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| タイトル | 症例報告: 一連の手術による wolff-parkinson-white 症候群と心室洞
              の同時修復、1 例の報告。 |
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One stage repair of concomitant Wolff-Parkinson-White syndrome and ventricular septal defect: A case report


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ABSTRACT

We treated a 2.5-year-old Japanese girl by one stage surgery for Wolff-Parkinson-White (WPW) syndrome and associated with ventricular septal defect (VSD). VSD, 11.5mm in size, was corrected with a patch using expanded polytetra-fluoroethylene (E-PTFE) sheet through a transpulmonary approach. The accessory atrioventricular pathway in type B was divided by cryoablation through an endocardial approach. We suggest that one stage operation must be used for treating WPW syndrome and associated cardiac disorder, particularly, in infants and children as morbidity and mortality are lower compared to those in staged radiofrequency catheter ablation followed by surgical intervention. *Ryukyu Med. J.*, 15(1)41–43, 1995

Key words: One stage repair, WPW syndrome

INTRODUCTION

Concomitant heart disease with ventricular septal defect (VSD) and Wolff-Parkinson-White syndrome (WPW syndrome) in one patient is unusual. It is necessary for VSD to be corrected simultaneously with surgical ablation of accessory atrioventricular pathways. We report on a patient with VSD and WPW syndrome who was successfully treated by one stage operation.

CASE REPORT

A 2.5-year-old Japanese girl was admitted to Ryukyu University Hospital in February 1993. She was delivered prematurely at 37 weeks of gestation weighing 2470g. The delivery was spontaneous without any complications. She was found to have a heart murmur with a suspected diagnosis of VSD on a mass examination at the age of one month. At eight months of age, an electrocardiogram revealed type B WPW pattern. At one year of age, type I VSD was detected by an echocardiogram and cardiac catheterization, with a left to right shunting ratio of 33.7%. There was no pulmonary hypertension. Paroxysmal supraventricular tachycardia occurred during cardiac catheterization, with a left to right shunting ratio of 33.7%.

There was no pulmonary hypertension (Fig. 1). Paroxysmal supraventricular tachycardia occurred during cardiac catheterization. At 2 years of age, a mild aortic regurgitation was detected by an echocardiogram (Fig. 2).

Laboratory examinations including arterial blood gas analysis were within normal limits. The chest X-ray film showed no pulmonary hypervascularity and no cardio-megaly (CTR = 43.8%). Electrocardiogram showed a sinus rhythm, a short P-R interval and delta waves. Diagnosis was made as type B WPW pattern related to left bundle branch block (Fig. 3).

Operative findings (Fig. 4)

The heart was approached through a median sternotomy. Maximum thrill was noted on the right ventricular outflow tract. Electrophysiologic maps of the right and left ventricles were made in sinus rhythm. Supraventricular tachycardia was induced spontaneously, and epicardial mapping was repeated with reference methods using card type multielectrode grids with 45 points on the left side and 42 points on the right side. As the point of the earliest endocardial activation was identified at the diaphragmatic region (posterior wall) of the right ventricle, the antegrade conductive accessory AV pathway was determined to be located near the posterior leaflet ring of the tricuspid valve (Fig. 5).

VSD with the size of 11.5mm was located at the subaortic region and was corrected with a patch using expanded polytetra-fluoroethylene (E-PTFE) sheet through a transpulmonary approach under cardiopulmonary bypass (CPB). The division of the accessory pathways was done through an endocardial approach. An incision and dissection of the endocardium was extended circumferentially along the tricuspid posterior leaflet annulus, 2mm away from the hinge line, to ablate accessory pathways completely. After ablating accessory pathways, cryoablation was applied three times for one minute using cryoprobe at -60°C.
Fig. 1 A right atrioventriculogram in the front projection (left) shows no evidence of the atrialized ventricle and the dilated pulmonary artery. A left ventriculogram in hepatoclavicular view (right) shows VSD shunt flow with left to right shunting ratio 33.7% (arrow).

Fig. 2 A preoperative electrocardiogram at 2 years of age shows VSD shunt flow at the subaortic region (left), herniation of the right coronary cusp (center), and a mild aortic regurgitation (right).

Fig. 3 A preoperative electrocardiogram (left) shows sinus rhythm, a short P-R interval, delta waves and left bundle branch block. The findings of left ventricular hypertrophy is not evident. A postoperative electrocardiogram (right: 6 P. O. M.) shows absence of a short P-R interval and delta waves.

Fig. 4 The operative procedure: The subaortic VSD in type I of 11.5 mm in size, was repaired with a patch using E-PTFE sheet through a transpulmonary approach under cardiopulmonary bypass. The division of the accessory pathway was done through endocardial approach using the application of cryoprobe for one minute at three times.

Fig. 5 The point of earliest endocardial activation was detected in the diaphragmatic region (posterior wall) of the right ventricle, and the location of the antegrade conduction accessory atrioventricular pathway was determined approximately at the posterior leaflet ring of the tricuspid valve with epicardial mapping.

Fig. 6 The division of accessory atrioventricular pathway was demonstrated with an epicardial mapping on beat after weaning from cardiopulmonary bypass.
After weaning from CPB, the complete division of the accessory pathway was demonstrated with epicardial mapping on the heart beat (Fig. 6). The total CPB time was 77 minutes with aortic cross clamping time of 45 minutes.

A postoperative electrocardiogram showed the absence of a short P-R interval and delta waves, because of complete division of the accessory pathways (Fig. 3).

The patient is now completely free from symptoms of WPW syndrome and VSD.

**DISCUSSION**

The surgical treatment for WPW syndrome was originally attempted by Sealy in 1968 and the success rate of the surgical treatments has been markedly high with low morbidity mortality in many Institutes. Percutaneous radiofrequency catheter ablation of accessory pathways has recently evolved as a promising technique in the treatment of WPW syndrome. With this technique, Calkins et al. reported a 93% success in 56 cases, and Lesh et al. a 89% success of 109 accessory pathways in 100 cases. Jackman and colleagues also reported a 99% success of 177 accessory pathways in 166 cases. These results of radio-frequency ablation procedures for WPW syndrome were similar to those of the surgical ablation. Therefore, a staged catheter ablation prior to carrying the surgery for concomitant structural heart disease including cardiac valve diseases or cardiac anomalies was advocated, since surgery for concomitant heart disease often places the patient at a risk of developing supraventricular tachycardia during the surgery. Although the concept of ablating accessory pathways without resorting to the standard cardiac surgery is attractive, the potential for long-term critical adverse effects of radio-frequency catheter therapy is still unclear. Prolonged radiation exposure requiring 10 to 14 hours for one session of the catheter ablation, will have adverse effects on patients, especially infants and children. The catheter ablation therapy is associated with substantial morbidity, in cluding coronary occlusion and aortic valve injury, as compared to those in surgical ablations. Even though radio-frequency is said to be less traumatic, long-term adverse effects of radio-frequency energy delivery on the surrounding tissues including coronary artery adjacent to the site of ablation is unclear. In addition, the safe application of radio-frequency catheter ablation technique is now approved only in special Institutes, and should be limited to cases with WPW syndrome without coexisting heart diseases.

We conclude that, in the treatment of infants and children, with concomitant WPW syndrome and other structural heart disease, one stage surgical repair of accessory pathways and an accompanying structural heart disease would be preferable.

**REFERENCES**