

# Open repair of a type Ia endoleak with a giant abdominal aortic aneurysm sac

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## ABSTRACT

Endovascular aneurysm repair (EVAR) has been widely accepted as a safe and effective treatment for abdominal aortic aneurysm. Endoleaks are the most common complication after EVAR and require urgent interventions. Usually endoleaks can be treated with endovascular procedures using a variety of techniques. Despite these interventions, if the endoleak still persists, conventional open surgery should be evaluated. A 67-year-old man had been treated with EVAR after a ruptured abdominal aortic aneurysm 7 years ago. Later on, a type II endoleak was detected due to the inferior mesenteric artery and treated with coil embolization at the first follow-up year. The patient was admitted to our emergency department due to abdominal pain. Computed tomography angiography demonstrated a type Ia endoleak from the posterior side of the graft with a huge abdominal aortic aneurysm sac (22.9 cm) without rupture. The patient was hemodynamically unstable, and open surgical repair was performed via left anterolateral thoracotomy and laparotomy. Here we report a case where we performed open repair of a type Ia endoleak and discuss the repairing techniques for type Ia endoleak in the light of the literature.

*Keywords: Abdominal aortic aneurysm; endovascular procedures; reoperation; type Ia endoleak.*

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Endovascular aortic aneurysm repair (EVAR) is a less invasive technique than open surgery and has been widely accepted as a safe and effective treatment for abdominal aortic aneurysms (AAA); it offers several potential benefits over conventional surgical procedures and was first reported by Parodi et al. [1] in 1991. Despite the advancements in endovascular technology and the growing experience of physicians, endoleaks remain to be the complex complications after endovascular AAA repairs. Type Ia endoleak is defined as persistent blood flow into the aneurysmal sac from proximally. Incomplete proximal sealing results in type Ia endoleak in about 4% of all patients treated with EVAR [2]. In addition, type I endoleak is associated with an increased

risk of post-procedural aneurysm and late aneurysm-related mortality, and re-intervention is recommended as soon as possible after diagnosis [3]. Most endoleaks can be successfully treated using endovascular methods, but open conversion can be required with a rate of 2.1% as reflected in the European Collaborators on Stent Graft Techniques for Aortic Aneurysm Repair Registry [4]. Stent-graft extension combined with visceral artery bypass and use of chimney or periscope grafts to extend landing zones may be considered in open surgery [5].

Here we report the case of a patient who underwent open surgical treatment of a type Ia endoleak after EVAR with a 22.9-cm abdominal aortic aneurysm sac.

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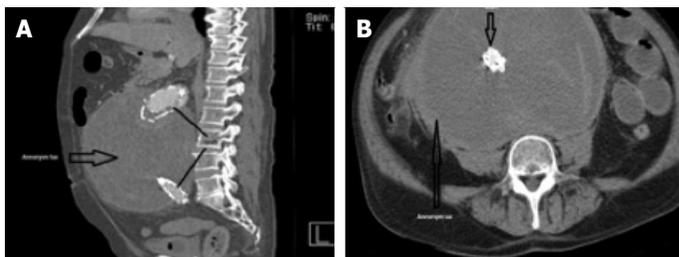
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## CASE REPORT

A 67-year-old male patient was admitted to another surgery institution with a ruptured infrarenal abdominal aortic aneurysm (6.2 cm) 7 years ago. Left iliac artery occlusion and femorofemoral bypass were performed with right aortoiliac graft insertion. Afterwards, a type II endoleak was detected due to the inferior mesenteric artery and was treated with coil embolization at the first follow-up year, after which the patient was lost to follow-up.

The patient was admitted to our emergency department due to abdominal pain. Computed tomography angiography demonstrated a type Ia endoleak from the posterior side of the graft with a huge aneurysm sac (22.9 cm) without rupture (Fig. 1A, B). His right kidney was atrophic, and the hemoglobin level was detected to be 8.1 g/dL. Endovascular repair techniques were considered first, but the proximal neck length was <6 mm, which was very near to the left renal artery; the vascular team lacked the experience of endovascular repair techniques for type Ia endoleaks, so the conventional open surgery was immediately planned. The patient was hemodynamically unstable, and inotropic drug infusion was initiated before the surgery. The proximal side of the endovascular graft was at the juxtarenal part of the aorta, and clamping by abdominal incision could be complicated; thus, left anterolateral thoracotomy was performed for safe clamping. The endovascular graft and the surrounding aortic tissue were resected with a wide laparotomy (Fig. 2A, B). An aortobifemoral bypass was performed using a Dacron graft. The proximal anastomosis was done with end-to-end configuration just below the superior mesenteric artery, and left renal artery bypass was established with the saphenous vein. The right renal artery was ligated as the right kidney was known to be atrophic. The patient was transferred to the intensive care unit after



**FIGURE 1.** CT angiography showed a huge aneurysm sac and endovascular graft in the coronal plane (A) and horizontal plane (B).

the surgery; he died postoperative 6<sup>th</sup> hour due to persistent deep acidosis. Visceral or renal protection could not be provided during the surgery; total operation time was nearly 6 h, and four erythrocyte suspensions were replaced during the surgery and follow up. This study was approved ethically by Institutional Board.

## DISCUSSION

Multiple techniques for the treatment of type Ia endoleak have been described in the literature with variable success rates. Usually, endoleaks can be treated with endovascular procedures. Standard endovascular treatment options for type Ia endoleaks include insertion of an aortic cuff to extend the endograft coverage more proximally or repeated ballooning or placement of a large-caliber, balloon-expandable stent inside the proximal endograft [6, 7]. Despite these interventions, if the endoleak still persists, conventional open surgery should be considered. Early detection and classification of the endoleaks are crucial for proper management and treatment. In the present case, the patient underwent open



**FIGURE 2.** A huge aneurysm sac is seen after laparotomy (A); endovascular graft after resection (B).

repair of a type Ia endoleak because the proximal neck length of the aneurysm was under 6 mm, which was very near to the left renal artery; moreover, the patient was hemodynamically unstable, and inotropic drug infusion had to be initiated before the surgery.

Tan et al. [8] reported that type I endoleaks occur in up to 3% patients after EVAR and are associated with an increasing age, female gender, large endograft diameter, and unplanned graft extension. However, an increase in the diameter of aneurysmal sac due to other types of endoleaks could be a major reason for type I endoleak as seen as in the present case. In addition, when a type I endoleak is detected late, it is typically secondary to a caudad migration of the stent graft or continued dilatation of the neck [9].

The largest diameter of a giant unruptured AAA has been reported to be 25 cm in literature [10]. We observed a giant AAA sac 22.9 cm in diameter, which occurred due to a type Ia endoleak. Both endovascular and conventional open surgical procedures should be considered for type Ia endoleaks, but overcoming these complex complications remains a challenge. We did not get the expected result in this case, and the patient died. This is attributable to the preoperative conditions of the patient such as having cardiac inotropic support and being hemodynamically unstable. With the growing experience of physicians and development of new graft technologies, type Ia endoleaks are expected to be more successfully treated using endovascular techniques or hybrid procedures.

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