Balloon-expandable covered stent implantation for treatment of a traumatic pulmonary artery pseudoaneurysm in a pediatric patient

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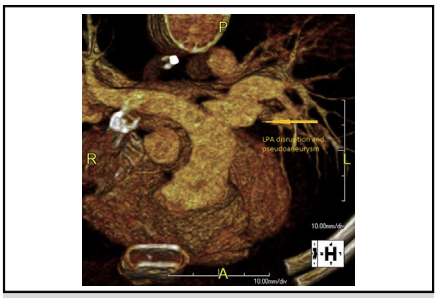

Left pulmonary artery disruption and pseudoaneurysm.

Central Message

Balloon-expandable covered stents are a safe and effective alternative to open surgical repair or percutaneous endograft implantation for the treatment of pediatric traumatic pulmonary artery injury.

Traumatic pulmonary artery pseudoaneurysms (PAPs) are rare in the pediatric population. Although open surgical repair was once the most viable means of care, endovascular approaches have become more favorable as techniques and devices have improved. Currently, endovascular management varies, as covered stent grafts and coil embolization with and without stent coverage are among the various approaches taken to treat PAPs.[1-4] A large-diameter, balloon-expandable, covered endovascular stent has recently been approved by the US Food and Drug Administration as commercially available for use in the United States. At the time of our case, the NuMED covered Cheatham platinum balloon-expandable stent (NuMED, Inc, Hopkinton, NY) was available to centers participating in the Coarctation of the Aorta Stent Trial (COAST) and the Pulmonary Artery Repair with Covered Stents (PARCS) trial. This case demonstrates the youngest reported patient to have undergone successful covered stent implantation for a PAP under emergency use guidelines, performed with permission from the US Food and Drug Administration.

CLINICAL SUMMARY

We present the case of an 8-year-old boy who was a restrained, front-seat passenger in a motor vehicle collision and was taken to an outside hospital. His initial Glasgow Coma Scale score was 6; it quickly improved to 14 to 15, at which time he was transported to our emergency department. He was intubated for oxygen saturations in the 80% to 90% range and significant bilateral pulmonary contusions. Initial imaging demonstrated these contusions, along with posterior rib fractures (including the 4th, 5th, and 6th ribs), bilateral pneumothoraxes, a small pericardial effusion, lacerations of splenic poles, a distal femur fracture, metatarsal fractures, and a medial orbital wall fracture without intracranial injury.

A follow-up gated chest computed tomographic angiogram was performed that demonstrated a 1.9 × 1.1 × 2.6-cm contrast-filled outpouching, described as a moderate pseudoaneurysm at the proximal left pulmonary artery from traumatic pulmonary artery disruption (Figures 1, 2, and 3). The level of the injury was just beyond the bifurcation of the pulmonary arteries and posteroinferior to the proximal left pulmonary artery, with the entry into the pseudoaneurysm in the left pulmonary artery. There was no evidence of aortic injury, but there was a small hemopericardium. The patient was started on an esmolol drip to minimize blood pressure, heart rate, and wall stress. Because of the pulmonary contusions and continual hemoptysis, the patient was deemed high risk for the systemic anticoagulation required for an open surgical repair, which was deemed necessary by the surgical team for successful repair of the left pulmonary artery. The decision was made to attempt percutaneous covered stent placement across the PAP in the pediatric cardiac catheterization laboratory to prevent further expansion and possible complete tear of the pseudoaneurysm before lifting sedation. As a participant in the multicenter PARCS trial, our institution has access to balloon-expandable Cheatham platinum covered stents.

In the catheterization laboratory, femoral arterial and venous access was obtained. With the percutaneous

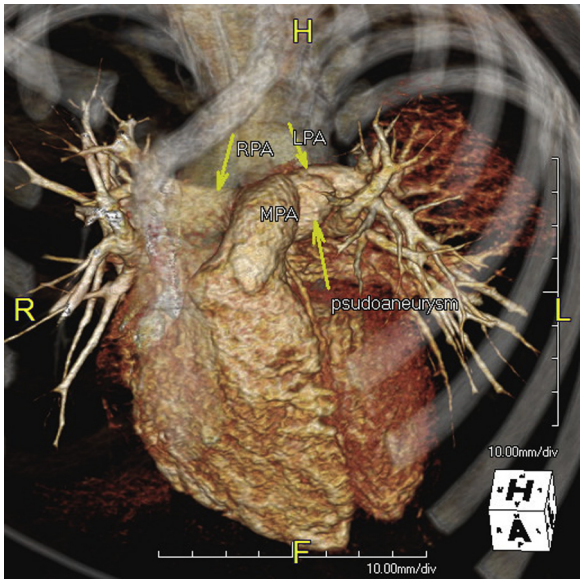

FIGURE 1. Gated chest computed tomographic angiogram demonstrating a 1.9 × 1.1 × 2.6-cm contrast-filled outpouching, described as a moderate pseudoaneurysm, at the proximal left pulmonary artery (*LPA*), just beyond the bifurcation of the pulmonary arteries. Anteroposterior cranial view. *RPA*, Right pulmonary artery; *MPA*, main pulmonary artery.

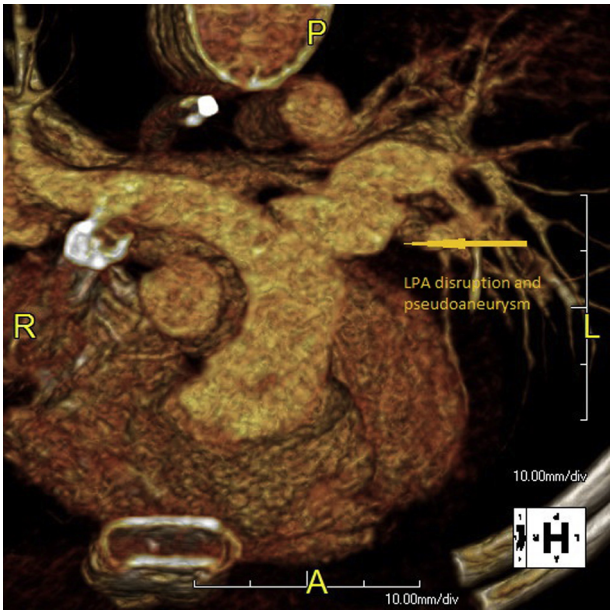

FIGURE 3. Gated chest computed tomographic angiogram demonstrating a 1.9 × 1.1 × 2.6-cm contrast-filled outpouching, described as a moderate pseudoaneurysm, at the proximal left pulmonary artery (*LPA*), just beyond the bifurcation of the pulmonary arteries. Left-lateral view.

Seldinger technique, a sidearm sheath was placed in the femoral vein. An angiogram was performed in the main pulmonary artery (MPA; Figures 4 and 5). A balloon wedge catheter was advanced into the left pulmonary artery (LPA) and exchanged for a transseptal sheath. A balloon-in-balloon angioplasty catheter (BIB; NuMED) with the mounted covered Cheatham platinum stent was advanced through the transseptal sheath to the level of the pseudoaneurysm. The stent was expanded in place, and an angiogram confirming placement was performed. The

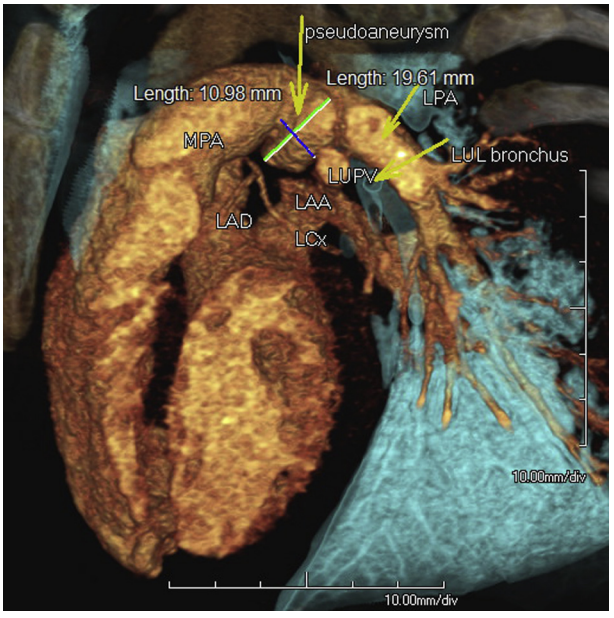

FIGURE 2. Gated chest computed tomographic angiogram demonstrating a 1.9 × 1.1 × 2.6-cm contrast-filled outpouching, described as a moderate pseudoaneurysm, at the proximal left pulmonary artery (*LPA*), just beyond the bifurcation of the pulmonary arteries. Craniocaudal view. *MPA*, Main pulmonary artery; *LUPV*, left upper pulmonary vein; *LUL*, left upper lobe; *LAA*, left atrial appendage; *LAD*, left anterior descending coronary artery; *LCx*, left circumflex coronary artery.

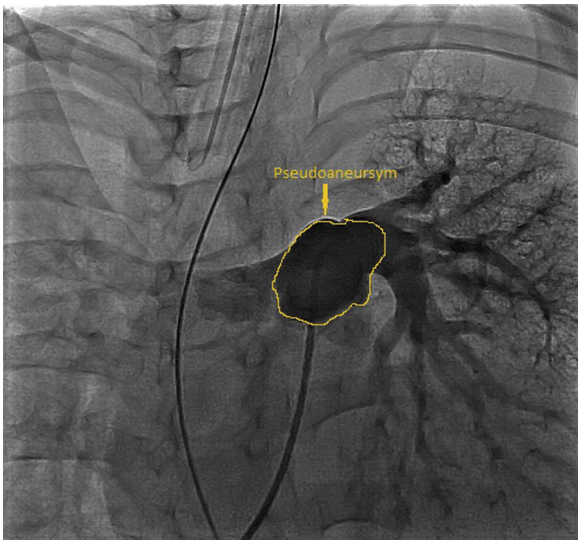

FIGURE 4. Anteroposterior computed tomographic angiogram demonstrating the pseudoaneurysm before intervention in the catheterization laboratory.