MRI CAN PREDICT THE DEGREE OF LEFT VENTRICULAR REMODELING AFTER MITRAL VALVE SURGERY

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BACKGROUND:

Chronic mitral regurgitation (MR) has hemodynamic effects on the LV, namely dilatation.

Prior studies have shown:

1. A tight correlation between MR regurgitant volume by MRI and LV dilatation.¹

2. A tight correlation between MR regurgitant volume pre-surgery and LV remodeling post-surgery.²

1. Uretsky et al. JCMR 2010
2. Uretsky et al. JACC 2015
BACKGROUND:

We hypothesized that the LV remolds so as to maintain forward blood flow, and that the main adaptation is an increase in LV end-diastolic volume.

Thus, the degree of LV EDV remodeling post-surgery is based on the amount of MR and the LV EF pre surgery.

\[ \Delta \text{LVEDV} = \frac{\text{Volume} \downarrow \text{MR}}{\text{LVEF}} \]
METHODS

Prospective enrollment of 106 pts

Baseline MRI

No MV Surgery (n= 79)

ACC/AHA guideline directed MV surgery (n=27)

Post-surgery MRI

LV Prediction Model
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVSV</td>
<td>78 ml</td>
</tr>
<tr>
<td>RVSV</td>
<td>50 ml</td>
</tr>
<tr>
<td>FF</td>
<td>54 ml</td>
</tr>
<tr>
<td>MR Rvol.</td>
<td>24 ml</td>
</tr>
</tbody>
</table>
Pre Surgery

LV EDV 130
LV ESV 52
LVEF 60

Post Surgery

LV EDV 89
LV ESV 46
LVEF 56
PREDICTING POST SURGICAL LV REMODELING

Post Surgical Δ in LV EDV (ml)

CMR Expected: 40
Measured: 41

Post Surgical LV EDV
RESULTS: BASELINE CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>All patients (n=106)</th>
<th>Surgery (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>60 ± 14</td>
<td>57 ± 15</td>
</tr>
<tr>
<td>Male</td>
<td>67 (58)</td>
<td>17 (63)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>51 (49)</td>
<td>11 (41)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>14 (14)</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>32 (31)</td>
<td>7 (26)</td>
</tr>
<tr>
<td>Smoking</td>
<td>21 (20)</td>
<td>4 (15)</td>
</tr>
<tr>
<td>MI</td>
<td>5 (5)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>CVA</td>
<td>2 (2)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>39 (38)</td>
<td>9 (35)</td>
</tr>
<tr>
<td>Degenerative MR</td>
<td>46 (45)</td>
<td>21 (78)</td>
</tr>
<tr>
<td>Flail</td>
<td>12 (14)</td>
<td>9 (33)</td>
</tr>
</tbody>
</table>
RESULTS: OBSERVED VS. PREDICTED POST-SURGICAL LV REMODELING

\[ y = 0.8x + 20 \]

\[ R^2 = 0.8 \]

\[ p < 0.0001 \]
CONCLUSION:

• Mitral regurgitant volume calculated by MRI can be used to predict the degree of post-surgical LV remodeling.

• This data illustrates the accuracy of MR determined by MRI and can help guide clinicians in their decision making as to the expected degree of LV remodeling.

• Whether clinical benefit is associated with LV remodeling needs further study.
THANK YOU!

Questions?