Staged aortic septotomy and endografting for persistent aneurysmal degeneration with dissection in patient following three open repairs, and novel technique for rescue of cannulation failure in TAMBE

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Background/Introduction

We present a challenging case of a 67-year-old male with multiple prior open thoracic and abdominal aortic interventions and residual aneurysmal degeneration with dissection of his remaining aorta, treated with a combination of newly-approved and newly-described techniques and devices, as well as introduction of a novel technique used to address an intraoperative complication.

Pre-operative Imaging

Figure 1: 3D aortic reconstruction showing prior ascending and hemiarch, proximal descending thoracic, and infrarenal aortic grafts, with dissection and aneurysmal degeneration of the remaining descending thoracic and visceral abdominal aorta

Case Report

The patient has a history of acute type A aortic dissection with hemiarch repair 25 years prior—followed two years later by open replacement of his proximal descending thoracic aorta via left thoracotomy, and eight years after that by aorto-bi-iliac grafting via retroperitoneal approach—and presented asymptomatic for evaluation of aneurysmal degeneration of his distal thoracic and visceral abdominal aorta to 7.2cm. A plan was made for staged endovascular intervention.

Stage 1 comprised transcatheter electrosurgical septotomy for the chronic dissection flap, which was executed via IVUS-assisted cannulation of the proximal septal fenestration and placement of an Astato wire attached to electrocautery for controlled septostomy that terminated just proximal to the bifurcated Dacron graft. A pair of conformable thoracic aortic grafts were then placed, with proximal landing zone within the Dacron graft in the proximal descending thoracic aorta, and a free-floating distal end 3cm proximal to the celiac artery, for a TAMBE landing zone.

Two months later, stage 2 of his intervention proceeded with femoral-only approach for planned four-vessel thoracoabdominal multibranched endografting. The graft was pre-loaded and deployed as previously described, with double-internal “up-and-over” reverse-loaded wires to facilitate tracking of the steerable sheath. However, it became clear that celiac artery cannulation would not be possible without significant radiation exposure, and following an initial attempt and subsequent final attempt after cannulation and successful stenting of the superior mesenteric and bilateral renal arteries, with additional placement of a distal tube endograft to connect the TAMBE device with the pre-existing Dacron bifurcated graft, the procedure was terminated with the celiac branch left open to the sac, with plan for re-attempt at cannulation via left brachial artery cutdown in the coming days.

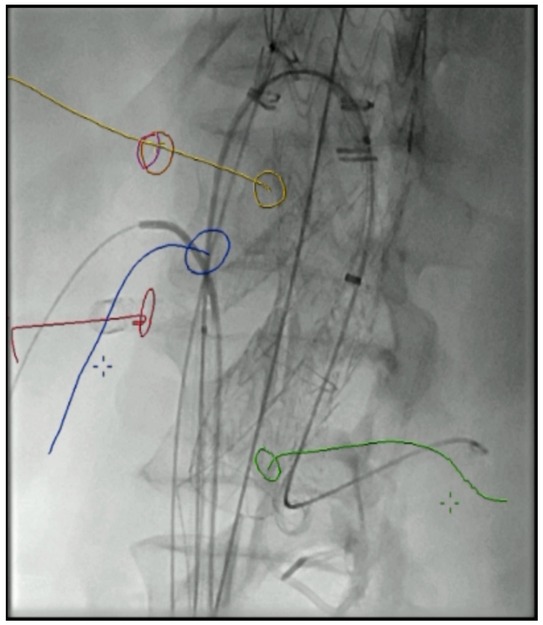

Figure 2: TAMBE deployment and visceral vessel cannulation via total-femoral approach

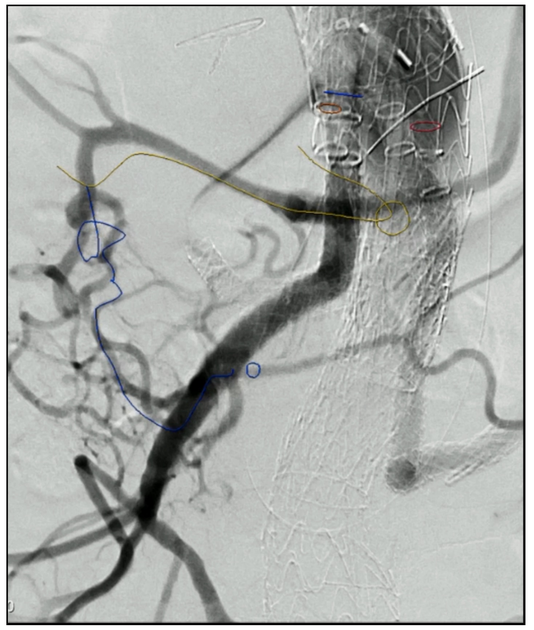

Figure 3: Temporary balloon occlusion of TAMBE celiac branch and superior mesenteric angiography, showing patent gastroduodenal, common hepatic, and splenic artery with preserved robust visceral perfusion

Case Report (cont.)

Following brachial cutdown three days later, the celiac artery was again unable to be cannulated. The superior mesenteric artery was then cannulated and an occlusive balloon was placed in the celiac branch of the endograft, and angiography demonstrated widely patent superior mesenteric, gastroduodenal, common hepatic, and splenic arteries, with no appreciable back-filling into the aneurysm sac. Given this collateral perfusion pattern and extensive prior failed cannulation attempts of the native celiac artery origin, decision was made to terminate further attempts, and to permanently occlude the celiac branch of the TAMBE. A 10x7mm Amplatzer Vascular Plug II was inserted through the celiac branch, unscrewed, retracted back into place within the branch, and deployed. Repeat angiography showed an occluded celiac branch with no appreciable flow, and excellent perfusion of the mesentery and liver via the superior mesenteric artery and collaterals.

Figure 4: Permanent occlusion of celiac branch of TAMBE using Amplatzer Vascular Plug II, with resultant aneurysm sac exclusion and preserved visceral perfusion

Conclusions

As far as we are aware, this is the first described use of this vascular plug for intentional occlusion of a previously deployed TAMBE graft, with resultant exclusion of the aneurysm sac.