Off-the-Shelf Parallel Stent-Graft Technique for Urgent Symptomatic Type 1a Endoleak

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Purpose

Endovascular aneurysm repair (EVAR) has transformed the way in which we treat aortic aneurysms. However, surveillance is necessary to detect endoleak even years after the repair. Late proximal endoleak has been associated with proximal neck degeneration and reestablishment of blood flow into the aneurysmal sac. Type 1a endoleaks often require customized endografts to successfully treat the aneurysm. Unfortunately, in the emergent setting, customized endografts are unavailable, and complex endovascular techniques and/or endograft modifications are required to attain an adequate aneurysmal exclusion. We describe here an off-the-shelf technique for the repair of a type 1a endoleak.

Materials and Methods

An 80-year-old gentleman with a history of CABG, stage III CKD, and AAA s/p EVAR 11 years prior, presented to the University of Cincinnati Medical Center with abdominal pain and a pulsatile mass. CT angiography revealed a type 1a endoleak with aneurysm sac expansion (Figure 1). The aorta measured 36.9 mm at the level of the highest renal and the previous endograft measured 28 mm proximally. Given the lack of appropriate proximal neck, type of endoleak, acuity of presentation, and his clinical condition, an urgent endovascular repair using a parallel stent-graft technique was offered.

Figure 1. CTA showing type 1a endoleak.

Results

After direct surgical exposure, a 22Fr sheath was inserted into the right common femoral artery and a 10Fr sheath into the left brachial artery. A 34mmx10cm thoracic endograft was deployed in the supraceliac aorta. A 10mmx10cm self-expanding covered stent was deployed in the celiac artery and extended cephalad with appropriate overlap using a second 10mmx10cm covered stent. These stents were internally reinforced with a 10mmx8cm and a 10mmx4cm self-expanding bare-metal stents. In the SMA, a 10mmx15cm self-expanding covered stent was deployed and internally reinforced with a self-expanding bare-metal stent of the same dimensions. Both renal snorkels were constructed with 7mmx15cm self-expanding covered stents and internally reinforced using 7mmx15cm self-expanding bare-metal stents. All visceral vessels were cannulated from the upper extremity. Lastly, a 37mmx15cm thoracic level of the lowest visceral limb, bridging the snorkeled vessels to the distal EVAR (Figure 2). The inner endograft was expanded with a compliant balloon to ensure adequate seal along the entire length. Follow-up duplex-scan at 1 month showed no endoleaks and a CT angiography at 9 months demonstrated favorable aortic remodeling indicated by aneurysm sac shrinkage and resolution of the type 1a endoleak. No other endoleaks were identified (Figure 3).

Figure 2. a) Outer thoracic endograft and 4-vessel chimney, b) 4-vessel chimney with the inner thoracic endograft, c) Celiac stent, d) SMA stent, e) bilateral renal artery stents.

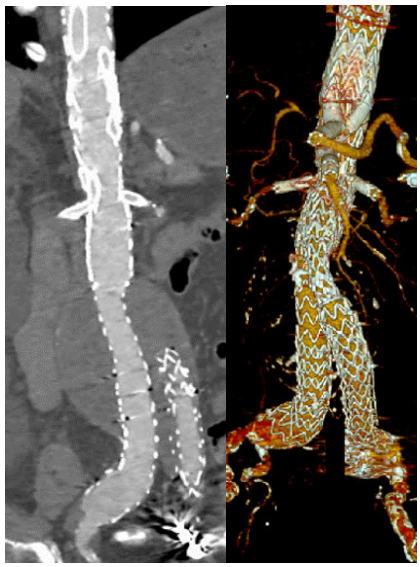

Figure 3. 4-vessel chimney with resolution of type 1a endoleak.

Conclusions

Parallel stent-graft techniques can be used in the urgent setting and do not require modifications to off-the-shelf devices, making them widely accessible. The internal stent reinforcement described here provides advantages: (1) No need to maintain wire access in each snorkeled vessel, (2) A lower profile sheath can be used, avoiding conduits, and (3) The endograft can be expanded without collapsing the snorkels. Key steps to prevent gutter leak: (1) Overlap between the thoracic endografts and the visceral stents should be >5cm, (2) Use a larger diameter inner endograft as a bridging component. Finally, the inner thoracic endograft must be deployed below the lowest visceral stent to prevent occlusion of the visceral snorkels.