Cardiovasc Intervent Radiol (2019) 42:313–316
https://doi.org/10.1007/s00270-018-2102-1

CASE REPORT

Unusual Access for the Treatment of Iliac Artery Aneurysm in Association with Type II Endoleak After Endovascular Repair of an Aortoiliac Aneurysm

Rohit Philip Thomas[1] · Martin Köcher[2] · Marie Černa[2] · Petr Utíkal[3]

Received: 14 June 2018 / Accepted: 24 October 2018 / Published online: 31 October 2018

Abstract Internal iliac artery aneurysms (IIAAs), although rare, are associated with a significant risk of mortality, if they rupture. Endovascular approach with exclusion of the aneurysm sac from antegrade and retrograde perfusion is proved to be a feasible treatment option. However, this option is not always technically possible with a preexisting endovascular aneurysm repair (EVAR) or surgical aortoiliac reconstruction with ligation of internal iliac artery origin. We report another safe treatment option of an enlarging IIAA associated with a type II endoleak after EVAR and a standard endovascular treatment was not possible. The access to the aneurysm sac was achieved retrograde via percutaneous access to the superior gluteal artery under fluoroscopy followed by treatment with embolization of the inflow and outflow vessels.

Keywords Internal iliac artery aneurysm · Type II endoleak · Percutaneous access

✉ Rohit Philip Thomas
rohit0904@gmail.com

[1] Department of Diagnostic and Interventional Radiology, UKGM University Hospital Marburg, Philipps-University Marburg, Baldingerstrasse 1, 35043 Marburg, Germany

[2] Department of Radiology, University Hospital Olomouc, Palacky University, Olomouc, Czech Republic

[3] Department of Surgery II, Vascular and Transplantation Surgery, University Hospital Olomouc, Palacky University, Olomouc, Czech Republic

Introduction

Internal iliac artery aneurysms (IIAAs) are not that common and are usually associated with abdominal aorta/common iliac artery (CIA) aneurysms. These are reported to have a rupture risk approaching 40%, with an associated 80% mortality for large IIAAs [1, 2]. Surgical treatment may be technically challenging with significant morbidity, especially in patients with previous history of pelvis surgery [1]. Endovascular approach with exclusion of the aneurysm sac from antegrade and retrograde perfusion is proved to be a feasible alternative by avoiding the direct operative morbidity [3, 4]. However, antegrade access to the internal iliac artery (IIA) may not always be possible when a previous surgical aortoiliac reconstruction with ligation of IIA origin exists or the same is covered in previous endovascular aortic aneurysm repair (EVAR) with an extension of the distal landing zone to the external iliac artery (EIA).

This paper aims to describe the treatment of a case where a patient presented with enlarging IIAA associated with a type II endoleak after EVAR and a standard endovascular treatment was not possible. The access to the aneurysm sac was achieved retrograde via percutaneous access to the superior gluteal artery (SGA) under fluoroscopy followed by treatment with embolization of the inflow and outflow vessels. To the best of our knowledge, percutaneous puncture of SGA under fluoroscopy in the treatment of type II endoleak has not been previously reported.

Case Report

An 81-year-old man presented for the evaluation of expanding IIAA. His past-history included treatment of the abdominal–iliac aortic aneurysm with EVAR in 1997 with

a standard aorto-bi-iliac first-generation stent graft (ELLA-CS, Hradec Kralove, Czech Republic). He was stable till 2013 when his surveillance computed tomography (CT) showed a caudal stent graft migration and neck dilatation with a type Ia endoleak and significant increase in size of the aneurysm (70 × 65 mm), which demanded treatment. The known aneurysm of the left IIA (23 mm) which remained stable till 2012 also showed a sudden increase in size (58 mm) in 2013. A revision intervention procedure was performed with proximal stent graft extension with a fenestrated part (Zenith fenestrated AAA Endovascular Graft, William Cook Australia Ltd. Brisbane, Australia) and a uni-iliac stent graft distally to the right side due to lack of space for a bifurcated distal part of the fenestrated stent graft, in the already existing bifurcation-stent graft. The left proximal CIA was occluded endovascularly with iliac-plugs (Cook Medical, Bjaeverskov, Denmark). A femoro-femoral crossover bypass was also done on the same setting with proximal surgical ligation of the distal left EIA.

The follow-up CT examinations in 2014 and 2015 showed a complete exclusion/shrinkage of the abdominal aneurysm (58 × 66 mm) without any signs of endoleak. The follow-up CT in 2016 showed a stable situation of the excluded aortic aneurysm but a significant size increase in the left IIAA (diameter of 68.9 mm) with a type II endoleak (Fig. 1).

Because of the prior occlusion of the left CIA and existing femoro-femoral crossover bypass, an antegrade approach to the left IIA was not feasible. A percutaneous transgluteal retrograde approach of SGA was performed to access the aneurysm. With patient in prone position, under local anesthesia, direct access of the left SGA was attained with a micropuncture set (Cook Inc., Bloomington, IN) under fluoroscopy guidance outside the pelvis, near to the sciatic foramen. The arterial calcification helped in the vessel puncture under fluoroscopy (Fig. 2), without ultrasound guidance. The correct intraluminal position was angiographically confirmed with exchange of a 4F sheath. The digital subtraction angiogram (DSA) confirmed the perfused aneurysm of the left IIA with inflow and outflow arteries (Fig. 3). Selective catheterization of the inflow and outflow arteries was performed and these were embolised with coils (Nester embolization coils, Cook Medical Inc. Bloomington, IN, USA, diameter 4-8 mm). Postembolization angiograms showed complete exclusion of the aneurysm sac from circulation. The access site hemostasis was achieved by direct manual compression of the puncture site.

The patient did not experience any buttock claudication or other ischemic complications and was discharged on the second postoperative day. The control CT after 1 year demonstrated a thrombosed aneurysm sac without evidence of endoleak or other complications (Fig. 4).

Discussion/Conclusion

The rupture risk of IIAA aneurysms is variable with size and up to 50% of untreated IIAAs can eventually rupture [5]. It is therefore recommended that IIAA more than 3 cm

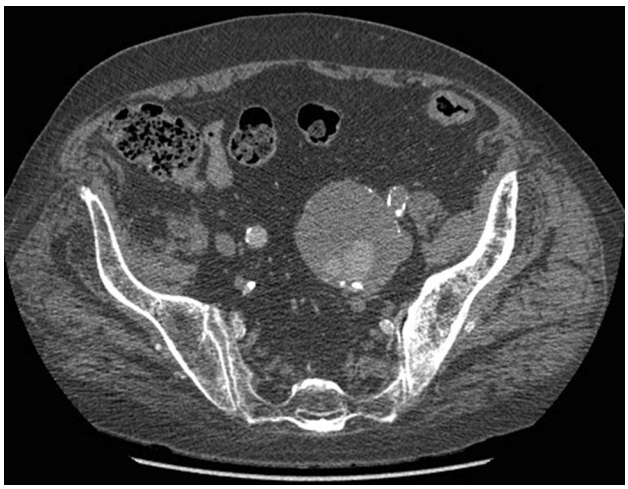

Fig. 1 Computed tomography (CT) image showing enlarged left internal iliac artery aneurysm with type II endoleak

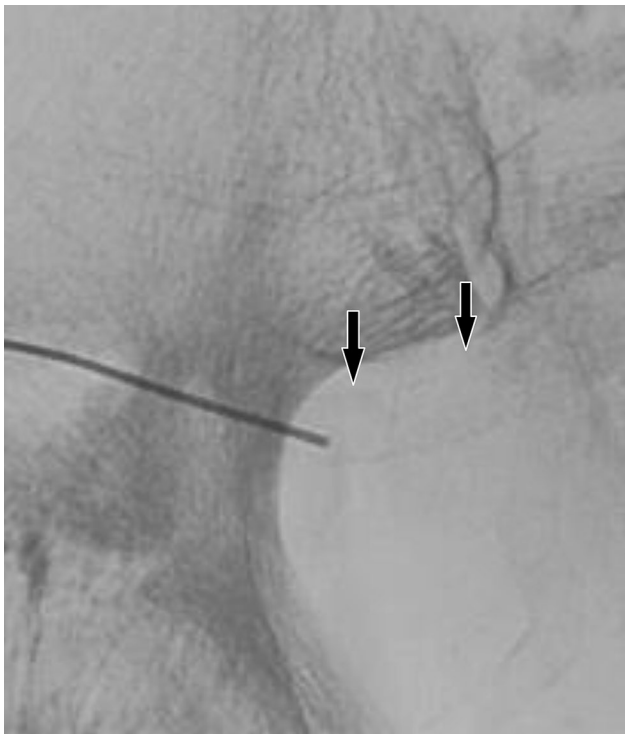

Fig. 2 Fluoroscopy during the superior gluteal artery (SGA) puncture showing wall calcification

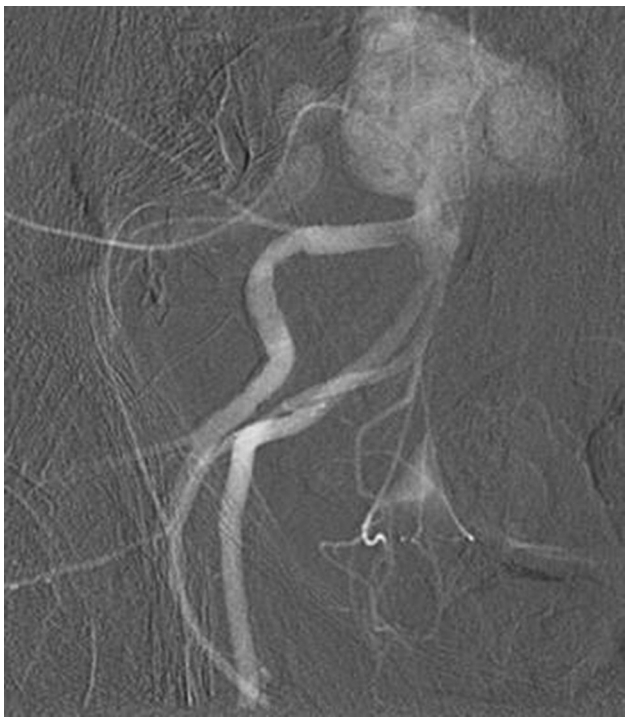

Fig. 3 Digital subtraction angiography (DSA) through the attained SGA access showing type II endoleak and perfusion of the aneurysm sac

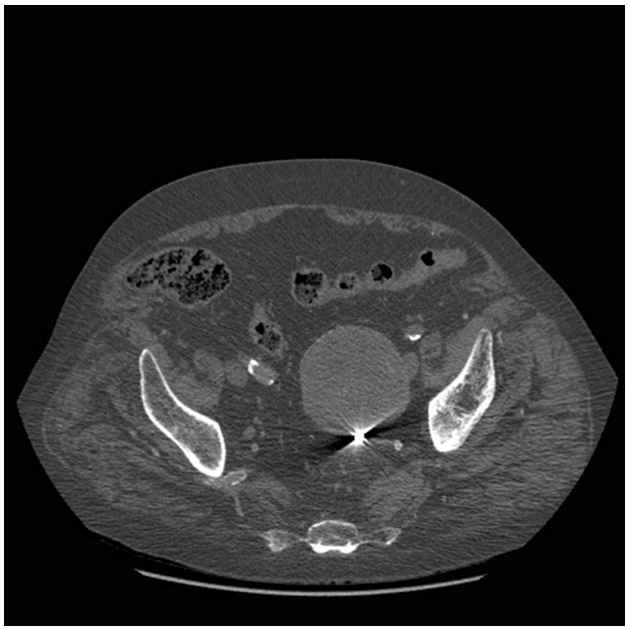

Fig. 4 Follow-up CT 1 year after embolization, showing stationary size of the IIAA

should be treated. Furthermore, aggressive treatment of expanding IIAA is advisable to prevent the high morbidity and mortality associated with rupture.

In the past, the management of IIAA was surgical, with proximal ligation of the artery. However, ongoing sac expansion and rupture secondary to retrograde perfusion have been reported [6]. Recently, endovascular management of IIAA has become the mainstay of treatment by coil embolization, stent graft implantation or a combination of both [7].

The type II endoleak of the IIAAs after a previous EVAR can present as a technical challenge, as coverage of the origin of the IIA by stent grafts and tortuous feeding collaterals can make endovascular access and embolization impossible. In the immediate post-EVAR period, extrastent approach is reported as a treatment method in type II endoleaks [8]. In chronic endoleaks, the direct percutaneous access of the aneurysm with sac embolization and the feeding arteries is reported to be a feasible method of management [9]. Since then a variety of methods for accessing the sac have been described which included transosseous [10] approach and gluteal artery cutdown [11].

The posterior division of IIA comprises the superior and inferior gluteal arteries supplying mainly the musculature and the cutaneous regions. The SGA traverses along the superior border of the pyriformis muscles and the inferior gluteal artery courses along its lower border. Both of these can be approached in a retrograde fashion mini-invasively to access the IIA. The access to the SGA outside the pelvis avoids the punctures in the peritoneal cavity that may result in perforation of pelvic organs.

Our experience shows that the percutaneous transgluteal approach is safe and feasible and can be easily accomplished using fluoroscopy, when arterial wall calcifications are present. If the calcification is not present, image guidance either by ultrasound or CT guidance as reported [12] can be used. Possible rare complications that should be considered with this technique include buttock claudication, pseudoaneurysm formation, sexual dysfunction and bowel and bladder ischemia.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Consent for Publication Consent for publication was obtained for every individual person's data included in the study.

References

1. Perry DJ, Kessel D, Scott D. Simplifying the internal iliac artery aneurysm. Ann R Coll Surg Engl. 2001;83:302–8.
2. Million A, Paquet Y, Ahmed SB, Pinel G, Rosset E, Lermusiaux P. Midterm outcomes of embolization of internal iliac artery aneurysms. Eur J Vasc Endovasc Surg. 2013;45:22–7.
3. Mori M, Sakamoto I, Morikawa M, Kozhaki S, Makino K, Matsunaga N, et al. Transcatheter embolization of internal iliac artery aneurysms. J Vasc Interv Radiol. 1999;10:591–7.
4. Henry M, Amor M, Henry I, Tzvetanov K, Buniet JM, Amicabile C. Endovascular treatment of internal iliac artery aneurysms. J Endovasc Surg. 1998;5:345–8.
5. Dix FP, Tixi M, Al-Khaffof H. The isolated internal iliac artery aneurysm—a review. Eur J Vasc Endovasc Surg. 2005;30:119–29.
6. Deb B, Benjamin M, Comerota AJ. Delayed rupture of an internal iliac artery aneurysm following proximal ligation for abdominal aortic aneurysm repair. Ann Vasc Surg. 1992;6:537–40.
7. Wolf F, Loewe C, Cejna M, Schroder M, Rand T, Kettenbach Dirisamer A, Lammer J, Funovics M. Endovascular management performed percutaneously of isolated iliac artery aneurysms. Eur J Radiol. 2008;65(3):491–7.
8. Hsu MY, Su TW, Su IH, Ko PJ, Chu SY. Management of type II endoleak from internal iliac artery immediately after endovascular aneurysm repair. Vasc Endovascular Surg. 2017;51(1):47–50.
9. Rogoff PA, Stock JR. Percutaneous transabdominal embolization of an iliac artery aneurysm. Am J Roentgenol. 1985;145(6):1258–60.
10. Gemmete JJ, Arabi M, Cwikiel WB. Percutaneous transosseous embolization of internal iliac artery aneurysm type II endoleak: report of two cases. Cardiovasc Intervent Radiol. 2011;34(Suppl 2):S122–5.
11. Magishi K, Izumi Y, Tanaka K, Shimizu N, Uchida D. Surgical access of gluteal artery to embolise a previously excluded, expanding internal iliac artery aneurysms. J Vasc Surg. 2007;45(2):387–90.
12. Parlani G, Simonte G, Fiorucci B, De Rango P, Isernia G, Fischer MJ, Rebonato A. Bilateral staged computed tomography guided gluteal artery puncture for internal iliac embolization in a patient with type II endoleak. Ann Vasc Surg. 2016;36:293.e5–10. https://doi.org/10.1016/j.avsg.2016.03.021 **(Epub 2016 Jul 15)**.