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SURGICAL CORRECTION OF PULMONARY VEINS DRAINING INTO THE LEFT INNOMINATE VEIN*

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Anomalous pulmonary venous return is a congenital cardiovascular malformation where the pulmonary veins drain into the right atrium, coronary sinus, inferior or superior vena cava or their tributaries. One or more pulmonary venous connections to the right atrium have been encountered in 0.6% of the consecutive necropsy studies[1]. Total anomalous pulmonary venous connections (TAPVC) make up 1% of all congenital cardiac anomalies[2].

This paper presents a rare case of pulmonary venous return where the left inferior pulmonary vein opened into the left atrium and the other three pulmonary veins drained into the left innominate vein via a common pulmonary venous sac and a common vertical vein.

Case Report

M.K., a 7-year-old boy (file no. 575947) was referred to the Hacettepe Children's Hospital because of limited exercise capacity and growth retardation. His parents noted that he had dyspnea and fatigue during exercise and recurrent attacks of respiratory tract infections.

He was acyanotic. Blood pressure was 100/80 mmHg, and pulse was regular (rate: 84/min). A pansystolic ejection murmur was heard most clearly at the 2nd and 3rd intercostal spaces along the left sternal border. Fixed splitting of the second heart sound was heard. Examination of the other systems was non-contributory. ECG displayed right ventricular hypertrophy and right bundle branch block. Increased pulmonary vascularity was observed in the chest x-ray. Hemogram showed Hb: 13.50 g/dl and Hct: 38%.

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Catheterization studies: Blood oxygen saturation and content were high at the junction of the right atrium and superior vena cava, showing an increase of 20-25% over the normal. QP/QS was 6.1, left ventricular pressure 100/5 mmHg, pulmonary artery pressure 20/10 mmHg, and right ventricular pressure 45/5 mmHg. Cineangiocardiography demonstrated the left inferior pulmonary vein opening into the left atrium and the other three pulmonary veins forming a common truncus draining into the left innominate vein. An atrial septal defect (secundum) was also present.

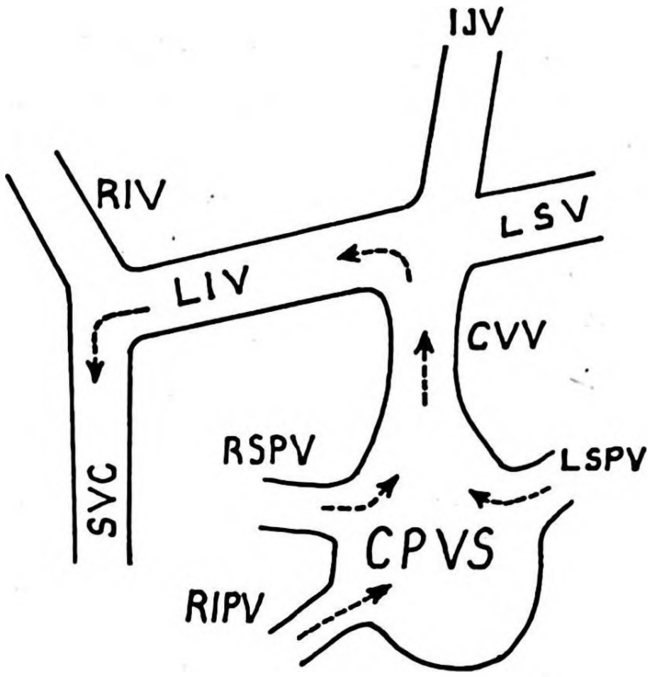
The patient was subjected to open heart surgery under 30°C of hypothermia. The atrial septal defect was 3 cm in diameter. The orifice of the left inferior pulmonary vein was seen in the left atrium. A giant sac (common pulmonary vein) was found near the junction of the left subclavian and jugular veins, quite far from the left atrium. This sac drained into the left innominate vein through a common vertical pulmonary vein. The atrial septal defect was closed by primary sutures. An anastomosis 2 cm in diameter was performed between the left atrial appendix and the common pulmonary venous sac using 5-0 ti-cron sutures. The technique of free anastomosis, using only traction sutures without applying side clamps either on the common pulmonary venous sac or the left atrial appendix, was used. The junction of the common pulmonary vertical vein and the left innominate vein was ligated. The cardio-pulmonary bypass was discontinued and the following pressures obtained: right atrium 16 mmHg, left atrium 15 mmHg, aorta 110/70 mmHg. The patient's postoperative course was complicated by a larnygeal edema necessitating tracheotomy on the 3rd day, and a nodal rhythm on the 10th day with a rate of 80/min. Isoproterenol was started, and the sinus rhythm was restored. The tracheotomy cannula was removed. The patient was discharged from the hospital in good condition. Re-catheterization study 4 months after the operation showed: right atrial pressure 4 mmHg, right ventricular pressure 27/0 mmHg, pulmonary artery pressure 25/10 mmHg, and femoral artery pressure: 120/70 mmHg. Cineangiography proved the patency of the anastomosis. There was no residual shunt between the atria.
Schematic representation of the pathology encountered in this case is shown in Figure 1.

Discussion

The type of abnormal pulmonary venous return described in this paper is very rare. Blake et al[3] encountered this type of anomaly in only one of their series of 113 cases with anomalous pulmonary venous connections. Our case simulated a supracardiac type of total anomalous pulmonary venous connection (TAPVC) because of its hemodynamic and anatomic features. Lack of pulmonary hypertension was an important point in our case. According to some authors, the absence of pulmonary hypertension in TAPVC is the major factor leading to an increase in the survival rate of these patients[4]. The size of the left atrium is important in the outcome of the

Figure 1.

Schematic representation of the pathology of pulmonary veins draining into the left innominate vein.



RIV : Right innominate (brachiocephalic) vein
SVC : Superior vena cava
LIV : Left innominate (brachiocephalic) vein
IJV : Internal jugular vein
LSV : Left subclavian vein
CVV : Common vertical vein
LSPV : Left superior pulmonary vein
RSPV : Right superior pulmonary vein
RIPV : Right inferior pulmonary vein
CPVS : Common pulmonary venous sac

Note: The left inferior pulmonary vein opened normally into the left atrium.

operation. The presence of a small left atrium may lead to postoperative pulmonary edema despite the sufficient size of the anastomosis between the abnormal pulmonary venous truncus and the left atrium[5]. The stricture of the anastomosis is still a possible future hazard in these cases. Applying side clamps both on the common pulmonary sac and the left atrial appendix during anastomosis has been reported as a factor in increased incidence of postoperative anastomotic stricture. This justifies the use, as in our case, of the technique of free anastomosis by traction sutures only, without applying side clamps[6,7].

Summary

A rare case of partial anomalous pulmonary venous connection is presented where the left inferior pulmonary vein drained into the left atrium and all other pulmonary veins into the left innominate vein via a common pulmonary venous sac and a common pulmonary vertical vein. The patient was correctly diagnosed preoperatively, and the surgical intervention was performed by open heart technique. An anastomosis was performed between the common pulmonary venous sac and the left atrial appendix. The junction of the common pulmonary vein and the left innominate vein was ligated. The atrial septal defect (secundum) was closed by primary sutures. The absence of pulmonary hypertension in this case helped a great deal in the successful outcome of the operation.

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