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ARTICLES

Physiologic role of the mitral apparatus in left ventricular regional mechanics, contraction synergy, and global systolic performance

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In animal models, severing the chordae tendineae of the mitral valve reduces the maximum global left ventricular elastance (Emax,g), a load- independent measure of left ventricular systolic performance; moreover, chamber geometry is altered with systolic bulging in the region of the papillary muscle insertions. This suggests that forces transmitted by the mitral apparatus increase the regional volume elastance (Emax,r) of segments subtending the insertions of the papillary muscles, and these regions contribute substantially to overall left ventricular systolic function (Emax,g). To test this hypothesis, we developed a method to evaluate changes in the magnitude and uniformity of Emax,r as quantitated by the slopes (E'max,i) of regional left ventricular isovolumetric pressure-dimension relations. Such measurements were obtained before and after all chordal attachments of the mitral valve were surgically divided in seven open-chest swine preparations. Significant declines in E'max,i were limited to the region of the posteromedial papillary muscle insertion. Although the mean E'max,i of all ventricular regions (E'max,ave) was unchanged, regional left ventricular elastances were less uniform after the mitral chordae tendineae were severed, which indicated a less synergistic contraction, and Emax,g fell by 21% from 7.1 +/- 2.0 to 5.6 +/- 1.2 mm Hg/ml (p less than 0.05). These data demonstrate that the mitral apparatus contributes importantly to the magnitude and uniformity of regional left ventricular elastances and suggest that such alterations in regional mechanics underlie the deterioration in global left ventricular systolic performance (Emax,g) after excision of the mitral apparatus.

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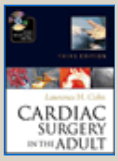

CARDIAC SURGERY IN THE ADULT HOME

J. I. Fann, N. B. Ingels Jr., and D. C. Miller
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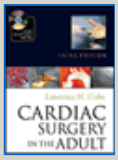

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