Changes in Diuretic Regimen and Impact on Readmission Rates Following Transcatheter Aortic Valve Replacement

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Background

Aortic stenosis (AS) is the most common cause of valvular heart disease
Heart failure symptoms are common in patients with severe AS
Loop diuretics are often needed to maintain euvolemia and control symptoms
Transcatheter aortic valve replacement (TAVR) is a treatment option for patients with symptomatic severe AS who are intermediate-high risk of mortality with surgical valve replacement
After TAVR, cardiac output is improved immediately but reverse remodeling takes time
Loop diuretic requirements may change after intervention

Study Purpose:
• Discern if there is a difference in readmissions rates in the first 30 days after TAVR in patients discharged on the same or different loop diuretic dose compared to admission dose
• Determine if these readmissions are related to acute kidney injury or heart failure exacerbations related to dose change

Endpoints

Primary Endpoint:
• Hospital readmission within 30 days

Secondary Endpoints:
• Hospital readmission within 7 days
• Hospital readmission within 90 days
• Time to first hospital readmission
• Rates of hospitalization for heart failure exacerbation and acute kidney injury

Methods

Retrospective Chart Review

Inclusion Criteria:
• Admitted to University of Maryland Medical Center following TAVR
• On loop diuretic therapy before TAVR

Exclusion Criteria:
• Death during hospitalization
• End stage renal disease – dialysis dependent
• Conversion to surgical aortic valve replacement

Statistical Analysis

• Descriptive statistics – used to describe patient demographics, clinical and laboratory data, rates of acute kidney injury and heart failure related readmissions
• Student t-test and Wilcoxon rank sum tests – used to identify potential confounders for continuous and categorical variables respectively
• Logistic regression model – used to detect association between time to readmission, and impact of same or different diuretic dose on discharge
• p < 0.05 was set for statistical significance
• Analyses performed with SAS version 9.4

Results

• 240 patient reviewed for study inclusion
• 104 patients were not on loop diuretic therapy
• 8 died during hospitalization
• 2 converted to surgical valve replacement
• 8 had no follow up data after TAVR
• 116 patients met inclusion criteria
• 58 patients included that were discharged on same diuretic dose
• 58 patients included that were discharged on different diuretic dose

Table 1: Baseline Demographics

<table>
<thead>
<tr>
<th></th>
<th>Same Diuretic Dose (n = 58)</th>
<th>Different Diuretic Dose (n = 58)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Gender</td>
<td>53 (88.7%)</td>
<td>30 (51.7%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Age years</td>
<td>79</td>
<td>79</td>
<td>0.3</td>
</tr>
<tr>
<td>Past Medical History</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>14 (24.1%)</td>
<td>14 (24.1%)</td>
<td>1</td>
</tr>
<tr>
<td>Heart Failure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced Ejection Fraction</td>
<td>21 (36.2%)</td>
<td>27 (46.5%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Preserved Ejection Fraction</td>
<td>37 (63.8%)</td>
<td>31 (53.4%)</td>
<td>0.4</td>
</tr>
<tr>
<td>Prior Valve Replacement</td>
<td>8 (13.8%)</td>
<td>10 (26.3%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Admission Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Society of Thoracic Surgery Score</td>
<td>5.9</td>
<td>6.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Length of Stay after TAVR, days</td>
<td>3.2</td>
<td>5.3</td>
<td>0.01*</td>
</tr>
<tr>
<td>Left Ventricular Ejection Fraction</td>
<td>48.7</td>
<td>47.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Serum Creatinine, mg/dL</td>
<td>1.11</td>
<td>1.17</td>
<td>0.9</td>
</tr>
<tr>
<td>Loop Diuretic Dose, fosinomide mg equivalent</td>
<td>47.9</td>
<td>54.7</td>
<td></td>
</tr>
<tr>
<td>Acute Kidney Injury During Admission</td>
<td>6.10%</td>
<td>15 (25.9%)</td>
<td>0.03*</td>
</tr>
<tr>
<td>Serum Creatinine, mg/dL</td>
<td>1.11</td>
<td>1.3</td>
<td>0.04</td>
</tr>
<tr>
<td>Left Ventricular Ejection Fraction</td>
<td>52.6</td>
<td>50.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Loop Diuretic Dose, fosinomide mg equivalent</td>
<td>47.9</td>
<td>37</td>
<td>0.03*</td>
</tr>
</tbody>
</table>

* Denotes statistical significance

Figure 1: Admission and Discharge Diuretic Doses

Table 2: Readmission Rates

<table>
<thead>
<tr>
<th></th>
<th>Total n (%)</th>
<th>Same Diuretic Dose n (%)</th>
<th>Different Diuretic Dose n (%)</th>
<th>Odd Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Day</td>
<td>13 (11.3%)</td>
<td>10 (8.7%)</td>
<td>3 (2.6%)</td>
<td>0.23 (0.05, 0.95)</td>
<td>0.04</td>
</tr>
<tr>
<td>30 Day</td>
<td>36 (31.3%)</td>
<td>20 (17.4%)</td>
<td>16 (13.9%)</td>
<td>0.70 (0.29, 1.67)</td>
<td>0.4</td>
</tr>
<tr>
<td>90 Day</td>
<td>61 (53%)</td>
<td>37 (32.1%)</td>
<td>24 (20.9%)</td>
<td>0.60 (0.27, 1.30)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

* Denotes statistical significance

Figure 2: 30 Day Readmission Characteristics

Conclusions

• No difference seen in hospital readmissions within 30 days for patients discharged on same or different loop diuretic dose following TAVR
• There was an increase in 7 day readmissions for patients discharged on same dose, however most patients were readmitted for stroke or mechanical fall
• The most frequent dose changes post-TAVR were dose reduction or discontinuation of loop diuretic
• There were no significant variables in the subgroup analyses (reduced vs preserved ejection fraction, acute kidney injury during admission)
• Dose titrations were common in clinic follow-up within 30 days after TAVR suggesting diuretic requirements change but may not be fully capturing that through hospital readmissions
• Careful decision making on diuretic doses post-TAVR and close outpatient follow-up are necessary to minimize hospital readmissions

References

2. Nambi S et al. JACC 2018; 71; 3460-3471
4. Laks H et al. JACC 2018; 70: 1337-1343

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