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## Case Report

# Internal iliac artery aneurysm embolization with direct percutaneous puncture and thrombin injection

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### ABSTRACT

Endoleak it is the most common complication after endovascular abdominal aortic aneurysm repair and it represents the failure of endovascular treatment. In particular type 2 endoleak is associated with retrograde flow in the aneurysm sac from one or more arterial branches.

We describe a reperfusion of the aortic aneurysm sac with slow-flow type II endoleak from the right internal iliac artery aneurysm through the posterior door previously closed with coils, and treatment with direct puncture of the internal iliac artery aneurysm with inflixion of human thrombin under ultrasound guidance, not previously described in the literature.

In this case the direct puncture of the aneurysm sac was the faster and safer way to treat this patient just because the back door was closed by coils and the entry by the iliac graft.

Thrombin reduces significantly the presence of artifacts and give to us the exact extension of thrombosis into the aneurysm sac and the echo-guided offers the advantage of being able to monitor the progression of the thrombotic process induced by thrombin injection in real time.

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## Introduction

Endoleak is defined as persistence of blood flow outside the endoprosthesis but within the aortic aneurysmatic sac [1]. It is the most common complication after endovascular abdominal aortic aneurysm repair (EVAR) and it represents the failure of endovascular treatment [1,2]. Endoleak has an incidence of 10%-50% and its persistence can lead to an enlargement and subsequent rupture of the aneurysmatic sac [2]. Generally, high pressure endoleak (type 1 and 3) require urgent treatment due to the high risk of rupture of the aneurysmal sac [3]. However, the treatment of low-pressure endoleak remains controversial, in particular type 2, which alone represents 20% of all cases [4,5].

We describe a rare case of reperfusion of an internal iliac artery aneurysm successfully treated using direct puncture and thrombin injection in a patient with abdominal aortic aneurysm and a bilateral internal iliac artery aneurysm treated with aortic endograft and coils.

## Case report

Male, 74 years old patient with an abdominal aortic aneurysm and bilateral internal iliac artery aneurysms was treated by EVAR with a bifurcated aortic stent graft placement.

Preliminarily (the day before), it was decided to close also the right internal iliac artery aneurysm (bigger compared to

the contralateral, diameter 4,5 × 3 cm) closing the back door with coils; the entrance was covered with the iliac graft during the day of the aortic aneurysm procedure. No immediate complications after the EVAR procedure.

After 1 year, the CT scan follow-up in the late venous phase showed a reperfusion of the aortic aneurysm sac with a slow flow type II endoleak from the right internal iliac artery aneurysm through the back door previously closed with coils (Fig 1).

Under local anesthesia, using CT guidance, with 21 g needle we performed a direct puncture of the right internal iliac artery aneurysm sac (Fig 2) and we injected human thrombin (2500 IU). We used ultrasound guidance during the thrombin injection and performed a CT scan at the end of the procedure (total time of the procedure about 30 minutes).

The patient was discharged after 1 hour.

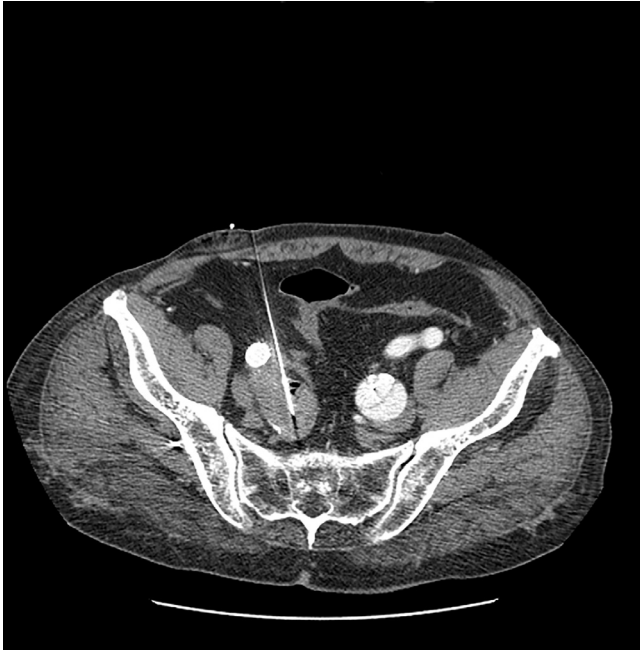
At the CT scan examination after the procedure there was still a minimal perfusion of the right internal iliac artery aneurysm sac (Fig 3); we performed a second CT scan examination after 1 week and the Type II aortic endoleak and the right internal iliac artery aneurysm were completely embolized (Fig 4).

## Discussion

Type 2 aortic endoleak is associated with retrograde flow in the aneurysm sac from one or more arterial branches [7]. They are generally supported by intercostal arterial branches,



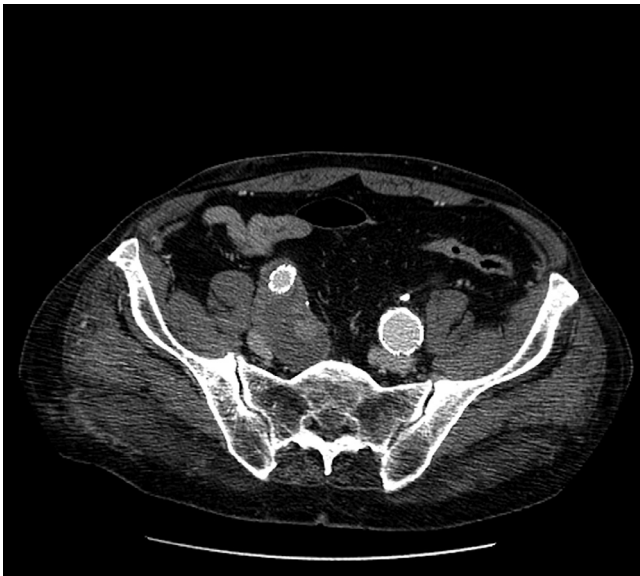
**Fig. 1 – Reperfusion of the aortic aneurysm sac with a slow flow type II endoleak from the right internal iliac artery aneurysm.**



**Fig. 2 – Control computed tomography after placement of the needle in the endoleak area before thrombin injection before the injection of thrombin needle tip in the endoleak area.**



**Fig. 4 – After 1 week to thrombin injection—no persistent endoleak with right internal iliac artery aneurysm completely embolized.**



**Fig. 3 – Control computed tomography after thrombin injection and needle removal—minimal perfusion of the right internal iliac artery aneurysm sac.**

lumbar, from the inferior mesenteric artery or internal iliac artery. They are further differentiated into type IIA when only 1 branch is involved and type IIB when 2 or more branches are involved, creating a continuous flow situation [2].

The mechanism of formation of type 2 endoleak is unknown. After EVAR, many potential communications remain

between the arteries that originate from the aorta (Inferior mesenteric artery (IMA), lumbar arteries, etc.) through the aneurysm sac; when these connections fail to create thrombosis, the type 2 endoleak develops [5]. According the several literature, up to 54% of the type 2 endoleak resolve spontaneously [8]. Treatment is reserved in case of expansion of the aneurysm sac (>5 mm) and if it persists for more than 6 months [4]. Several possibilities of treatment are described in literature, including transarterial approach or direct puncture. Transarterial embolization is the most commonly used approach, although there is evidence to suggest that the translumbar approach provides more stable results in the long term [5]. Direct endoleak puncture can be performed using the translumbar or transabdominal approach, depending on the position of the endoleak [6]. Our case describes a reperfusion of the aortic aneurysm sac with slow-flow type II endoleak from the right internal iliac artery aneurysm through the posterior door previously closed with coils, and treatment with direct puncture of the internal iliac artery aneurysm with inflexion of human thrombin under ultrasound guidance, not previously described in the literature. The injection of percutaneous thrombin under ultrasound guidance is commonly used for the treatment of postcatheterism pseudoaneurysm because it is rapid, safe, well tolerated, and cheap [9]. The echo-guided thrombin injection offers the advantage of being able to monitor the progression of the thrombotic process induced by thrombin injection in real time. This way, it is possible to avoid involuntary injection into the lateral branches or peripheral embolization [10].

Furthermore, the use of thrombin reduces the presence of artifacts giving us information on the exact extent of the thrombosis in the aneurysmal sac. Direct puncture of the

aneurysm sac was possible only because the back door was closed by coils and the entrance was from the iliac graft. Our experience shows that careful evaluation of imaging and knowledge of materials are necessary for a tailored, safe, and fast treatment for the patient.

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## Conclusion

In this case, in our opinion, the direct puncture of the aneurysmatic sac was the faster and safer way to treat this patient, just because the back door was closed by coils and the entry by the iliac graft. Thrombin vs coils or other liquid embolic agents significantly reduce the presence of artifacts and give us the exact extension of thrombosis into the aneurysmatic sac.

## REFERENCES

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- [1] Moll FL, Powell JT, Fraedrich G, Verzini F, Haulon S, Waltham M, et al. Management of abdominal aortic aneurysms clinical practice guidelines of the European Society for Vascular Surgery. *Eur J Vasc Endovasc Surg* 2011;41:S1–S58.
- [2] Rand T, Uberoi R, Cil B, Munneke G, Tsetis D. Quality improvement guidelines for imaging detection and treatment of endoleaks following endo-vascular aneurysm repair (EVAR). *Cardiovasc Intervent Radiol* 2013;36:35–45.
- [3] Cao P, De Rango P, Verzini F, Parlani G. Endoleak after endovascular aortic repair: classification, diagnosis and management following endovascular thoracic and abdominal aortic repair. *J Cardiovasc Surg* 2010;51(1): 53–69.
- [4] Steinmetz E, Rubin BG, Sanchez LA, Choi ET, Geraghty PJ, Baty J, et al. Type II endoleak after endovascular abdominal aortic aneurysm repair: a conservative approach with selective intervention is safe and cost-effective. *J Vasc Surg* 2004;39:306–13.
- [5] Baum RA, Carpenter JP, Golden MA, Velazquez OC, Clark TW, Stavropoulos SW, et al. Treatment of type 2 endoleaks after endovascular repair of abdominal aortic aneurysm: Comparison of transarterial and translumbar techniques. *J Vasc Surg* 2002;35:23–9.
- [6] Zabicki B, Kubiak K, Gabriel M, Juszkat. Percutaneous direct thrombin injection with hydrodissection to manage type II endoleak after endovascular abdominal aortic aneurysm repair. *Pol J Radiol* 2018;83:e461–4.
- [7] Stavropoulos SW, Park J, Fairman R, Carpenter J. Type 2 endoleak embolization comparison: translumbar embolization versus modified transarterial embolization. *J Vasc Interv Radiol* 2009;20:1299–302.
- [8] Sidloff DA, Stather PW, Choke E, et al. Type II endoleak after endovascular aneurysm repair. *Br J Surg* 2013;100:1262–70.
- [9] La Perna L, Olin JW, Goines D, Childs MB, Ouriel K. Ultrasound-guided thrombin injection for the treatment of postcatheterization pseudoaneurysms. *Circulation* 2000;102:2391–5.
- [10] Van den Berg JC, Tutein Nolthenius RP, Casparie JWBM, Moll FL. CT-guided thrombin injection into aneurysm sac in a patient with endoleak after endovascular abdominal aortic aneurysm repair. *AJR Am J Roentgenol* 2000;175(6):1649–51.