Biological fibrin glue and prostaglandin E1 improve contractility in dynamic cardiomyoplasty: An experimental study in dogs. [Japanese]

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Abstract:

Background: In order to evaluate the effects of dynamic cardiomyoplasty as a surgical therapy to improve contractility in severe heart failure, this study was performed using the left latissimus dorsi muscle of 12 mongrel adult dogs to evaluate a cardiac wrapping method and to prevent ischemia of the latissimus dorsi muscle. Methods: Cardiac wrapping was performed using a tissue adhesive (biological fibrin glue: Beriplast P) between the ventricular surface and latissimus dorsi, without any direct suturing to the myocardium. To prevent ischemia of latissimus dorsi, prostaglandin E1 (PGE1) 6mu g/kg/day was administered for 10 days, starting during the perioperative period. Electrical stimulation for cardiac assist was provided with a DDD pacemaker starting on postoperative day 1. The animals were divided into two groups: those administered PGE1 (group 1) and those not administered PGE1 (group 2). The following were evaluated one month after surgery: aortic pressure, aortic blood flow, hemodynamics (echocardiography), cardiac function, and histological findings. Results: Aortic pressure with electrical stimulation increased by 11% in group 1 ($p<0.01$) and 7% in group 2 ($p<0.01$). Aortic blood flow with electrical stimulation increased by 23% in group 1 ($p<0.01$) and 18% in group 2 ($p<0.01$). Echocardiography clearly visualized latissimus dorsi wrapping after surgery. Increased contraction of the left ventricular cavity with stimulation versus no stimulation was confirmed. The ejection fraction increased by 12% in group 1 ($p<0.01$) and 10% in group 2 ($p<0.05$). Echocardiography revealed no significant changes in left ventricular diastolic diameter with stimulation versus no stimulation in either group. Histological examination of group 1 revealed satisfactory adhesion between the latissimus dorsi and the ventricular surface, and

ischemic sites in latissimus dorsi were limited to the peripheral aspect. However, in group 2, marked degenerative changes in the adhesion surface, as well as scattered sites of ischemia throughout the latissimus dorsi, were observed. Conclusion: The use of biological fibrin glue during cardiac wrapping provided effective adhesion between the latissimus dorsi and ventricular surface, resulting in beneficial hemodynamic effects. The use of PGE1 reduced ischemic changes in the latissimus dorsi immediately after dynamic cardiomyoplasty. These findings suggest that biological fibrin glue and PGE1 may be useful in preventing latissimus dorsi dysfunction, thus improve contractility of dynamic cardiomyoplasty.