

Surgical management of muscular ventricular septal defects: Selection of appropriate technique according to each location and size of ventricular septal defect.

Yoshimura N. (1), Aoki M. (1), Ikeno Y. (1), Nakaoka H. (2), Saito K. (2), Ozawa S. (2), Hirono K. (2), Ichida F. (2)

Department of Cardiothoracic Surgery, University of Toyama, Graduate School of Medicine, Toyama, Japan (1); Department of Pediatric Cardiology, University of Toyama, Graduate School of Medicine, Toyama, Japan (2)

Background: Although surgical results of multiple muscular ventricular septal defects (mVSDs) have been improved by new surgical techniques, standardized approach to these lesions has not been established. We have developed a treatment strategy that used direct closure, patch closure, and felt sandwich technique according to each location and size of mVSD. The present study evaluated the early and midterm results of this strategy.

Methods: One-hundred and eleven consecutive patients surgery for mVSDs and associated cardiac malformations from February 2005 to October 2016. They included 51 boys and 60 girls, with a median age of 9.0 months. Fifty patients had four or more VSDs (Swiss cheese septum).

Results: There were two early (pulmonary apoplexy, left ventricular dysfunction) and 1 late death (non cardiac death). There were no heart block. Two patients with Swiss cheese septum had postoperative congestive heart failure. Three mVSDs were closed by the sandwich technique in these 2 patients, whereas 1 or less VSD was closed by the sandwich technique in the other 109 patients. Two-hundred-and-sixty-eight mVSDs were closed in 111 patients. These included 35 high-trabecular (direct :25, patch :2, sandwich :8), 141 mid-trabecular (direct :130, patch :3, sandwich :8), 82 low-trabecular (direct :66, patch :1, sandwich :15), and 10 inlet muscular (direct :10) septal lesions. Two patients required reoperation for residual VSD (10mm and 7mm in high-trabecular lesion). The in-hospital echocardiograms demonstrated residual leakage in 39 lesions (high-trabecular :6, mid-trabecular : 8, low-trabecular : 25). At the latest echocardiographic study, the residual leakage had disappeared in 24 lesions.

Conclusions: The outcome of the surgical repair of mVSDs was satisfactory. To avoid postoperative cardiac dysfunction, the surgeon should try to close the muscular VSD directly. High-trabecular VSD especially that located at the junction between the ventricular septum and the right ventricular free wall was difficult to identify. Large residual VSD in this area caused congestive heart failure. This type of VSD was considered suitable for sandwich technique. Most of the mid-trabecular VSDs could be closed directly. Low-trabecular VSDs were difficult to close directly. However, small residual shunt disappeared spontaneously. Large low-trabecular VSDs were considered suitable for sandwich technique.