MITRAL REGURGITATION ACCELERATES LEFT VENTRICULAR REMODELING AFTER POSTERO-LATERAL MYOCARDIAL INFARCTION


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Ischemic Mitral Regurgitation

Introduction

- Chronic ischemic mitral regurgitation (CIMR: MR) affects 1.2 to 2.1 million patients in the US, with more than 400,000 patients having moderate-to-severe MR. [1]
- These numbers are expected to progressively increase as the population rapidly ages and more patients survive acute MI. [1]
- CIMR of 2+ severity discovered at cardiac catheterization for symptomatic coronary artery disease has a 1-year mortality of approximately 17%. [2]
- The one-year mortality for 3+ and 4+ CIMR is approximately 40%. [2]
- Thus this disorder represents a substantial disease burden.

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Background

• The effect of moderate CIMR on left ventricular (LV) remodeling after postero-lateral myocardial infarction (MI) is especially controversial. [3]

• Thus it remains open to question if surgical repair for moderate CMIR has a favorable effect on LV remodeling.

• Currently a NIH sponsored clinical trial of CABG or CABG + mitral repair in patients with moderate CIMR is underway. [4]

• We tested the hypothesis that moderate MR accelerates LV remodeling after postero-lateral MI.


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Methods

- An established sheep model of CIMR was used (MI). [5]
- We were concerned that the amount of MR after postero-lateral MI in the sheep was only mild. [6]
- Thus, a second group of animals underwent standard postero-lateral MI + tethering of the posterior mitral leaflet with a mitral stitch (MI + STITCH).

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Methods

- MI + Stitch procedure.

The purpose of the STITCH was to increase the amount of MR without significantly altering the pathophysiology of CIMR.
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Methods

• Cardiac magnetic resonance imaging (MRI) was used to more accurately measure LV and regurgitant volumes.
• Sheep underwent MRI 2 weeks before and 2, 8 and 16 weeks after MI.
• Short- and long-axis images were contoured using custom software.
• Regurgitant volume was calculated as the difference between RV and LV stroke volumes
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Results

- Changes in RegurgVolume (A) and RegurgFraction (B) over time in the MI and MI+STITCH groups.

  – Because of the wide range in RegurgVolume in both groups, the two groups were not statistically different (p=NS). However, on average, RegurgVolume was larger in the MI + STITCH group.
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Results

- Relationships between regurgitant volume and LV vol. at end-diastole (ED) (A) and LV vol. at end-systole (ES) (B)

  Linear mixed-effects model regression analysis showed that LV Volume at ED and ES were highly correlated with RegurgVolume (p<0.0001 and p<0.001 respectively). Linear regression analysis showed the multiple to be 0.77 for the change of LV EDV and 0.23 for the change of LV ESV.
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**Results**

- Relationships between time after MI and LV volume at end-diastole (A) and LV volume at end-systole (B). *: p < 0.05 between High and Low mitral regurgitation groups.

- LV volume at ED in the two groups was significantly different (Both time and High vs Low effects p<0.05). However, LV volume at ES was similar (p=NS).
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Conclusion

• The amount of MR after postero-lateral MI was increased to the moderate level with the STITCH procedure.

• We found that moderate mitral regurgitation accelerates LV remodeling after postero-lateral MI.

• Further studies are needed to determine whether mitral valve repair is able to slow or reverse remodeling associated with moderate CIMR.