



Kasai-Like Repair of Distant and Recurrent Pulmonary Venous Obstruction After Repair of Total Anomalous Pulmonary Venous Return

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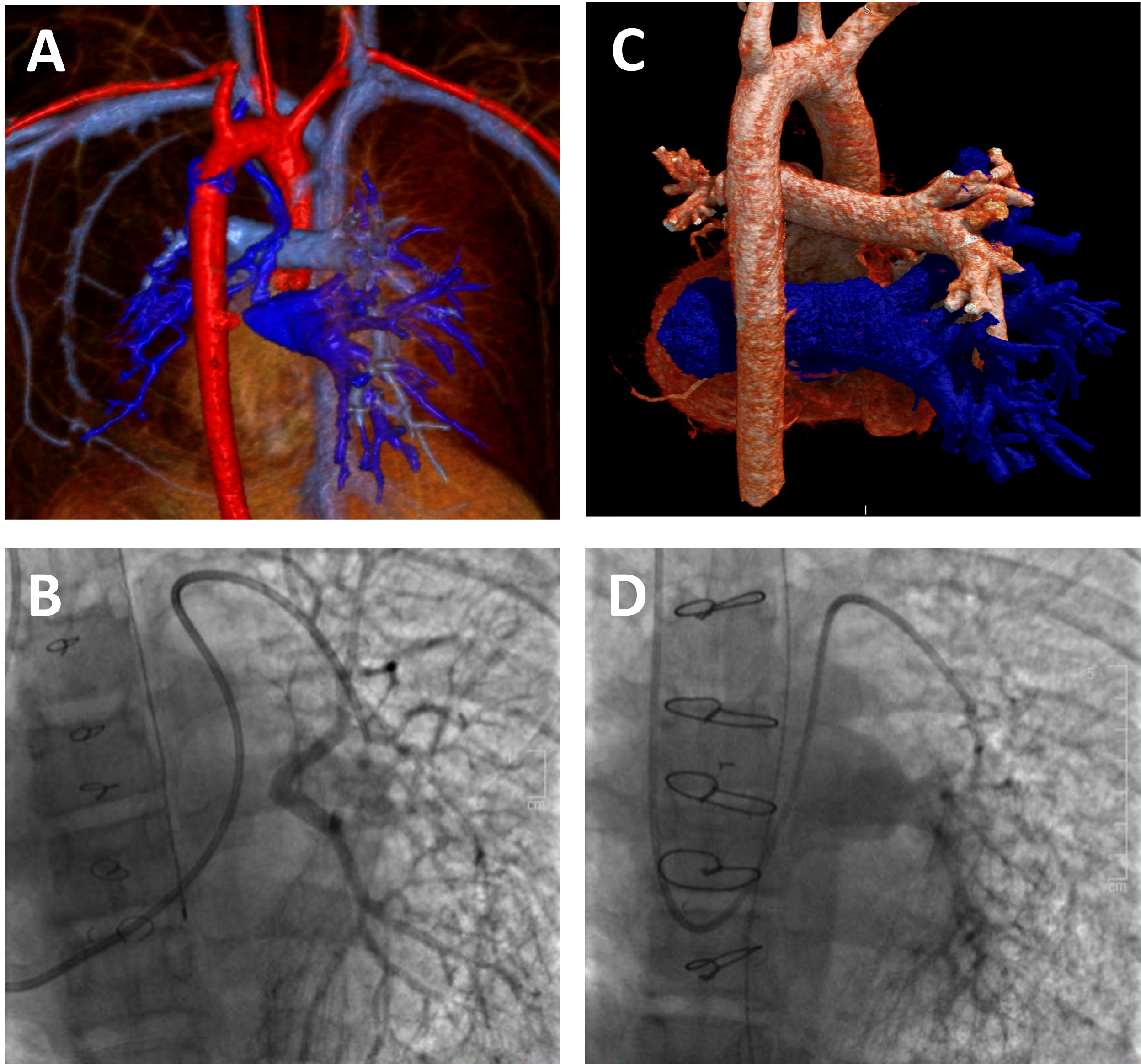
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Kasai-like anastomosis of pulmonary hilum to homograft



Preoperative CMR with 3D reconstruction (A) showed complete PVO outside of the lung parenchyma on the left (*posterior view*). The left superior and inferior pulmonary venous tributaries converge to a loose network of collaterals around the left hilum/peribronchial region and communicate with the hemiazygos, dilated left internal mammary and left intercostal veins and the left innominate vein. A preoperative catheterization (B) showed similar findings. Postoperative chest CT (C) demonstrated the pulmonary homograft connecting the distant left hilum (not shown) to the LA. Cardiac catheterization three months postoperatively (D) revealed continued patency of the LPVs and showed laminar and unobstructed flow through the homograft into the LA

Introduction

Pulmonary venous obstruction (PVO) remains a **major complication and the main cause of reoperation** following repair of total anomalous pulmonary venous return (TAPVR). While a primary sutureless repair is preferred to address this pathology, employment of such a technique can be limited by distant PVO. We describe a repair to address hilar pulmonary vein obstruction in two patients with infradiaphragmatic TAPVR in whom a standard sutureless repair was not feasible.

The repair is analogous to the Kasai repair for biliary atresia.

Case ONE

15 y/o M with recurrent PVO of the left pulmonary veins (LPVs) who previously underwent a re-repair with a sutureless technique and had received multiple balloon angioplasties of his PVs following standard repair of obstructed infradiaphragmatic TAPVR.

Case TWO

8 y/o F with a history of repaired obstructed infradiaphragmatic TAPVR, previous surgical revision for PVO, and multiple catheterizations for coiling of arterial collaterals causing hemoptysis now with recurrent PVO of the right pulmonary veins (RPVs).

Intraoperative Findings + Repair

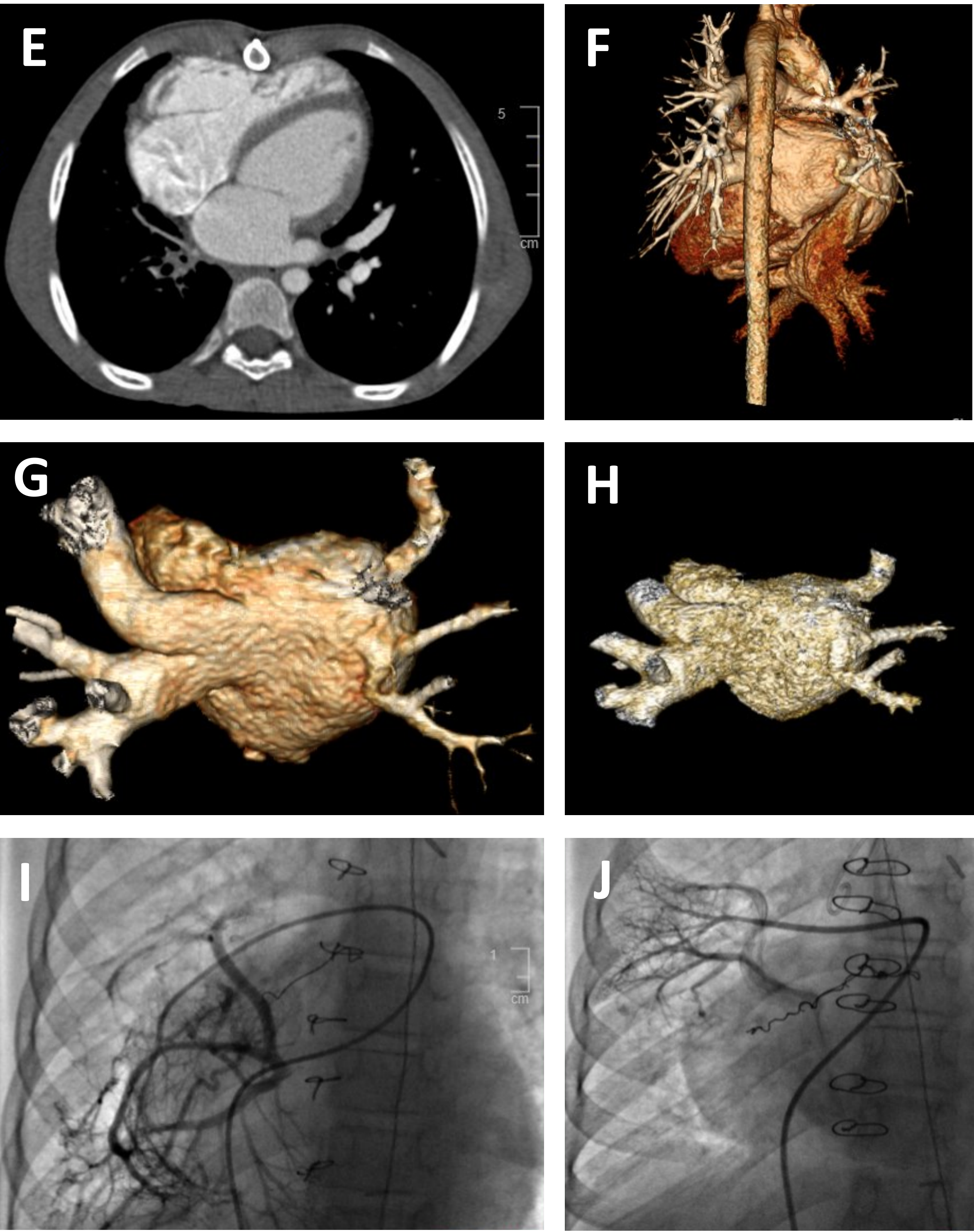
There was an atretic pulmonary vein cord attached to the left atrium (LA). This cord was dissected into the hilum until 2 small patent PVs were visible. The atretic and thickened portion of the veins were excised to the level of maximum size for that particular vein. The distance between the hilum and LA was 4-5 cm thus prohibiting a primary sutureless connection to the atrium. A 26 mm pulmonary homograft, with the valve excised, was used to bridge the gap. The anastomosis on the pulmonary side was a Kasai-type anastomosis to the deflated lung tissue in the hilum adjacent to the PVs. This resulted in a sutureless repair at the hilar level. The lung was inflated to 30 cm of H₂O pressure to ensure there was no air leak that could enter the connection.

The occluded RPVs were identified and dissected back to the pulmonary hilum where patent pulmonary veins were identified. A pericardial window was created adjacent to the hilum, and the two limbs of the RPVs were opened. A window was created in the LA - an anastomosis of the LA to the pericardium and to the lung hilum was completed thus connecting the hilum and free floating pulmonary veins to the LA in a sutureless manner. A Valsalva maneuver up to 30 mmHg demonstrated no air leak into the repair.

Discussion

Exploration and implementation of innovative techniques to address the persistent and recurring pathology of PVO is paramount in reducing its associated morbidity and mortality. Our cases highlight novel surgical repairs – a lung hilum Kasai-type anastomosis of either the atrium or conduit to be of some utility and medium-term durability – to address these challenges and add to the repertoire of the surgeon.

Kasai-like anastomosis of pulmonary hilum directly to LA



Preoperative CTA (E) revealed diminutive RPVs with no connection to the LA. The RPVs coursed superiorly, beneath the right bronchus and carina to join with mediastinal systemic veins. Postoperative showed improved caliber of RPVs at 1-year (F & G) and 2-year (H) follow-up. Pre-operative catheterization (I) similarly revealed occluded RPVs but with distal patency and an extensive network of AP and VV collaterals – much improved by 3-year follow-up (J).