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Anomalous Pulmonary Venous Return of the Left Upper Lobe in a Donor Lung

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We report a case of partial anomalous pulmonary venous return from the left upper lobe in a donor lung discovered during lung transplantation. The upper lobe vein could be implanted successfully into the donor atrial cuff to restore physiologic venous drainage. The abnormality was retrospectively identified on the donor's chest computed tomographic scan. Cardiac magnetic resonance imaging performed in the recipient 6 months after transplantation demonstrated patent left pulmonary venous drainage. This is the third reported case of partial anomalous pulmonary venous return in a donor lung, but the first description of direct ex vivo suture into the donor cuff.

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Partial anomalous pulmonary venous return (PAPVR) is a rare congenital condition. According to autopsy series, its incidence ranges from 0.4% to 0.7% in a general population [1–3]. Isolated PAPVR can be asymptomatic in the adult and may be encountered incidentally during lung transplantation in the recipient and in the donor [4, 5]. PAPVR in a donor lung requires restoration of physiologic venous drainage, to avoid lung infarction or massive bleeding following allograft implantation and release of clamps [5]. We report a case in which the donor presented with PAPVR of the left upper lobe draining into the innominate vein.

A 50-year-old man with end-stage emphysema was listed for lung transplantation. A brain-dead donor suitable for bilateral lung transplantation was identified and concurrent heart and lung graft retrieval was uneventful. We used the standard technique of sequential bilateral lung transplantation through separate anterolateral thoracotomies without sternal division. During the ex vivo preparation of the left lung allograft, we noticed the stump of an isolated vessel originating from the upper lobe and consistent with a venous structure separate from the atrial donor cuff. An antegrade flush with Perfadex (Vitrolife AB, Kungsbacka, Sweden) through the pulmonary artery determined outflow of fluid from the lower lobe vein but also from the aberrant vessel. We concluded that PAPVR was present. As a consequence, physiologic venous drainage of the upper lobe had to be restored before implanting the allograft.

The atrial cuff was large enough to accept a small fenestration into which the vessel could be sutured with a running 5/0 polypropylene suture (Fig 1). The vessel was long enough to avoid tension or kinking. Repeated antegrade flush with Perfadex showed outflow from the upper lobe vein into the donor cuff without any leakage from the suture; testing with a retrograde flush showed outflow from the pulmonary artery. The left lung was subsequently implanted into the recipient following the standard technique.

Postoperatively, the chest radiography showed a mild infiltrate of the upper left lobe compatible with reperfusion edema. Blood gas samples showed consistently a $Pao_2/Fio_2 > 300$, and the chest radiograph gradually improved to normalize on the third postoperative day.

We reviewed retrospectively the donor's chest computed tomographic (CT) scan to identify the venous drainage of the left upper lobe. Tridimensional reconstruction showed a left upper pulmonary vein draining into the innominate vein (Fig 2).

The pulmonary veins were assessed by dynamic cardiac magnetic resonance imaging (MRI). MRI showed a patent venous drainage of the left upper lobe into the left atrium. There was no stenosis on the reimplanted pulmonary vein or on the left atrium suture (Fig 3).

Comment

PAPVR has been reported in both the donor and the recipient during lung transplantation [4, 5]. This is the

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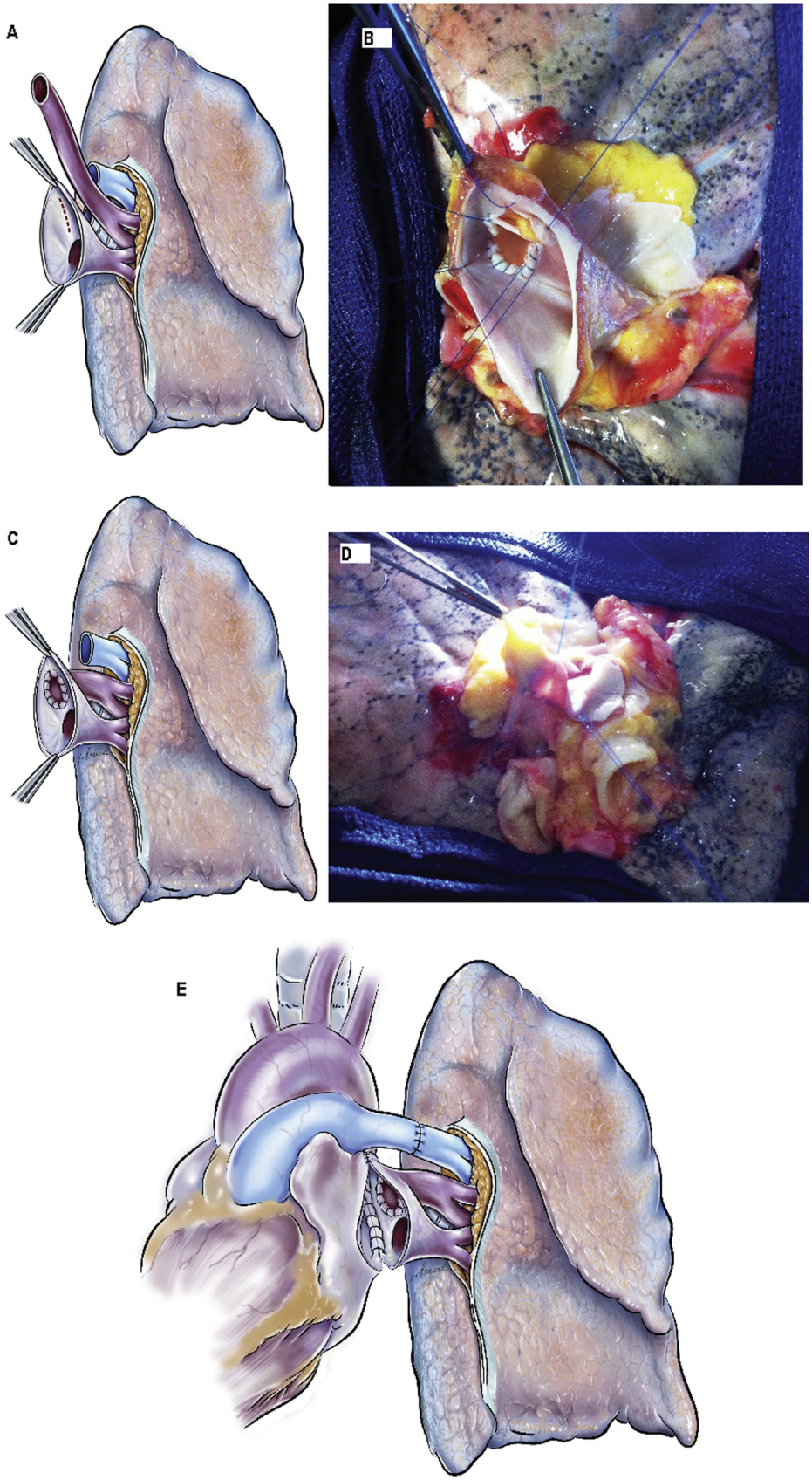

Fig 1. Implantation of partial anomalous pulmonary venous return into the left atrial cuff. (A) Schematic overview of the initial condition of venous drainage of the left lung graft. The upper pulmonary vein is free, and the lower pulmonary vein is normally connected to the atrial cuff. An incision was made into the atrial cuff following the dotted line. (B) Intraoperative photograph during direct suture of the left upper vein into the atrial cuff. A running suture of 5/0 polypropylene was used. The atrial cuffed is exposed using several polypropylene stay sutures. (C) Schematic overview of the final result of reconstruction on the inside of the atrial cuff. (D) Photograph of the outside aspect of the left upper vein directly sutured into the atrial cuff. The outer aspect of the suture shows no tension and no stricture on the final calibre of the pulmonary vein. (E) Schematic overview of the final result during allograft implantation into the recipient.