Endovascular Fenestration for Distal Aortic Sealing After Frozen Elephant Trunk With Thoraflex

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We describe a case of total arch replacement with frozen elephant trunk for chronic type B aortic dissecting aneurysm, which resulted in inadvertent landing of the frozen elephant trunk into the false lumen. A radiofrequency puncture system–assisted controlled endovascular fenestration of the dissection flap was performed at the upper abdominal aorta and subsequent thoracic endovascular stenting, successfully redirecting the blood flow from the false to the true lumen. Our case illustrated a possible way to seal distal reentry in chronic type B aortic dissection.

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Total arch replacement and frozen elephant trunk (FET) is a single-stage procedure for treatment of ascending arch and proximal descending aortic pathologic conditions. We report a case of inadvertent landing of the frozen elephant trunk into the false lumen, resulting in persistent false lumen perfusion, which was subsequently diverted back to the true lumen by an endovascular stent graft deployed through an endovascular fenestration of the dissection flap created by use of a radiofrequency puncture system.

A 53-year-old man presented to us with Stanford type B aortic dissection with a distal aortic arch aneurysm measuring a maximum of 7.8 cm in the short axis diameter. Total arch replacement with FET with use of the Thoraflex hybrid device (Vascutek, Terumo, Scotland) was performed with the technique we previously described [1]. The FET part of the Thoraflex hybrid device was deployed into the true lumen, and a satisfactory opening was confirmed by intraoperative transesophageal echocardiography. The total operative time was 355 minutes.

The patient recovered well from the operation without evidence of visceral or lower limb malperfusion. Computed tomographic (CT) aortography 2 months after the operation showed that the mid and distal portion of the FET was within the false lumen of the descending thoracic aorta (Fig 1A), and the true lumen remained very small.

A second-stage thoracic endovascular aortic repair (TEVAR) was performed. With the patient under general anesthesia, the right common femoral artery (CFA) was cannulated with an 8F sheath for true lumen access (Fig 2A). A left CFA 6F sheath for false lumen access and a right brachial 4F sheath were placed. Under TEE and fluoroscopic guidance, the septum was punctured by use of the Baylis radiofrequency (RF) puncture system with the NRG RF transseptal needle (Baylis Medical Company) 5 cm above the celiac axis (Fig 3A). A microwire was passed through the punctured septum from the true lumen to the false lumen and was snared with an Amplatz gooseneck snare kit (Microvena, Minneapolis, MN) and was pulled down to exit through the left femoral artery (Fig 2B). The septum between the true and false lumens was destroyed to form a new single common lumen of

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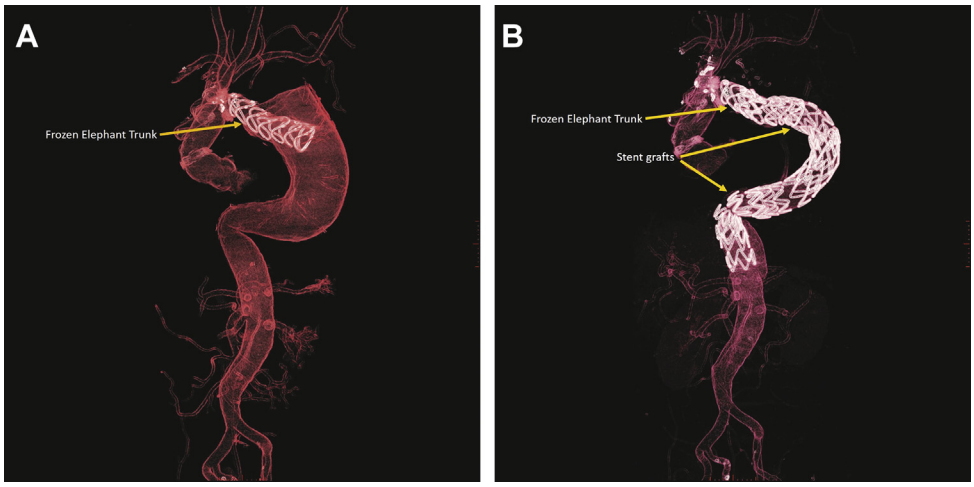

Fig 1. Contrast computed tomographic views of the aorta with 3-dimensional image reconstruction. (A) The frozen elephant trunk was deployed into the false lumen and the aneurysm sac. (B) Exclusion of false lumen perfusion after aortic fenestration followed by thoracic endovascular aortic repair.

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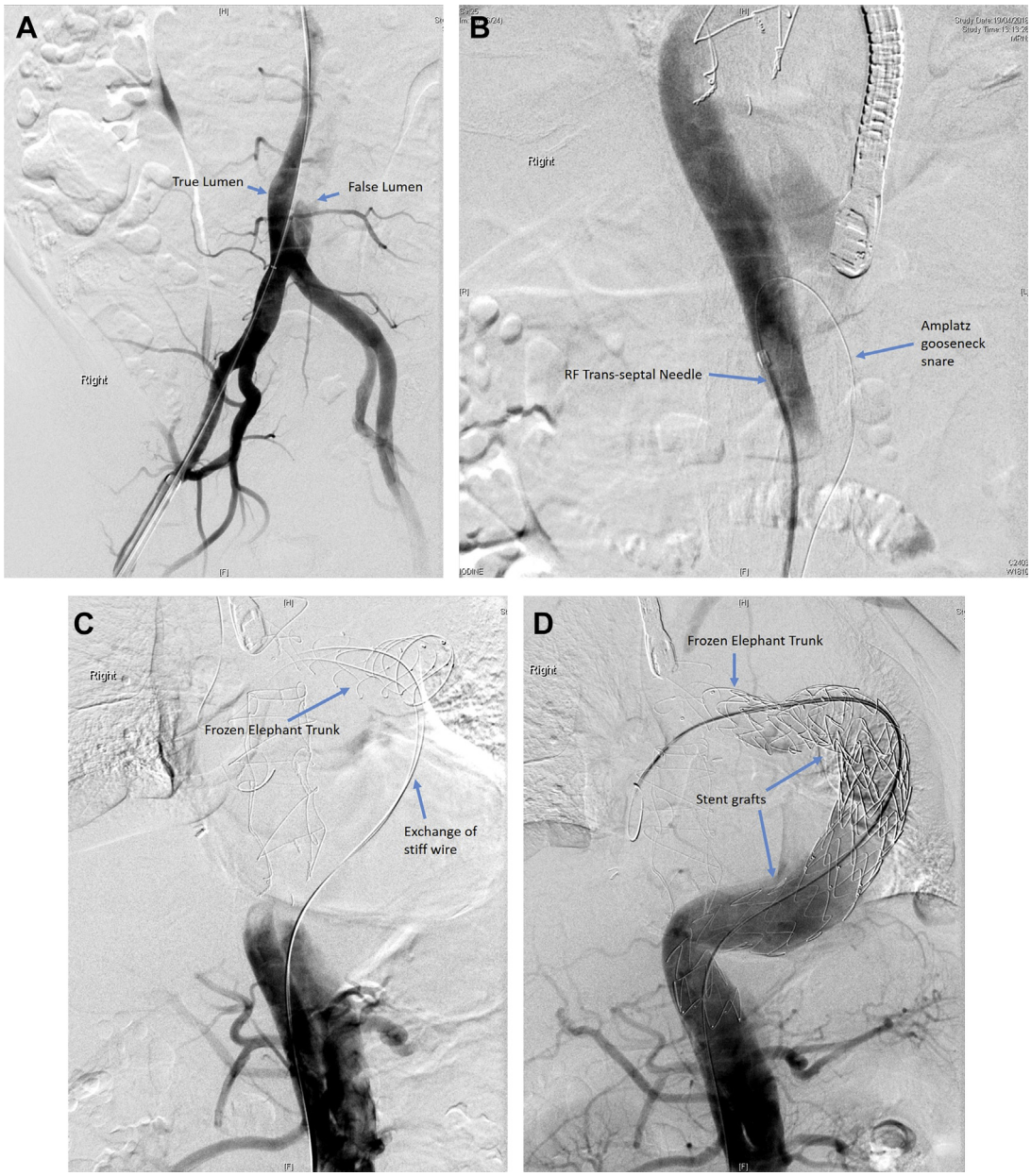

Fig 2. Intraoperative digital subtraction angiogram. (A) Via right femoral cannulation, the true and false lumen, and the position of the dissection flap were identified. (B) After puncture of the dissection flap, the fenestration was enlarged by snaring the microwire with Amplatz gooseneck snare passed via the left femoral artery. (C) Through the fenestration, a Terumo guidewire was passed from the true lumen into the false elephant trunk inside the false lumen. (D) Three stent grafts were deployed, diverting all the perfusion from the false elephant trunk back into the true lumen. (RF = radiofrequency.)

around 4 cm in longitudinal length for better distal sealing by the stent. A through-and-through Terumo 300-cm wire (Terumo Cardiovascular Systems, Ann Arbor, MI) was passed through the right brachial artery to the FET with the help of a Rösch Inferior Mesenteric catheter (Cordis, Miami, FL) and was snared by an Amplatz snare kit passed from the right femoral true lumen. The Amplatz snare catheter was passed to the ascending aorta, followed by an exchange of the multi-purpose A catheter (Beacon Tip Torcon NB Advantage, Cook Medical, IN). and Lunderquist Extra Stiff Wire (Cook Medical) (Fig 2C). A stent graft (Cook ZTA-P, 32 mm–201 mm, Cook Medical) was deployed with more than 4 cm overlapping with the FET. Two additional stent grafts (Cook ZTA-P, 34 mm–209 mm and Cook ZTA-P, 34 mm–113 mm, Cook Medical) were deployed and landed just above the celiac axis (Fig 2D and Fig 3B). A completion aortogram showed a trivial type Ib endoleak. TEE showed stagnant flow in the thoracic aortic false lumen. The right CFA was closed with percutaneous closure devices.

The patient was uneventfully discharged on postoperative day 7. A follow-up CT aortogram 1 week after