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1: Circulation. 1989 Sep;80(3 Pt 1):I24-42.   Links

Global and regional left ventricular systolic performance in the in situ ejecting canine heart. Importance of the mitral apparatus.

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The importance of the intact mitral apparatus in left ventricular (LV) systolic performance has been indirectly suggested by clinical studies of chordal-preserving mitral valve replacement (MVR) or reconstruction. The importance of the intact mitral apparatus has been clearly demonstrated in isovolumic experimental preparations but has not been demonstrated unequivocally in ejecting hearts. Therefore, this question was assessed independently of load in an in situ, open-chest ejecting canine heart preparation (n = 9). Three orthogonal LV dimensions were measured by sonomicrometry. During MVR with complete chordal preservation, snares were placed around the anterior and posterior papillary muscles. After the hearts were weaned from cardiopulmonary bypass, LV function was assessed by caval occlusion to alter LV preload abruptly. The slopes of the end-systolic--pressure-volume (end-systolic elastance, Ees) and stroke-work--end-diastolic volume (preload-recruitable stroke work, PRSW) relations were used to measure global LV systolic function; similarly, the slopes of the end-systolic--pressure-dimension (regional end-systolic elastance, rEes) and stroke-work--end-diastolic dimension changes in regional LV systolic performance. All chordae were then divided by pulling the snares. Immediate reassessment revealed deterioration of global LV function: Ees declined by 72% (14.1 +/- 11.2 mm Hg/ml [mean +/- SD] vs. 3.9 +/- 3.5 mm Hg/ml, p less than 0.001), and PRSW declined by 39% (129 +/- 37 vs. 79 +/- 29 mm Hg, p = 0.0001). Regional LV function was also adversely affected but somewhat selectively: rEes decreased significantly in all three LV dimensions (p less than or equal to 0.03), but rPRSW decreased significantly (-21%) only in the anteroposterior minor LV axis (89 +/- 19 vs. 70 +/- 15 mm Hg, p = 0.005) and in the septal-lateral axis (-19%, p = NS). These data demonstrate the importance of the intact mitral apparatus on LV systolic performance in ejecting hearts, particularly in the LV regions subtended by the papillary muscles.

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