 (100%)        | 21 (91.3%)      |

TAVR- Transcatheter aortic valve replacement.
Funding

None.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abbreviations

TAVR/TAVI: transcatheter aortic valve replacement
CT: computed tomography
AS: aortic stenosis
CHB: Complete heart block
CRT: Cardiac resynchronisation therapy
ACS: Acute coronary event
CVA: Cerebrovascular accident