Left ventricular efficiency after ligation of patent ductus arteriosus for premature infants

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Objectives: The purpose of this study was to evaluate the hemodynamic changes in the left ventricular function before and after patent ductus arteriosus ligation in premature infants with regard to the energetic efficiency of left ventricular pumping.

Methods: Thirty-five premature infants who underwent patent ductus arteriosus ligation were enrolled in this study. The left ventricular efficiency was evaluated at four points: within 24 hours before patent ductus arteriosus ligation, within 24 hour after patent ductus arteriosus ligation, between postoperative days 2 and 4, and on postoperative day 7. The indices of contractility (Ees) and afterload (Ea) were approximated on the basis of the systemic blood pressure and systolic or diastolic left ventricular volume. The ratio of stroke work and pressure-volume area, representing the ventricular efficiency, was estimated using the theoretical formula: The ratio of stroke work and pressure-volume area = 1 / (1 + 0.5 Ea/Ees).

Results: The left ventricular efficiency was transiently deteriorated within 24 hours after patent ductus arteriosus ligation due to the marked increase of the afterload and the slight increase of contraction, and then recovered to the pre-operation levels by 2-4 days after patent ductus arteriosus ligation.

Conclusions: The analysis of indices representing the afterload, contractility and energetic efficiency of left ventricle could provide practical information for the management of premature infants during the postoperative period after patent ductus arteriosus ligation.