Useful surgical instruments for the resection of subaortic stenosis

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Myotomy or myectomy for hypertrophic subaortic stenosis (SAS) and membrane resection for discrete SAS have been performed widely.^{1,2} Although some previous studies have demonstrated problems, such as a high recurrence rate and postoperative aortic regurgitation, there is no alternative to the operation in patients with a high pressure gradient.^{3,4} Furthermore, it is difficult for individual cardiovascular surgeons to gain sufficient experience outside high-volume centers because of the low incidence of surgical cases. To perform this difficult surgical technique more easily, we use made-to-order surgical instruments for resection of the membrane or muscle in patients with SAS. These surgical instruments are custom-made for the depth and target angle in the transaortic approach. We report their usefulness in a sample surgical case of SAS.

TECHNIQUE AND RESULTS

Instruments

Here we describe the special features of surgical instruments for resection of the subaortic region (Figure 1). The scalpel has a total length of 22 cm and an angle of 140° at 3 cm from the tip. It is used by attaching an edge to the tip. The scissors has a total length of 25 cm and an angle of 160° right in the middle. The retractors have a total length of 30 cm and an angle of 120° at 5 cm from the tip with a groove.

Case

An 11-year-old girl had a diagnosis of discrete SAS with constrictive pericarditis. Although she could not report subjective symptoms because of severe mental disability, we elected to perform pericardiotomy with resection of the subaortic membrane in light of the high peak instantaneous left ventricular outflow tract (LVOT) gradient of 80 mm Hg. The operation was performed through a median sternotomy. After pericardiotomy, the patient was cooled to 32°C for

FIGURE 1. Photograph of our made-to-order surgical instruments. From top to bottom, this figure shows a scalpel, an angled scissors, and retractors.

cerebral protection under cardiopulmonary bypass and subsequent cardiac arrest. After aortotomy, the subaortic region was excellently exposed with angled retractors with a groove (Figure 2, A). The obstructive fibrous membrane, which appeared on the LVOT (Figure 2, B), and a part of the septal muscle were resected with a scalpel and scissors angled to enter the septal muscle at a shallow angle (Figure 2, C and D). We confirmed passage of the diameter dilator (15 mm). After we confirmed that there was no aortic regurgitation and no injury of the aortic valve, the incision of the aorta was closed. The postoperative peak instantaneous LVOT gradient was decreased, and this patient was discharged from the hospital on postoperative day 11.

DISCUSSION

Although early surgical repair of SAS is associated with a significant recurrence risk and aortic regurgitation progression, surgical intervention is required in patients with a high LVOT gradient.² LVOT obstruction repair by the transaortic approach is difficult because of the small exposure and angle of approach. This approach, however, is necessary to avoid aortic valve injury, ventricular septal perforation, and impulse conduction defect. We therefore sought optimized instruments that would decrease the risk of surgical complications. The surgical instruments that we describe in this report have been adjusted several times before reaching their final form. The area and the depth of resection may vary in each case; however, we believe that this challenging surgical procedure is performed more simply and safely

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FIGURE 2. Intraoperative images. A, Exposure is obtained with angled retractors. B, Intraoperative endoscopy showing the subaortic membrane. C, An endoscopic image showing resection of the subaortic membrane with an angled scalpel (*black arrow*). D, Resection of the subaortic membrane with an angled scissors (*black arrow*).

with such devices. We hope for further development of similar useful devices in cardiovascular surgery.

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Repair of anomalous aortic origin of coronary arteries with combined unroofing and unflooring technique

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Anomalous aortic origin of a coronary artery (AAOCA) is a congenital anomaly in which a major coronary artery arises from the atypical sinus of Valsalva and commonly courses within the aortic wall (intramural) or between the great arteries before reaching its normal epicardial distribution. AAOCA predisposes affected persons toward hemodynamic collapse during or shortly after strenuous exercise.