Repair of an Anomalous Origin of the Left Pulmonary Artery From the Ascending Aorta

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An anomalous origin of a pulmonary artery branch from the ascending aorta is an uncommon congenital cardiac malformation. Different surgical techniques have been employed. The direct implantation has been the strategy of choice. However, postoperative restenosis across the anastomotic site is frequently observed. We present a case in which a flap of the left pulmonary artery was used downward along the main pulmonary artery after excision, in a transverse diamond shape, of the fusion of the media wall between them. This technique is feasible and effective to achieve a noncircular anastomosis without any prosthetic material.


Anomalous origin of a left pulmonary artery from the ascending aorta is a very uncommon congenital cardiac malformation. Different surgical techniques have been employed to implant the anomalous pulmonary artery branch to the main pulmonary artery. Such techniques include direct implantation, end-to-end anastomosis with a synthetic graft, homograft patch, and an “aortic-ring” flap have been successfully employed to implant the anomalous pulmonary artery branch to the main pulmonary artery.

Different techniques, such as direct implantation, end-to-end anastomosis with a synthetic graft, homograft patch, and an “aortic-ring” flap have been successfully employed to implant the anomalous pulmonary artery branch to the main pulmonary artery. This technique is feasible and effective to achieve a noncircular anastomosis without any prosthetic material.

A 6-month-old girl was referred with classic clinical signs of increased pulmonary flow confirmed by plain chest X-ray. The diagnosis of AOLPA and a perimembranous ventricular septal defect with systemic pulmonary arterial pressure was established according to the echocardiogram and confirmed by catheterization. The aortic arch was rightward with mirror-image branching. After median sternotomy, the left pulmonary artery (LPA) appeared grossly dilated, originating from the left side of the ascending aorta about 10 mm above the aortic valve and crossing on the top of the main pulmonary artery (MPA), while the right pulmonary artery (RPA) originated from the pulmonary trunk in the usual fashion.

After the LPA was dissected freely, encircled, and snared with a tourniquet, normothermic cardiopulmonary bypass was commenced routinely. The heart was arrested by cold crystalloid cardioplegia and the ventricular septal defect was closed transatrial with a flap valve fenestrated patch of Dacron (DuPont, Wilmington, DE) and running suture of polypropylene. A fenestration of 4 mm was made in the center of the patch. The origin of the LPA was detached and the orifice at the ascending aorta was closed with a patch of autologous pericardium treated with 0.6% glutaraldehyde. The posterior wall of the anomalous LPA was shared inferiorly with the superior wall of the MPA. After removal of air from the left heart, the aortic cross-clamp was released. With a beating heart, the common wall between the LPA and the MPA was excised in a diamond shape, in a transverse direction, and within the fused portion of the vessels. A flap of the anterior wall of the LPA was anastomosed downward along the main pulmonary artery incision in a transverse direction (Fig 1). The computed tomographic scan showed a noncircular anastomosis with adequate size (Fig 2). After weaning from the bypass, the pulmonary artery pressures increased to systemic levels and intravenous infusion of prostaglandin I2 and oral sildenafil were started. She was weaned from mechanical ventilation with half systemic pulmonary arterial pressure a week later.

The patient was discharged from the hospital at 21 days and the echocardiogram at 6-month follow-up showed normal right ventricular size and function, with laminar flow and no gradient through the pulmonary arteries. The Doppler pulmonary flow velocity curves change from type II to III at the preoperative period to type I to II now. She has been receiving sildenafil (2 mg/kg) every day.

Comment

Anomalous origin of the left pulmonary artery is a very rare congenital cardiac malformation. It exists in only 25% of all anomalous origins of the pulmonary arteries reported in about 200 cases in the literature [3, 4]. The creation of a confluent pulmonary artery and the recruitment of an additional pulmonary arterial bed...
connected to the right ventricle is the mainstay of repairing this lesion. The occurrence of stenosis at the anastomotic site has been a major problem, being the main late complication [1–4]. It has been speculated that direct reimplantation or synthetic graft interposition fail to gradually accommodate larger volumes with the patient’s somatic growth, due to failure of increase size of the anastomotic site [3]. Reintervention includes augmentation using a patch and transcatheter balloon dilation with or without stent [2–5].

The technique described here is simple and helps to avoid a circular direct anastomosis of the anomalous pulmonary artery to the main pulmonary artery. Because of the usual space disposition and the dilatation of pulmonary arteries, it could be used in the majority of these patients, without prosthetic tissue. One must check to be sure the natural fusion between the LPA and MPA is intact after the diamond-shaped excision; if not, a few stitches placed internally may be needed before completing the repair.
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References


