Transaortic Approach to Residual Ventricular Septal Shunt after Repairing Corrected Transposition of the Great Arteries

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Many surgical approaches have been taken when closing ventricular septal defects after correcting transposition of the great arteries in order to avoid postoperative complete heart block. We describe a residual ventricular septal shunt that developed after repair using de Leval’s method in a patient with congestive heart failure. The defect was closed transaortically without a complete heart block.

Keywords: corrected transposition of the great arteries, residual ventricular septal defect, transaortic approach, complete heart block

Introduction

To improve the surgical view and avoid postoperative complete heart block, various approaches have been taken when closing ventricular septal defects that can arise after correcting transposition of the great arteries. We describe a residual ventricular septal shunt that developed after repair using de Leval’s method in a patient with congestive heart failure. We achieved transaortic closure of a residual ventricular septal defect without complete heart block after repair of a corrected transposition of the great arteries.

Case Report

A 23-year-old man in whom a corrected transposition of the great arteries of the S, L, L type was surgically repaired at the 8 years of age was referred to our hospital for management of a residual ventricular septal defect.

During the previous surgery, the intraventricular view was poor, despite an extensive right atriotomy. Therefore, the operative view was improved via a morphological left ventricular incision and the ventricular septal defect (VSD) was closed using de Leval’s method. The VSD sutures were carefully positioned on the morphological right ventricular aspect of the VSD margins to reduce the risk of damaging the conduction tissue. After the aorta was unclamped, he underwent a pulmonary commissurotomy and the main pulmonary artery was enlarged with autologous pericardium. The postoperative course of the previous surgery was uneventful. However, postoperative transthoracic echocardiogram revealed a residual shunt in the upper rim of the VSD. Cardiac catheterization one month after the initial surgery revealed a moderate left to right shunt (ratio of pulmonary to systemic blood flow [Qp/Qs] = 1.5) across the VSD. Strict follow-up by echocardiography at our outpatient department since the surgery had revealed good right and left ventricular function without pulmonary stenosis or regurgitation except for a residual VSD that had been previously diagnosed. Nevertheless, dyspnea upon exertion had gradually developed by the time he reached the age of 22 years. Transthoracic echocardiogram still revealed a residual shunt in the upper rim of the VSD (Fig. 1), and cardiac catheterization at that time revealed a residual VSD with a significant shunt (Qp/Qs = 2.4). We, therefore, scheduled surgery to treat the significant residual VSD shunt 15 years
after the initial surgical repair.

Routine cannulation for cardiopulmonary bypass through a standard median sternotomy was performed with the arterial cannula in the ascending aorta and bivacal venous drainage. After the aorta was clamped, a small transverse aortotomy was extended both upwards and downwards under direct vision to provide good exposure of the aortic root. The residual VSD was located in the anterosuperior rim of the original defect. The residual defect in the superior aspect of the original patch was closed with pledget-reinforced mattress sutures and an additional polytetrafluoroethylene augmentation patch (0.4 mm thickness) (Fig. 2). Weaning from the bypass was uneventful and sinus rhythm was normal. The postoperative clinical course was also uneventful, and a postoperative echocardiographic examination indicated no aortic valve regurgitation and no residual ventricular septal shunt.

Discussion

The approach described by de Leval et al.1) involves a right atriotomy and exposure of a ventricular septal defect through the right mitral valve. The ventricular septal defect was carefully sutured on the morphological right ventricular aspect of the ventricular septal defect margins because the bundle of His was positioned along the anterosuperior rim of the defect on the morphological left ventricle in the corrected transposition of the great arteries. However, postoperative cardiac catheterization revealed a residual ventricular septal defect with a significant shunt, which might have been associated with the intent of the original surgeon to avoid the area of conduction tissue by placing the sutures more superficially.

A transaortic approach has been taken for some intracardiac surgical repairs,2,3) and the entire left ventricular outflow including the ventricular septal defect can be visualized. A transaortic approach to ventricular septal defect closure was originally described by Galioto et al.2) in 1974. Both Matsuda et al.4) and Kitamura et al.5) then applied this technique to patients with corrected transposition of the great arteries in 1984. Most of these patients with a ventricular septal defect in whom the transaortic approach was planned tolerated transaortic repair. We applied the method to a patient with a significant residual ventricular septal shunt after corrected transposition of the great arteries was repaired. This approach allowed excellent access to the defect, and postoperative aortic regurgitation or residual ventricular septal shunt were not evident. This approach can be used particularly for more elderly patients with corrected transposition of the great arteries.

We described a patient who developed a significant residual ventricular septal shunt after repair of corrected transposition of the great arteries. The transaortic approach provides an excellent operative field for closing ventricular septal defects in such patients. However, postoperative follow-up is necessary to exclude late aortic regurgitation.
Disclosure Statement

The authors declare no conflicts of interest or relationships with industry.

References