REPAIR OF TETRALOGY OF FALLOT WITH ANOMALOUS ORIGIN OF LEFT ANTERIOR DESCENDING CORONARY ARTERY

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In tetralogy of Fallot the left anterior descending coronary artery (LAD) originates anomalously from the right coronary artery in approximately 5% of patients and crosses the right ventricular outflow tract (RVOT) at a variable distance from the pulmonary anulus.^{1,2} The surgical approach in this subset of tetralogy, as in the entire spectrum of this anomaly, primarily depends on the size of the pulmonary valve anulus and the anatomic features of the RVOT. In many patients successful repair can be accomplished by a transatrial-transpulmonary approach, which, as compared with the classic transventricular approach, may lessen development of right ventricular dysfunction over the long term.^{3,4} Generally, transannular patching is required when the pulmonary anulus is expected to be too small (Z value -5 or smaller) to lead to an acceptable postoperative right ventricular/left ventricular pressure ratio (maximum 0.65).⁵

Various techniques for repair of tetralogy with anomalous origin of the LAD and small pulmonary anulus have been reported, all of which consist of RVOT reconstruction with either a patch or a conduit.^{2,6-8} An alternative technique of RVOT reconstruction in this subset of tetralogy is analogous to the one described by Barbero-Marcial and colleagues⁹ for repair of truncus arteriosus without use of an extracardiac conduit. A longitudinal incision is made in the RVOT extending approximately 4 mm proximal to the LAD (Fig. 1). Two parallel longitudinal incisions in the main pulmonary artery are connected by a transverse incision so that a wide flap is created that is of sufficient length to reach the edge of the ventriculotomy (Fig. 2). The pulmonary artery flap is approximated to the superior edge of the ventriculotomy with 7-0 or 6-0 polyglyconate suture (Maxon; Davis & Geck, Inc., Danbury, Conn.). Subsequently, a hood of oval-shaped glutaraldehyde-treated pericardial patch or pulmonary homograft patch is circumferentially sutured to the edge of the ventriculotomy, both edges of the pulmonary artery flap, and the edge of the pulmonary arteriotomy (Fig. 3).

This technique (using glutaraldehyde-treated pericardium) was successfully applied in a 2-month-old infant with tetralogy and anomalous origin of the LAD. Both hemodynamically (intraoperative right ventricular/left ventricular pressure ratio of 0.44) and echocardiographically there was no evidence of residual RVOT obstruction. The postoperative course was uneventful, in particular without electrocardiographic evidence of left ven-

Fig. 1. Repair of tetralogy of Fallot with anomalous origin of LAD and small pulmonary anulus. Longitudinal incision is made in RVOT distal to LAD; if possible, large conal branch should be preserved. Two parallel longitudinal incisions in main pulmonary artery are connected distally, thus creating wide flap of pulmonary artery tissue.

tricular ischemia. At 9 months after operation, the infant is thriving; a follow-up echocardiogram, as compared with an intraoperative study, showed a widely patent RVOT with a 3 mm increase in the cross-sectional diameter of the created pathway at the level of the pulmonary valve anulus.

Potential advantages of the proposed technique (versus conventional patch or conduit reconstruction) are (1) lower probability of late RVOT or pulmonary stenosis, or both, because the posterior wall of the constructed pathway consists of autogenous tissue with preserved growth potential and (2) lower probability of compression or stretching of the LAD as compared with that when the conventional patch technique is used, especially when the patch is placed underneath the mobilized LAD. If the described technique is applied at neonatal age, use of a pulmonary homograft patch with a monocusp valve may be advantageous to preserve right ventricular compliance in the presence of increased pulmonary arteriolar resistance.

Although repair of tetralogy with anomalous origin of the LAD and small pulmonary anulus can be staged, long-term results of this approach may be less favorable than those with early (age 1 to 6 months) primary repair. Advantages of the latter approach (versus a staged ap-

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Fig. 2. Pulmonary artery flap is sutured to superior edge of ventriculotomy.

Fig. 3. Oval-shaped glutaraldehyde-treated pericardial patch (or, alternatively, pulmonary homograft patch) is circumferentially sutured to edges of ventriculotomy, pulmonary artery flap, and pulmonary arteriotomy.

proach) are as follows: (1) early relief of RVOT obstruction, which avoids secondary hypertrophy of the right ventricular infundibulum and muscle bundles and therefore necessitates less extensive muscle resection; (2) avoidance of biventricular volume overload (as a result of shunt physiologic conditions), which leads to better preservation of ventricular function; (3) preservation of pulmonary artery architecture; and (4) avoidance of detrimental developmental effects of prolonged cyanosis.

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