

**Chimney Graft Endovascular Repair Of Para-Anastomotic  
Pseudoaneurysm After Mycotic Infrarenal Aortic Aneurysmectomy**

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**ABSTRACT**

Para-anastomotic aneurysms are either true aneurysms or pseudoaneurysms. The latter tend to be asymptomatic until rupture. Para-anastomotic aneurysms (PASA) should be approached surgically either endovascular or open surgery despite the high morbidity and mortality associated with their treatment. This report describes the case of a 73-year-old man who presented with a para-anastomotic pseudoaneurysm (PASA) secondary to mycotic infrarenal aortic aneurysmectomy. We chose to use an endovascular approach, and results were good. Endovascular techniques are increasingly becoming the method of choice in the treatment of para-anastomotic pseudoaneurysms.

**Key words:** Para-anastomotic pseudoaneurysm, aneurysmectomy, endovascular procedures.

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**INTRODUCTION**

Para-anastomotic pseudoaneurysms (PASA) are serious complications of reconstructive surgery of the abdominal aorta for both occlusive and aneurysmal disease. Para-anastomotic pseudoaneurysms are more common than true aneurysm and the rupture rate is higher and less predictable. Early intervention is needed after diagnosis of PASA due to high risk of rupture. Endovascular repair of PASA is reported to have lower morbidity and short term mortality with benefits of avoidance of general anesthesia, avoidance of reoperation through previous operated field and reduced intraoperative blood loss. 1-8 Chimney endograft was first used as a bailout maneuver when inadvertent renal artery coverage occurred during endovascular repair of aneurysm. We report a case of successful chimney endovascular repair of para-anastomotic pseudoaneurysm that occurred after open repair of mycotic infrarenal aortic aneurysmectomy.

**CASE REPORT**

A 73-year-old man, with underlying hypertension, presented with one day history of epigastric pain and hematemesis. He had history of open aneurysmectomy with inlay graft repair for mycotic abdominal aortic aneurysm (AAA) eight months prior to current admission. His blood culture from the previous admission showed *Burkholderia*

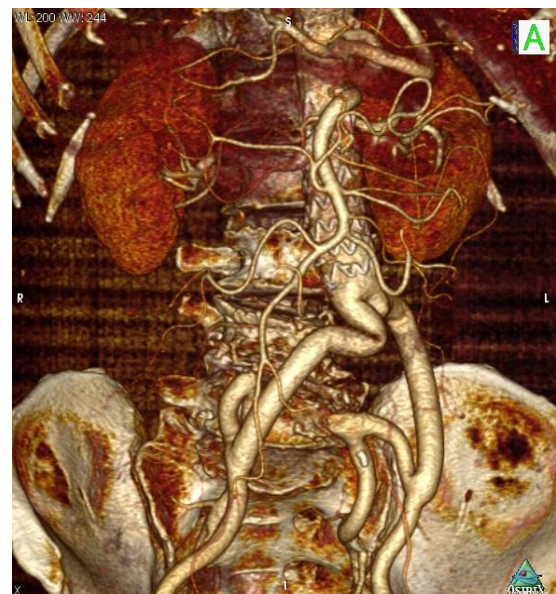
pseudomallei with positive serology. He was treated with six weeks of intravenous Ceftriaxone which later converted to oral Augmentin 625mg bd and oral Ciprofloxacin 500mg bd. He was discharged well after a two month long stay in hospital. On admission, he was pale and tachycardic (HR: 90-110/min) with stable blood pressure (110/60mmHg). Abdominal examination revealed a tender, pulsatile mass at epigastric region. Lower limb peripheral pulses were palpable. Examination of other systems were unremarkable. Hemoglobin on admission was 5.1g/dL. OGDS showed antral gastritis with no stigmata of recent bleeding. CTA showed possibility of leaking into old aortic sac with pseudoaneurysm at the proximal anastomotic site (Figure. 1).

Diagnosis of para-anastomotic pseudoaneurysm with aortoenteric fistula was made and decision was made for a combination of left renal artery chimney and aortic extension stent grafting made due to the closed proximity of right renal artery to the pseudoaneurysm. The aorta was accessed via bilateral groin cut-downs to expose both common femoral arteries. Intra-operatively, the proximal paraanastomotic pseudoaneurysm was excluded using a extension stent graft (Endurant Stent Graft System, Medtronic Inc., Minneapolis, MN, USA) was placed above left renal artery and ballooning was then performed using a Reliant balloon (Medtronic Inc.). The left renal arteries were cannulated from the left brachial artery. A PTFE-covered nitinol stent (Atrium®V12) was advanced into the left renal artery and deployed in a chimney fashion. The completion angiography showed complete exclusion of paraanastomotic pseudoaneurysm and adequate sealing with no endoleak (Figure. 2). He completed two weeks of intravenous Ceftriaxone then was discharged well with lifelong Tab. Augmentin 625mg bd and Tab. Ciprofloxacin 500mg bd. Repeat CTA during six months and one year follow-up (figure. 2) showed no pseudoaneurysm recurrence and patient remain asymptomatic.

Figure. 1 CTA showing a pseudoaneurysm arising from the proximal anastomosis



Figure. 2 CTA at 1 year follow up showing no pseudoaneurysm recurrence and the stent and chimney stent graft in situ



## **DISCUSSION**

Para-anastomotic pseudoaneurysm (PASA) after aortoiliac disease repair is a dreadful complication with high mortality without intervention. Unlike true aneurysms, PASA occurs as result from disruption of the graft-to-vessel anastomosis with the actual defect found within the arterial wall.<sup>1</sup> Mismatch in aortic graft diameter, extreme mechanical stress at suture lines, hypertension, atherosclerosis, previous endarterectomy, technical errors, infection and  $\alpha$ 1-antitrypsin deficiency are associated with early onset of PASA.<sup>1</sup> As seen in this case report, previous mycotic aneurysm and post-operative periaortic infection were the risk factor for development of PASA and aortoenteric fistula. Eventhough the meliodosis infection consider common in this region, but the formation of PASA extremely rare .The reported incidence of PASA is 2.5-13.3%, which increases to 27-35% during long term follow up more than 15 years.<sup>3</sup> The complications of PASA include thrombosis, distal embolization, compression or erosion of adjacent organs and inevitable growth to the point of rupture.<sup>2</sup> The rupture rate for true para-anastomotic aneurysm is 15-55% but PASA has a higher and less predictable rupture risk.<sup>4</sup> This is due to the lower resistance to mechanical stress of its fibrotic capsule's as compared to that of native aortic wall.<sup>2</sup> The mortality rate for PASA is as high as 61% without intervention.<sup>4</sup> Hence, elective repair is warranted when PASA is detected. Early mortality rates vary from 4.5-14% for asymptomatic patients with surgical repair, but increased to 66-70% in symptomatic patients. Surgical morbidity rates for redo repair are reported 17-62.5%.<sup>3</sup>

Open repair of both true and false para-anastomotic aneurysm is technically challenging with high mortality and morbidity. This is attributed by the increased age and comorbidities of patients, and the need for reoperation via scarred area from previous operative dissection which extends deep into pelvis. The reported mortality rates for open repair of PASA are 8-70% and the morbidity rates are 70-80% which are higher than the rates associated with primary prosthetic reconstructions.<sup>4</sup> Endovascular repair has emerged as an option with lower mortality and morbidity as compared to open repair of PASA. The other advantages of endovascular repair include avoidance of general anesthesia, avoidance of reoperation on a surgically 'hostile' abdomen and reduced intraoperative blood loss. Recent studies have shown that endovascular repair of para-anastomotic aneurysm is feasible option with lower perioperative morbidity and mortality.<sup>1-4</sup> As illustrated in this case, the main issue with the proximal PASA is, it close proximity with renal artery make the endovascular repair is more challenging.

Chimney graft technique was first used as a bailout maneuver when inadvertent renal artery coverage occurred during endovascular repair of aneurysm. However, this technique has evolved into a primary treatment strategy for a variety of indications.<sup>5</sup> Chimney graft technique is based on the deployment of a covered or bare metal stent parallel to and outside of the aortic endograft with the aim of preserving the blood flow into aortic side branches in a totally endovascular way.<sup>6</sup> The advantages of using chimney grafts include its availability off the shelf avoiding the wait for custom made fenestrated graft which usually take 4-6 weeks, reduced costs, and avoidance of adjunct intervention such as debranching procedure in aortic arch aneurysm.<sup>5</sup> Recent studies have shown that chimney graft endovascular repair can be completed with high degree of success with lower risks of perioperative morbidity and short

term mortality as compared to open surgery.<sup>5-7</sup> However, its long term outcomes especially on stent patency, risk of endoleak and rate of reintervention remain a concern as there is no long term data to date.

### **CONCLUSION**

In conclusion, endovascular repair of para-anastomotic aneurysm is a safe and feasible method with lower morbidity and short term mortality rate. However, the lack of validated data on its long term outcomes remain a concern. Chimney endograft has gained popularity in past decade but there is lack of evidence to date to support its widespread use in elective surgery. Chimney endograft is justified in acute patients who are not fit for open surgery or as a bailout procedure in case of unintentional renal artery coverage.

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