Transcatheter Treatment of Right Ventricular Outflow Tract Compression by a Pseudoaneurysm in Tetralogy of Fallot

Running title: Transcatheter RVOT reconstruction for pseudoaneurysm compression

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Abbreviations:

RV-PSA = right ventricle pseudoaneurysm

RV-PA = right ventricle to pulmonary artery

RVOT = right ventricular outflow tract

TOF = tetralogy of Fallot

Improved survival for tetralogy of Fallot (TOF) has revealed unexpected complications, including right ventricle pseudoaneurysms (RV-PSA). Though usually asymptomatic and discovered incidentally, some RV-PSA require surgical intervention. We present an adult with RV-PSA after TOF repair treated with a novel transcatheter approach due to multiple medical comorbidities precluding surgery.

A 41-year-old male with TOF and valved right ventricle to pulmonary artery (RV-PA) conduit developed RV failure secondary to severe RV outflow tract (RVOT) obstruction caused by an expanding RV-PSA while on anti-coagulation. Comorbidities included heart failure with reduced ejection fraction (EF 40%), severe pulmonary regurgitation and persistent atrial flutter and atrial fibrillation after multiple ablations and pacemaker placement. With five prior sternotomies, surgery was not endorsed, and substance abuse made him ineligible for transplantation consideration. A virtual 3D model from cardiac CT (**Figure 1**) defined the anatomy to plan intervention, which involved anchoring the distal ends of a Covered CP Stent™ (B. Braun, Bethlehem, PA) and Palmaz™ XL 5010 stent (Cordis Corp, Miami Lakes, FL) in the pulmonary valve ring; two stents were used to improve radial strength and minimize risk of Covered CP Stent fracture (**Figure 2**). The stents excluded the RV-PSA leak and treated the RVOT obstruction. A Sapien S3 valve (Edwards, Irvine, CA) was implanted in the proximal end of the stents (**Figure 2, 3**). RV systolic pressure acutely decreased with improved systolic function and clinical status.

Treating adults with congenital heart disease requires unique interventional approaches due to complex anatomy, physiology and unnatural disease history. Accurate anatomical understanding

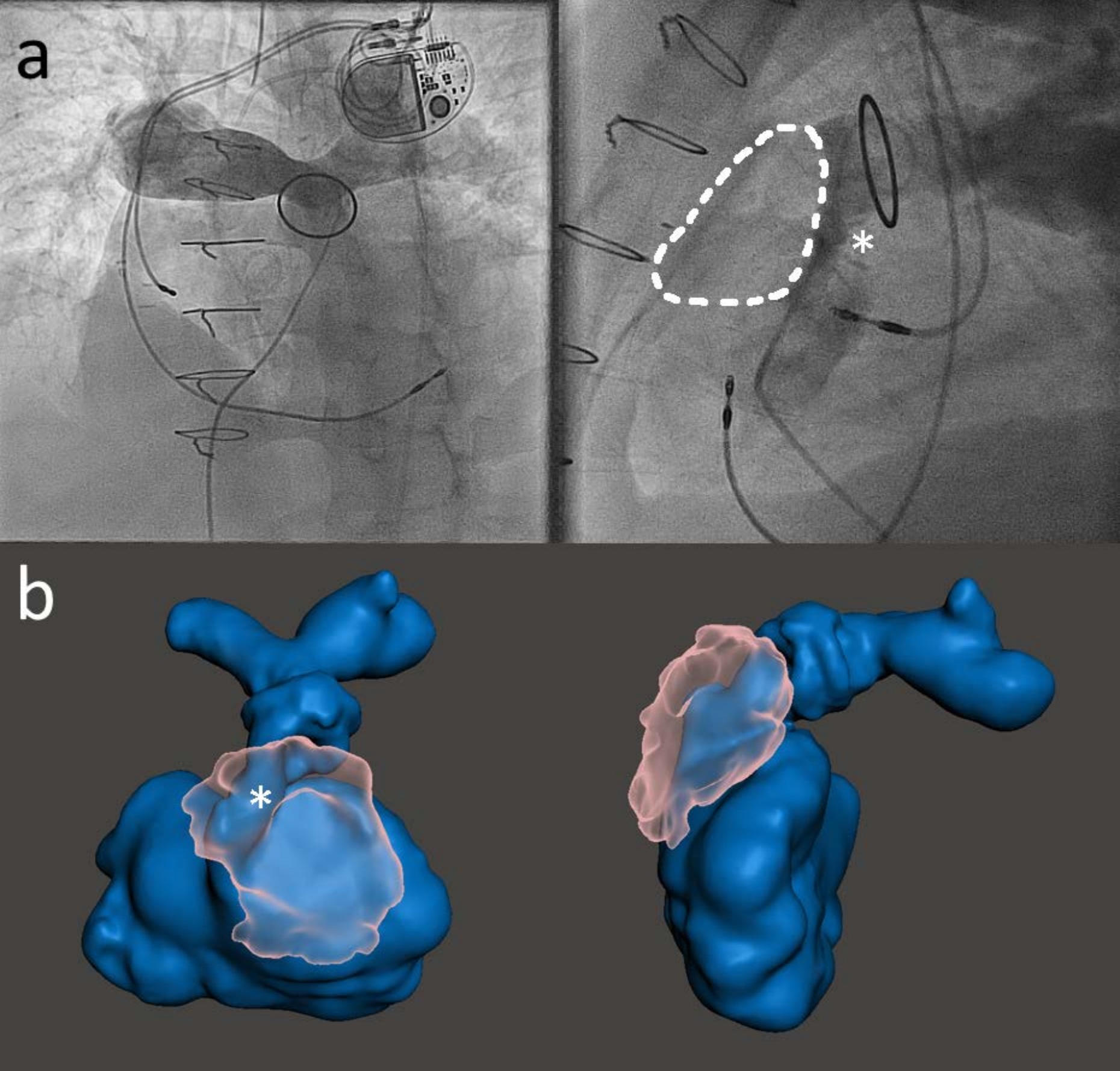
is crucial; 3D modeling is vital for intervention planning and communication between care teams, patients and families.

Figure Legends

Figure 1. Angiograms and 3D reconstruction from cardiac CT. **(a)** AP and lateral angiograms showing valved RV-PA conduit and RVOT compression (*) by RV-PSA (dotted line). **(b)** Corresponding views of 3D reconstruction show RV-PSA in pink and small RVOT (*).

Figure 2. Angiograms and 3D reconstruction from cardiac CT. **(a, b)** Positioning and deploying pre-stents in RV-PA conduit. **(c)** Expanded RVOT and unobstructed flow to branch pulmonary arteries. **(d)** Deployment of Sapien valve in proximal stents. **(e)** Stented RVOT with transcatheter valve. **(f)** Corresponding 3D reconstruction shows improved RVOT obstruction (RV-PSA in pink).

Figure 3. Pre- and post-procedure CT. (a) Pre-procedure CT shows RV-PSA (blue line) with contrast inside. **(b)** Post-procedure CT shows stents displacing the RV-PSA (blue line) out of the RVOT and no contrast inside.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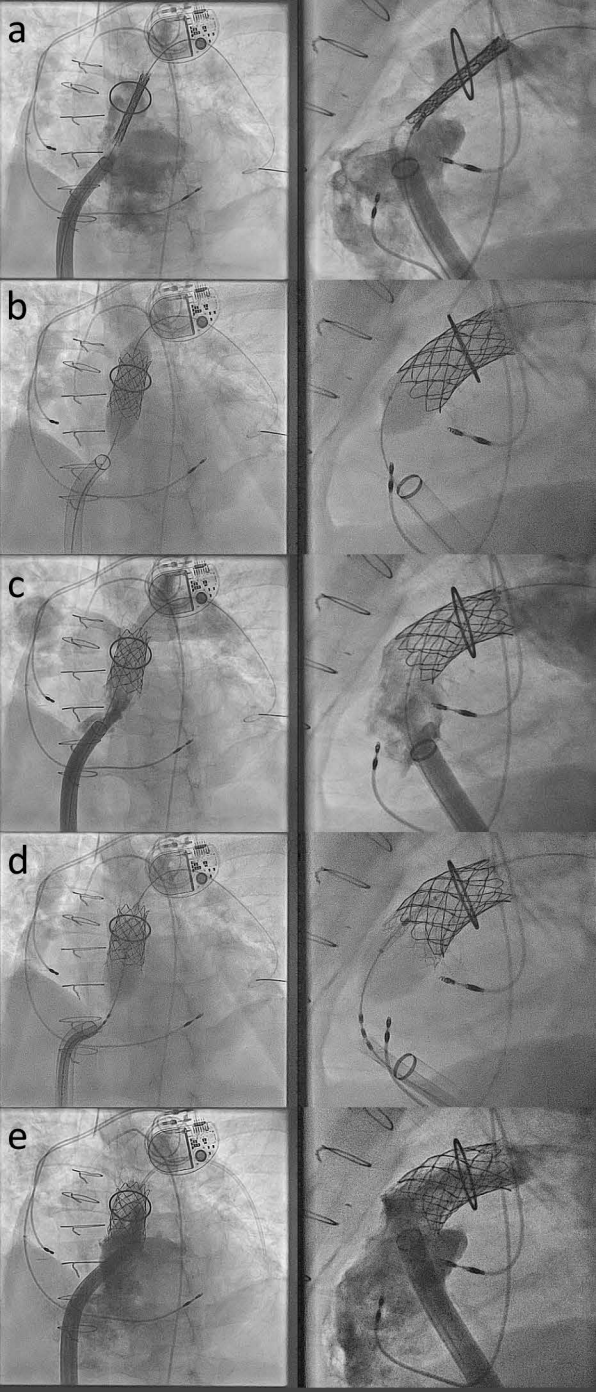
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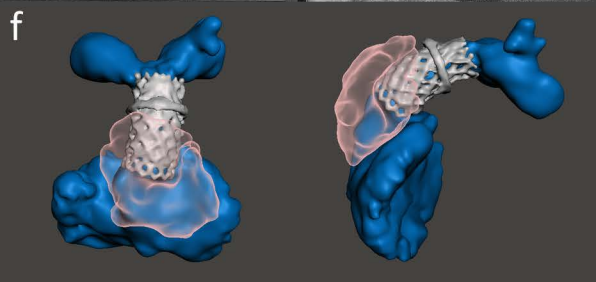
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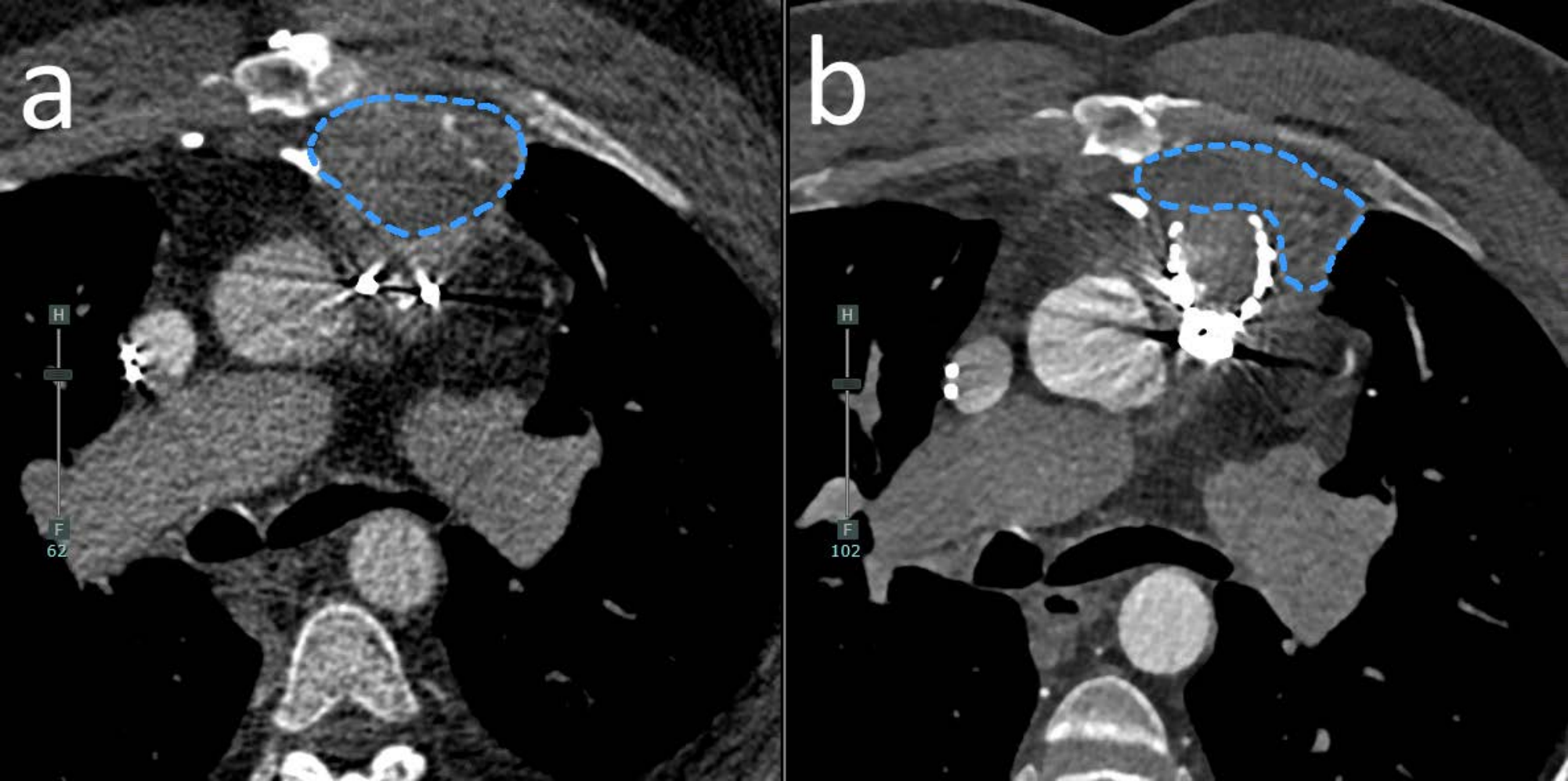
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