Modified Gersony-Malm procedure with sutureless technique for postoperative right-sided branch pulmonary venous obstruction after primary sutureless repair

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CENTRAL MESSAGE

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Postoperative pulmonary venous obstruction (PVO) may occur at the interval of several months after the repair of total anomalous pulmonary venous connection (TAPVC) and this results in pulmonary hypertension, atrial arrhythmia, as well as low cardiac output syndrome and desaturation. The cause of PVO is usually stenosis of the anastomosis site between the common PV and left atrium (LA). Lacour-Gayet and colleagues1 have popularized the concept of sutureless repair of PVO, and many surgeons have used this technique for primary repair, particularly in isomerism hearts.2 However, the branch PVO remains to be resolved even when the primary sutureless repair is applied.

CASE

A 1-day-old boy, weighing 3124 g, was diagnosed with supracardiac TAPVC without PVO. The vertical vein drained into the innominate vein. Total correction with primary pericardial sutureless technique was taken through a posterior approach when the boy was aged 10 days. The common PV chamber was incised longitudinally, 12 mm, with the pericardium. The incision was not extended into PV branches. The posterior wall of the LA was open from the junction of the inferior vena cava toward the appendage, along the atrioventricular groove. A wide sutureless anastomosis was made between the LA orifice and the pericardium using a 7–0 Prolene running suture.1 Hemodynamic parameters were stable after the operation, and normalized PV flow was shown via echocardiography. However, approximately 2 months later, echocardiography revealed continuous right PV flow of 2.2 to 2.4 m/second, and mild to moderate pulmonary hypertension. Chest radiograph revealed moderate venous congestion, and he showed desaturation (down to 88% to 90%). Computed tomography scans revealed that the bilateral proximal portion of the PV had become stenotic, and its diameters ranged from 1 to 3 mm (Figure 1, A and C). PV flow was hence accelerated to approximately 2.5 to 3.0 m/second, and an urgent reoperation was recommended because of progressive PVO.

Under fentanyl anesthesia with the patient in a supine position, median resternotomy was made. Cardiopulmonary bypass was established with ascending aortic perfusion and direct bicaval drainages. The right atrium (RA) was transversely opened toward the confluence of right PVs after aortic crossclamp and induction of cardioplegia.3–4 The atrial septum was also cut open and the anatomy of the LA and PVs were confirmed (Figure 2, A). First of all,
the right PVs were cut back to the pericardial reflection. Hegar dilator, 3 mm, could be passed through upper right PV and 5 mm through lower right PV. The orifice of the upper left PV was not found. Lower left PV orifice was narrowing, almost 2 mm, and the ridge around left PV orifice was resected so that Hegar dilator, 4 mm, could be passed. The upper ridge was fixed to the LA wall using 7–0 Prolene. Then, a 0.4-mm expanded polytetrafluoroethylene (ePTFE) patch, 15 × 20 mm in size, was sutured to the atrial septum and to lateral wall of pericardium using 6–0 Prolene, similar to the technique reported by Lacour-Gayet and colleagues (Figure 2, B). A wide right PV channel was created. The aorta was unclamped after meticulous air evacuation. The RA wall was closed with another 0.4-mm ePTFE patch, 15 × 15 mm in size, using 6–0 Prolene (Figure 2, C). The patient was weaned from cardiopulmonary bypass smoothly.

Postoperative hemodynamic parameters became stable and the patient left the hospital 2 weeks later, and has been healthy for 5 years so far. Computed tomography scans in the long-term period reveal the wide right branch PVs (Figure 1, B and D) and phasic PV flow <1.5 m/second was detected by echocardiography. Informed consent was obtained from the patient’s family for the publication of their information and imaging; institutional review board approval was not required.

FIGURE 1. Computed tomography findings (A) before and (B) after the pulmonary venous obstruction repair. A, Arrow indicates the portion of branch pulmonary vein. C, Arrow indicates the portion of the stenotic vein. D, Arrow indicates the widely opened vein. *A widely opened primary anastomosis orifice.

DISCUSSION

Postoperative PVO is a serious complication and might be associated with poor prognosis. In patients with poor development of the PV, the PV itself might become atrophic, stenotic, and obstructed toward the peripheral tree, regardless of the anastomosis site. Sutureless repair was introduced by Lacour-Gayet and colleagues, and many surgeons prefer to use this technique for the primary repair to avoid the stenosis at the anastomosis site that might be associated with not only unexpected distortion but also inflammation of the suture line.

As the approach for the right sided PVO, we used the transverse incision to the RA and interatrial septum as in the Gersony-Malm procedure because it enabled us to secure a better surgical field and create a larger neo-PV route. In the current procedure, either the autologous pericardium or ePTFE sheet may be used for the neo-PV reconstruction. We used an ePTFE sheet because autologous pericardium has the risk of future shrinkage and subsequent PV blood disturbance. We had an experience of re-PVO due to pericardial patch shrinkage in this technique at another hospital (unpublished data). The patch was largely trimmed in consideration of the patient’s future growth, and the sutureless technique was adapted for less fibrous tissue proliferations. Therefore, the augmented PV route was maintained.
CONCLUSIONS

The modified Gersony-Malm procedure\(^4\) with sutureless technique\(^1\) is a useful method, particularly for right-sided branch PVO, even after the primary pericardial sutureless repair for an extracardiac type TAPVC. Acknowledgment

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References


