

Retrograde transarterial embolization of a persistent internal iliac artery aneurysm after prior plug embolization and EVAR in a 90-year-old patient

Nando Mertineit², Carlos Buitrago Tellez², Pascal Kissling³, Frank Mosler¹, Johannes Heverhagen¹, Gerd Nöldge¹

¹Department of Diagnostic, Interventional and Pediatric Radiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

²Institute of Medical Radiology, Bürgerspital Solothurn, Solothurn, Switzerland

³Vascular Center, Bürgerspital Solothurn, Solothurn, Switzerland

***Corresponding author: Nando Mertineit**

Received: 3 March 2024 · Published: 30 March 2024 · Volume 6 · Issue 1 · Article 12

Swiss Journal of Radiology and Nuclear Medicine · www.sjoranm.com · SJORANM GmbH · Rosenweg 3 · CH-6340 Baar · Switzerland

Abstract

Persistent perfusion of an internal iliac artery aneurysm after endovascular aortic repair can be difficult to treat when the usual antegrade route is no longer available. We report a 90-year-old patient with a 5.2 cm partially thrombosed right internal iliac artery aneurysm and substantial comorbidity. Previous embolization with three microvascular plugs followed by endovascular aortic repair had markedly reduced but not eliminated aneurysm perfusion. Follow-up CT angiography demonstrated retrograde filling through a hypertrophied obturator artery connected to the deep external pudendal artery. Under local anesthesia, the deep external pudendal artery was accessed antegradely from the right common femoral artery using a micropuncture set. A microcatheter was advanced retrogradely to the aneurysm; two branches were coiled and the aneurysm lumen and feeding vessels were embolized with Onyx 34. The patient was monitored for six hours and discharged on the same day. CT angiography four months later demonstrated complete aneurysm occlusion with preserved peripheral pelvic perfusion. This case illustrates a collateral-based retrograde access strategy for persistent aneurysm perfusion in a patient considered unsuitable for major open surgery.

Keywords: internal iliac artery aneurysm; embolization; EVAR; microvascular plug; Onyx; obturator artery; deep external pudendal artery

Introduction

Isolated internal iliac artery aneurysms are uncommon. Published reviews describe them as a small proportion of aortoiliac aneurysms and emphasize that rupture risk increases with aneurysm diameter [1,4,5]. A 2022 review reported a rupture risk of 6.3% for iliac artery aneurysms below 4 cm and noted a marked increase with larger diameters; it did not describe this figure as an annual rate [1]. Contemporary treatment is predominantly endovascular because early mortality is lower than after open repair, provided that the anatomy permits secure exclusion while pelvic perfusion is preserved whenever feasible [1,2].

Treatment options include exclusion with a covered stent or stent graft, embolization with coils or vascular plugs, and combined techniques. Persistent perfusion after prior embolization and EVAR may require a secondary route based on collateral anatomy. The present case demonstrates retrograde access through the deep external pudendal and obturator arterial pathway.

Case Presentation

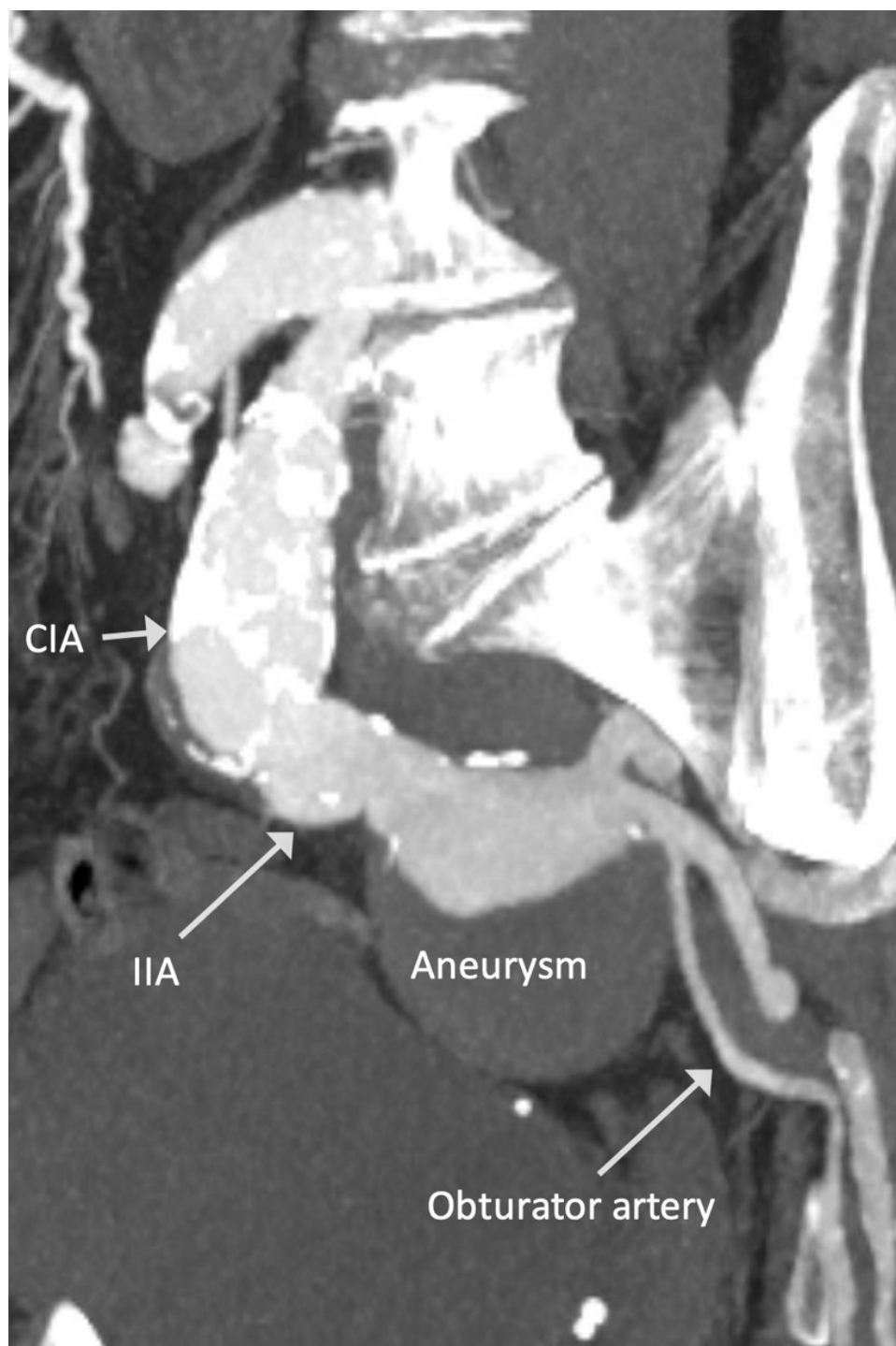
A 90-year-old patient had reduced general and nutritional status and multiple comorbidities, including arterial hypertension, dyslipidemia, previous three-level lower-limb venous thrombosis, opioid dependence, post-herpetic neuralgia at T4 on the right, previous left hemicolectomy, appendectomy and cholecystectomy, mild mitral valve prolapse, prostatic hyperplasia, longstanding right peripheral facial nerve palsy, and dilative arteriopathy with several prior endovascular procedures.

CT angiography demonstrated dilatation of the distal abdominal aorta and both common iliac arteries and a 5.2 cm partially thrombosed right internal iliac artery aneurysm with retrograde residual perfusion. The patient was considered unsuitable for major open surgical repair and general anesthesia because of age, comorbidity and clinical condition. The treatment plan was discussed interdisciplinarily. The patient

consented to the endovascular procedure and to publication of the case and images. The ethics review was positive.

Timeline

Stage	Event
Initial treatment	Selective embolization of branches arising from the right internal iliac artery aneurysm using three microvascular plugs.
Subsequent treatment	EVAR with coverage of the origin of the right internal iliac artery.
Early follow-up	CT angiography showed persistent retrograde perfusion through collateral vessels.
Secondary intervention	Retrograde transarterial access through the deep external pudendal and obturator arterial pathway; branch coiling and Onyx 34 embolization under local anesthesia.
Four-month follow-up	CT angiography demonstrated complete aneurysm occlusion and preserved peripheral pelvic perfusion.

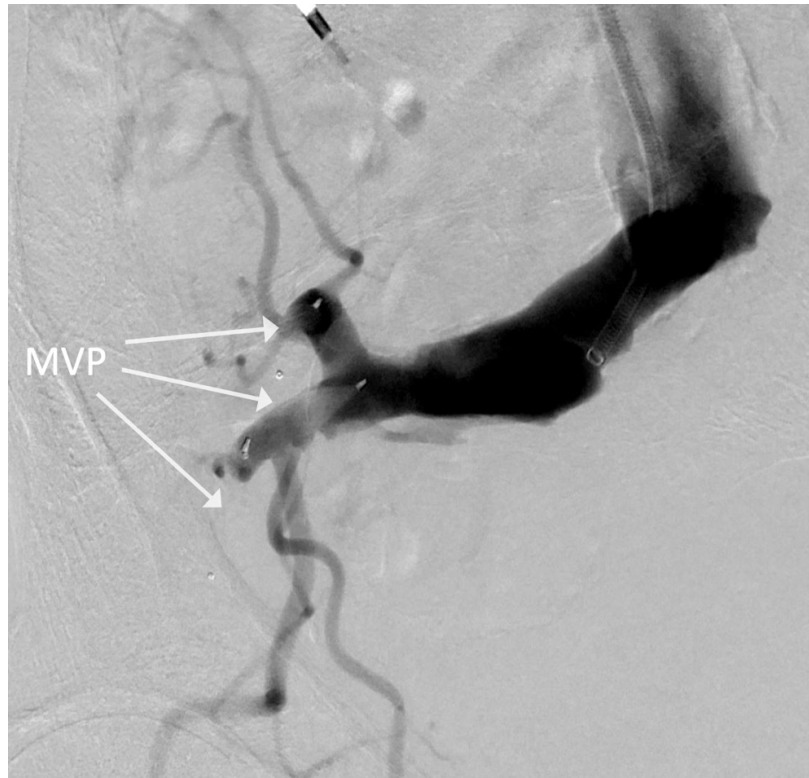


Img. 1: CT angiography (CTA) MIP, showing 52 mm right int. iliac artery aneurysm

Figure 1. CT angiography showing the right internal iliac artery aneurysm and its relationship to the iliac vessels and obturator artery.

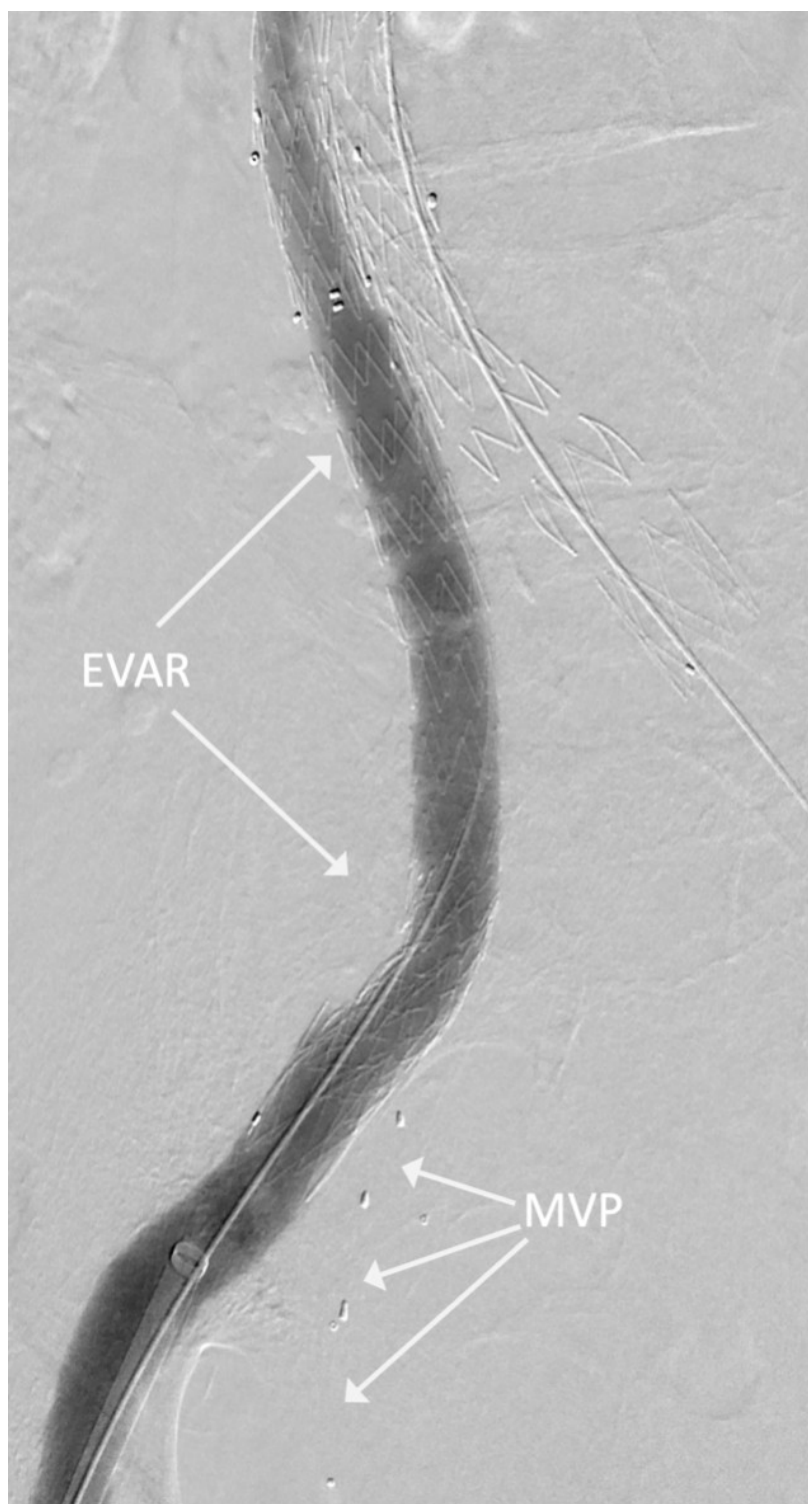
Initial Endovascular Treatment and Residual Perfusion

Selective embolization of branches arising from the aneurysm was initially performed by a crossover approach from the left using three microvascular plugs. Residual perfusion was substantially reduced but remained detectable. EVAR was subsequently performed, covering the origin of the right internal iliac artery. Follow-up CT angiography demonstrated persistent retrograde filling of the aneurysm. Direct percutaneous puncture would have required a long oblique transmuscular route and was considered unsuitable without complete immobilization.



Img 2: angiography during crossover distal All branch embolization using 3x MVP

Figure 2. Angiography during the initial crossover embolization with three microvascular plugs.



Img 3: angiography after IIA embolization and EVAR without perfusion of aneurysm

Figure 3. Angiography after internal iliac artery embolization and EVAR.

Collateral Pathway and Secondary Intervention

Comparison of pre- and post-EVAR CT angiography demonstrated enlargement of the right obturator artery and a connection to the common femoral artery through the deep external pudendal artery. Because the deep external pudendal artery arose distally, an antegrade femoral approach appeared feasible. After interdisciplinary review, the patient agreed to transarterial embolization under local anesthesia.

The right common femoral artery was punctured antegradely with a 21-gauge needle. The deep external pudendal artery was identified angiographically and probed with a 0.018-inch microwire. A 3 F micropuncture set was advanced into the vessel origin, and a 2.4 F ProGreat microcatheter (Terumo) was advanced retrogradely through the deep external pudendal and obturator arterial pathway to the previously

deployed plugs and the aneurysm. Angiography confirmed persistent filling between the plugs through collateral branches.

Two additional branches were embolized with coils to reduce flow. Onyx 34 (Medtronic) was then injected into the aneurysm lumen and the supplying channels. Mild transient pelvic discomfort occurred during embolization; no major periprocedural complication was documented. Completion angiography demonstrated exclusion of the aneurysm while peripheral right internal iliac perfusion was maintained. Hemostasis was achieved by manual compression and a four-hour pressure dressing. After six hours of monitoring, the patient was discharged on the same day.



Img 4: CTA MIP, showing persistent perfusion of the aneurysm despite distal MVPs

Figure 4. CT angiographic maximum-intensity projection showing persistent aneurysm perfusion despite distal plug embolization.

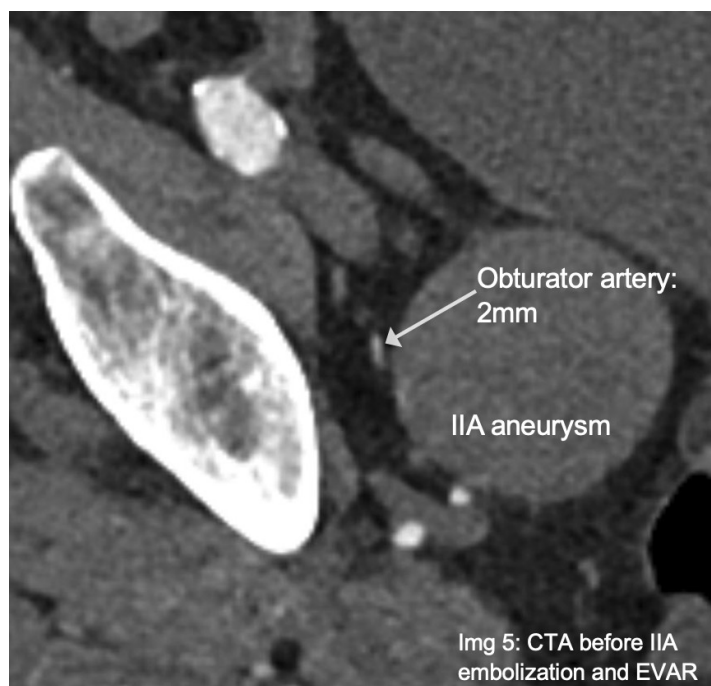


Figure 5. Right obturator artery before the initial embolization and EVAR.

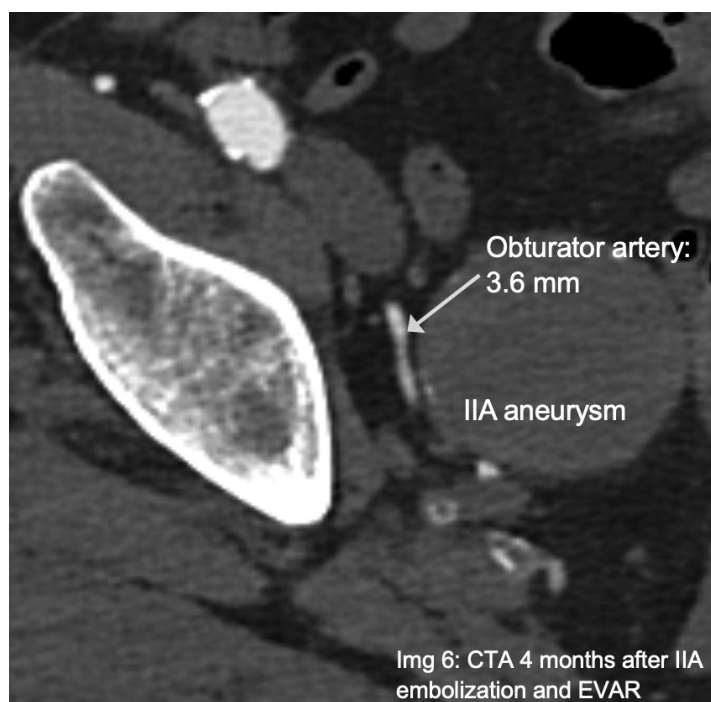


Figure 6. Follow-up angiographic image demonstrating interval enlargement of the right obturator artery and the collateral pathway.

Outcome and Follow-up

CT angiography four months after the secondary intervention demonstrated complete occlusion of the aneurysm and no documented major clinical complication. The available follow-up was limited to this four-month assessment; longer-term durability cannot be inferred from this report.

Discussion

Internal iliac artery aneurysms are rare and may present late. The cited literature supports endovascular treatment as the preferred approach for many elective and emergency cases because early mortality is lower than after open surgery [1,2]. In the systematic review by Perini et al., estimated 30-day mortality was 8.2% after open repair and 2.8% after endovascular repair; these pooled estimates arose from non-randomized studies and should not be interpreted as direct patient-specific predictions [2].

Pelvic ischemic symptoms remain an important consideration. Kang et al. reported no buttock claudication in 83 of 139 patients and mild symptoms in 51; no critical pelvic ischemic complications were observed in that cohort [3]. In the present case, the goal was therefore not only aneurysm exclusion but also preservation of peripheral pelvic perfusion.

The main technical lesson is that collateral enlargement after exclusion of the normal antegrade route can provide an alternative access path. Careful review of static CT angiography identified the deep external pudendal-obturator connection and permitted a low-profile retrograde approach under local anesthesia. The successful four-month imaging result supports the feasibility of this strategy in a selected high-risk patient, but a single case cannot establish comparative effectiveness or long-term safety.

Patient Perspective

The patient expressed a very positive view of the treatment and was grateful that the aneurysm could be managed without a major open abdominal operation.

Learning Points

Persistent aneurysm perfusion after plug embolization and EVAR requires systematic review of collateral pathways.

Hypertrophy of the obturator and deep external pudendal arteries may provide a retrograde transarterial route when antegrade access is occluded.

A low-profile micropuncture and microcatheter approach can permit treatment under local anesthesia in a carefully selected high-risk patient.

Technical success should be reported separately from clinical outcome and with the actual duration of imaging follow-up.

Limitations

This is a single-patient report with four months of imaging follow-up. It cannot determine comparative efficacy, durability or complication rates. Device sizes and some peri-interventional clinical data were not available in the public source. The report therefore describes feasibility in one selected patient and does not establish a general treatment recommendation.

Declarations

Patient consent: The patient provided informed consent for the procedure and for publication of the case and images.

Ethics statement: The case received a positive ethics assessment.

Conflict of interest: The authors declared no conflicts of interest.

Funding: No external funding was reported.

References

1. Scheurig-Münkler C, Zerwes S. Isolated iliac artery aneurysm: clinical background and interventional treatment strategies. *Radiologie (Heidelb)*. 2022;62(7):607-613. <https://doi.org/10.1007/s00117-022-01002-w>
2. Perini P, Mariani E, Fanelli M, et al. Surgical and endovascular management of isolated internal iliac artery aneurysms: a systematic review and meta-analysis. *Vasc Endovascular Surg*. 2021;55(3):254-264. <https://doi.org/10.1177/1538574420981812>
3. Kang J, Chung BH, Hyun DH, Park YJ, Kim DI. Clinical outcomes after internal iliac artery embolization prior to endovascular aortic aneurysm repair. *Int Angiol*. 2020;39(4):323-329. <https://doi.org/10.23736/S0392-9590.20.04328-X>
4. Dix FP, Titi M, Al-Khaffaf H. The isolated internal iliac artery aneurysm: a review. *Eur J Vasc Endovasc Surg*. 2005;30(2):119-129. <https://doi.org/10.1016/j.ejvs.2005.04.035>
5. Parry DJ, Kessel D, Scott DJA. Simplifying the internal iliac artery aneurysm. *Ann R Coll Surg Engl*. 2001;83(5):302-308. <https://pubmed.ncbi.nlm.nih.gov/11806552/>