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Links

Restoration of left ventricular systolic performance after reattachment of the mitral chordae tendineae. The importance of valvular-ventricular interaction.

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Clinical studies suggest that chorda-sparing mitral valve replacement techniques are associated with superior postoperative outcome, and several animal experiments have shown that disruption of the mitral subvalvular apparatus is followed by deterioration of left ventricular systolic function. One essential element, however, underlying the importance of chordal integrity for left ventricular function remains unproved: All investigators heretofore have been unable to demonstrate that left ventricular systolic performance can be restored by chordal reattachment after disruption of annular-papillary continuity. Therefore, we studied the effects of chordal detachment and subsequent chordal reattachment on left ventricular systolic performance using an in situ, isovolumic heart preparation in 10 halothane-anesthetized swine. The slope and left ventricular volume intercept of the isovolumic peak pressure-volume relationship were measured to assess global left ventricular systolic performance independent of load. Coronary perfusion pressure was maintained constant (95 +/- 6 mm Hg [+/- standard deviation]), and heart rates were in the physiologic range (133 +/- 26 min-1). Slope changed significantly (repeated measures analysis of variance, p = 0.0002), decreasing by 29% (from 4.74 +/- 0.94 to 3.37 +/- 0.87 mm Hg/ml, p less than 0.001) after chordal detachment and then returning to baseline (6.05 +/- 2.38 mm Hg/ml, p = 0.001) after chordal reattachment. Slope after chordal reattachment was not significantly different from the baseline value (p = 0.074). Volume intercept did not change significantly (p = 0.44) at any time. We conclude that the acute decrease in left ventricular contractility associated with surgical interruption of annular-ventricular continuity can, in fact, be reversed by chordal reattachment in this experimental model (isovolumically contracting normal porcine hearts). These data provide concrete confirmation of the concept of valvular-ventricular interaction; if these findings can be corroborated in the dilated, human left ventricle, such would strongly support efforts to preserve the mitral chordae tendineae during clinical mitral valve replacement to optimize postoperative left ventricular function.

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