

# Endovascular Management of Pseudoaneurysms Following Open Abdominal Aortic Aneurysm Repair

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## Introduction

Endoleak, defined as blood flow outside an endoluminal graft, but within an adjacent aneurysm sac or segment, is rare after open abdominal aortic aneurysm (AAA) repair and was first described by Chan et al in 6 patients in 2000.<sup>1</sup> Since then, only 4 cases of type I or type II endoleak have been reported worldwide<sup>2-4</sup> occurring as early as 6 weeks<sup>1</sup> and as late as 12 years<sup>5</sup> post op. They have been ascribed to anastomotic disruption in the case of a type I endoleak, and recanalisation or back bleeding from lumbar arteries or the inferior mesenteric artery in cases of type II endoleak.<sup>4</sup> We review two cases of pseudoaneurysm formation post open AAA repair.

**Patient 1:** 78 year old Male who originally underwent emergency open AAA repair in 2009 with an Ultramax tube Graft. He developed a type I endoleak in 2015, resulting in pseudoaneurysm formation (Fig 1a), most likely due to dehiscence of the proximal suture line, with the leak tracking down to an ilio lumbar branch distally.

**Patient 2:** 89 year old Male who had elective open AAA repair using a bifurcated Dacron graft in 2009. He was found to have a pseudoaneurysm on a CT in 2015 investigating his ongoing abdominal pain, with a leak most likely relating to the proximal anastomotic suture line.

## Methods

**Patient 1:** Left brachial approach was used to introduce a 90cm 7Fr Flexor® Shuttle® guiding sheath (COOK) into the aneurysmal sac via the dehiscised portion of the suture line. A 120cm MPA-A2 guiding catheter (CORDIS) was inserted up to the ilio lumbar branch (Fig 1b). A 2.7mm Progreat® microcatheter (TERUMO) was inserted into the guiding catheter using a tri-axial technique. Right CFA was accessed and a pigtail catheter (COOK) was inserted up to the aortic arch. A Lunderquist® extra-stiff wire (COOK) was used and a 35cm 20Fr sheath (CORDIS) was inserted up to the level of the renal arteries. Coiling of the ilio lumbar artery was undertaken (Fig 1c) using AZUR® CX (TERUMO) whilst coiling of the aneurysm sac was achieved with AZUR framing coil (TERUMO) and Onyx® LES (EV3 MEDTRONIC). Angiogram confirmed no flow in the ilio lumbar branch post coiling. A MEDTRONIC tube graft was inserted and deployed 1mm distal to the renal arteries. Completion angiogram confirmed no endoleak.

**Patient 2:** Both groins were percutaneously accessed with a ProGlide suture-mediated closure system (ABBOTT). A size 20Fr sheath (COOK) was inserted into the left groin. A 5Fr sheath (COOK) was inserted into the other groin. Through the 5 Fr sheath a pigtail catheter was inserted. An angiogram highlighted a large amount of contrast extravasation relating to the pseudoaneurysm (Fig 2a). An Endurant® II stent graft system cuff (MEDTRONIC) was inserted (Fig 2b) via the 20Fr sheath. Completion angiogram revealed a leak proximal to the stent thus a second 3cm Endurant® II stent graft system cuff (MEDTRONIC) was inserted proximally. Repeat angiogram revealed no endoleak. Realignment of the stents to eliminate a type III endoleak (Fig 2c) diagnosed 2 months post op was achieved with a 32 mm Gore® Excluder® AAA Endoprosthesis.

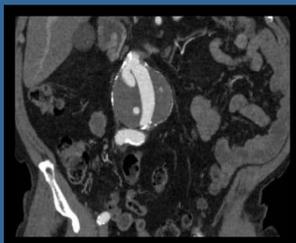


Fig 1a. CTA identifying pseudoaneurysm

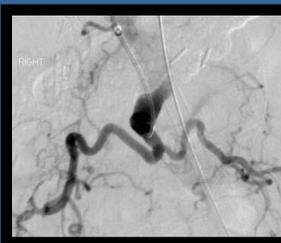


Fig 1b. MPA catheter up to ilio lumbar branch



Fig 1c. Coiling up to ilio lumbar branch

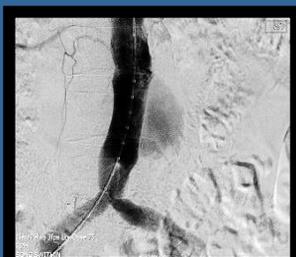


Fig 2a. Pseudoaneurysm on fluoroscopy

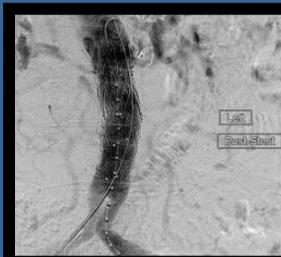


Fig 2b. Endovascular stent insertion

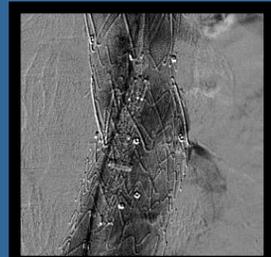


Fig 2c. Type III endoleak

## Results

In both patients, Completion angiogram and post operative CTA of the aorta revealed no endoleak and no increase in the aneurysmal sac size. The stents remained patent and free from migration or fracture. Patient 2 was readmitted to hospital with abdominal pain two months post op with a CTA revealing a type III endoleak, arising from between the two previous overlapping aortic stents.

## Discussion

Traditionally surveillance, of patients post open AAA repair does not occur on a long term basis and this is justified by a late complication rate reported as < 2% over 7 years.<sup>6</sup> Technical causes, such as a loose suture or suture breakage can lead to type I endoleaks and in the setting of a ruptured open AAA repair the possibility of a technical anastomotic breakdown is not hard to fathom. Besides technical causes, infection leading to anastomotic breakdown must be excluded as it introduces a contraindication to endovascular repair. Whilst endovascular repair of a type I endoleak can occur via insertion of a stent graft alone, in patient 1, tracking of blood from the superior anastomosis to the ilio lumbar branch required the addition of coiling from the anastomotic leak to the ilio lumbar branch, highlighting that in some cases, insertion of a stent graft alone is not sufficient to abolish an endoleak.

## Conclusion

Endovascular repair of pseudoaneurysms from resultant endoleaks post open AAA repair is a feasible and safe management approach and can be achieved via a combination of coiling and stent graft insertion. Surveillance of patients with imaging to detect the development of endoleak and pseudoaneurysm formation may be warranted in some cases.

## References

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