# Internal iliac artery aneurysm in a patient with proximal occlusion at its origin

Sahaj S. Shah, BA,[a] Gayatri S. Pillai, BS,[a] Matthew Major, MD,[b] Gregory G. Salzler, MD,[b] Evan J. Ryer, MD,[b] James R. Elmore, MD,[b] *and* Jeremy L. Irvan, MD,[b] *Scranton and Danville, PA*

## ABSTRACT

We present the case of an 87-year-old man with a ruptured right internal iliac artery aneurysm with hemoperitoneum. The right internal iliac artery aneurysm appeared to fill from the retrograde profunda femoris artery in the setting of a previously repaired abdominal aortic aneurysm with aorta-bi-iliac bypass with ligation of the bilateral internal iliac arteries. Abdominal computed tomography revealed an aneurysm of the right internal iliac artery measuring 8.9 cm, with filling through the collateral vessels. Open repair was performed, leading to complete exclusion of the aneurysm with no perioperative complications. (J Vasc Surg Cases Innov Tech 2023;9:101229.)

**Keywords:** Internal iliac aneurysm; Proximal occlusion; Ruptured aneurysm

An internal iliac artery aneurysm (IIAA) is a rare occurrence, with an estimated incidence of 0.03% to 0.4% in the population.[1,2] A bilateral presentation of IIAAs is even more uncommon, comprising 10.9% of cases.[3] Most IIAAs occur due to atherosclerotic degeneration of the aneurysmal wall, pressurized by the antegrade filling pressure from the common iliac artery. We present the case of an 87-year-old man with a ruptured right IIAA with a history of aorta-bi-iliac bypass and bilateral ligation of the internal iliac arteries performed 10 years previously. On further investigation, the aneurysmal sac was noted to be filling from the pelvic and gluteal collateral vessels instead of the common iliac artery. We performed an open repair to exclude the aneurysm and achieve hemostatic control. The patient provided written informed consent for the report of his case details and imaging studies.

## CASE REPORT

An 87-year-old man with a history of an open, aorta to bilateral external iliac bypass performed in 2010 to repair an abdominal aortic aneurysm (AAA) presented with acute lower abdominal pain, nausea, and vomiting as a transfer from an outside hospital. A computed tomography (CT) scan with intravenous contrast showed a ruptured right IIAA with blood in the peritoneal cavity. The patient has a history of hypertension, myocardial infarction, coronary artery disease, and smoking. The laboratory test results were remarkable for mild hyponatremia at 130 mEq/L, acute kidney injury with an elevated creatinine level of 1.4 mg/dL, and a significantly elevated lactate level of 6 mmol/L. The patient's hemoglobin level and hematocrit were 10.3 g/dL and 30.7%, respectively. The CT scan revealed an aneurysm of the right internal iliac artery measuring 8.0 cm × 8.6 cm × 8.9 cm and filling through retrograde flow (Fig 1). A circumferential enhancing thrombus with a discontinuous wall on the medial aspect associated with moderate pelvic hematoma was observed, consistent with a ruptured aneurysm. He also had a thrombosed aneurysm in the proximal left internal iliac artery measuring 6.6 × 7.2 × 10.1 cm that was intact. The distal left external iliac and internal iliac arteries are reconstituted through collateral vessels. Despite occlusion of the right common iliac and proximal internal iliac arteries, the aneurysm sac was supplied through pelvic and gluteal collateral vessels originating from the right profunda femoris artery. The patient underwent open repair of the ruptured right IIAA because the endovascular options were limited owing to occlusive disease. After the induction of general anesthesia, the right internal iliac artery was appropriately exposed via a midline laparotomy. The right colon was mobilized to the hepatic flexure and rotated medially. The remainder of the right common iliac artery and aortic graft were dissected and controlled with vessel loops. The iliac limb of the graft was clamped to limit back bleeding through the deep femoral artery. The small intestine was reflected cephalad, and the right ureter was identified (it was dilated due to compression by the aneurysm). A large pelvic hematoma was noted, and the entire pelvis was occupied by the bilateral large IIAAs. Thus, an expeditious method to achieve distal control did not exist. Therefore, we chose to open the IIAA and gain internal control of the anterior and posterior divisions. The aneurysm was incised, and all debris was removed from within the

From the Geisinger Commonwealth School of Medicine, Scranton[a]; and the Department of Endovascular and Vascular Surgery, Geisinger Medical Center, Danville.[b]

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Correspondence: Sahaj S. Shah, BA, Geisinger Commonwealth School of Medicine, 525 Pine St, Scranton, PA 18510 (e-mail: Sshah08@som.geisinger.edu).

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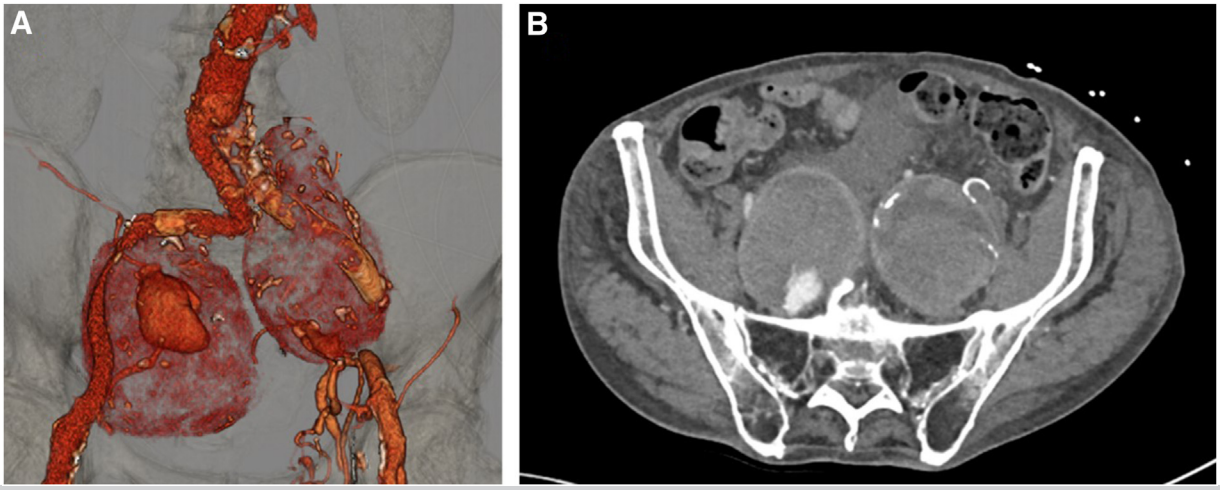


**Fig 1.** Preoperative computed tomography (CT). Reconstructed three-dimensional (**A**) and axial (**B**) images showing bilateral internal iliac artery aneurysms (IIAAs) with occlusion of the left common iliac, proximal external iliac, and proximal internal iliac arteries.

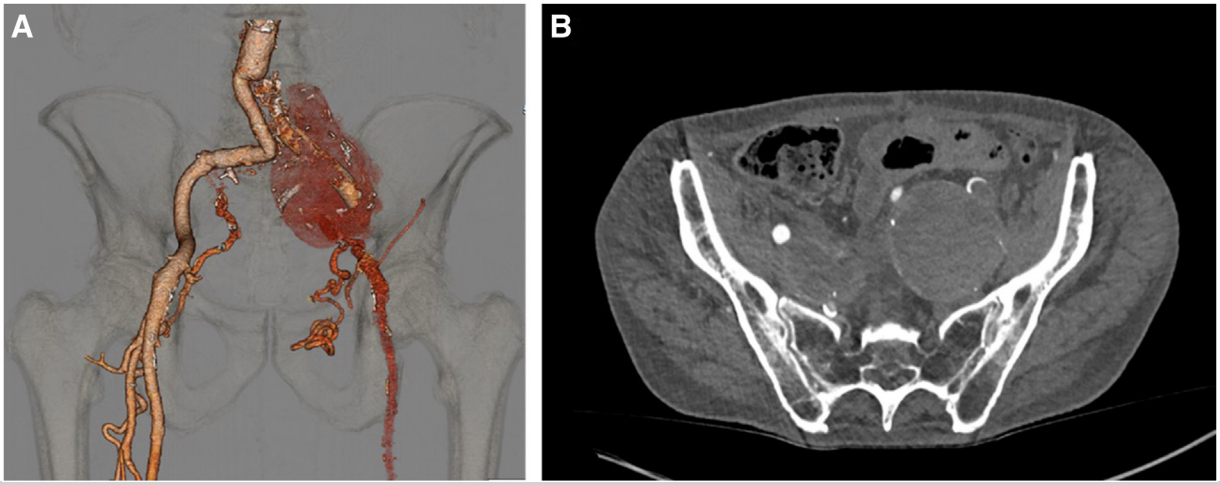


**Fig 2.** Postoperative computed tomography (CT). **A,** Reconstructed three-dimensional image. **B,** Axial image. After right internal iliac artery aneurysm (IIAA) repair, left internal iliac artery aneurysmal dilation measured 6.9 × 6.1 cm.

aneurysm sac. Proximal ligation of the right internal iliac artery was not necessary owing to the occlusion at the origin.

The posterior division of the internal iliac artery was identified as the source of perfusion supplying the IIAA, and this was oversewn from within the aneurysm sac to exclude the aneurysm from the circulation. Once the IIAA was opened, a Pruitt occlusion catheter (LeMaitre) was placed into the orifice of the posterior bifurcation of the anterior and posterior division of the internal iliac artery. This controlled the inflow to the IIAA. The origin was oversewn, and hemorrhage was controlled. Other options to control the inflow to this aneurysm, should the artery not be amenable to suture ligation, were also considered. These included further dissection of the anterior and posterior divisions and ligating them individually, coil embolization of the anterior and posterior divisions from the open exposure to their origin, and using a femoral cutdown to identify to the internal iliac artery to the deep femoral collateral vessel and ligating it to terminate the inflow to the aneurysm. Repeat inspection of the IIAA sac revealed adequate hemostasis. The aneurysm sac was partially resected and oversewn. The total estimated blood loss during the surgery was 3800 mL. An estimated 3000 mL of blood was in the abdomen at laparotomy. A cell saver was used, and 995 mL was returned to the patient. The surgery lasted for 2 hours and 20 minutes. Despite a brief period of hypotension during repair of the aneurysm, the patient progressed as expected and was discharged home on postoperative day 12. The 1-month follow-up CT angiogram still showed complete exclusion of the aneurysm with the occluded right internal iliac artery (Fig 2). The aneurysmal dilatation of the left internal iliac artery was stable and did not change significantly.

## DISCUSSION

IIAAs are infrequent and often coexist with other aortoiliac aneurysms.[4] With an etiology similar to that of AAAs, IIAAs present most often in men with a median age at diagnosis of 71.9 years.[5] Although most are asymptomatic, IIAAs carry a significant risk when they rupture owing to their deep location within the pelvis, with a mortality rate of 50% to 75%.[4] Thus, IIAAs >4 cm should undergo elective repair to avoid complications.[6] Several studies reported over the years have confirmed the rarity of IIAAs and the difficulty in capturing their natural history.[7-12] Two other case studies describe IIAAs with an occluded proximal origin. Kabutey et al[13] described a 63-year-old woman with bilateral IIAAs and proximal internal iliac artery occlusion, with retrograde filling of the IIAAs from the outflow pelvic branches. Deb et al[14] described a case of a patient presenting with rupture of an IIAA following proximal ligation after AAA repair 3 years earlier. In our patient, retrograde filling of the aneurysm sac from the collateral branches of the pelvic and gluteal region originating from the profunda femoris artery likely contributed to the growth of the aneurysm until its rupture. Although endovascular occlusion using microcatheters would have been very difficult because of the left iliac occlusion in our patient, it should be considered a feasible option in most IIAA cases. Furthermore, proximal exclusion of the IIAA should be avoided whenever possible. Even when open repair is chosen, preoperative embolization of the outflow vessels with coils or an Amplatzer plug (Abbott Vascular) should be considered. Follow-up imaging studies of patients even after open repair are indicated to exclude expansion of a type II endoleak. In our practice, patients undergo imaging studies after open repair with ultrasound at 3 months and repeat CT angiography at 3 years. Subsequent imaging studies can ensue after the 3-month ultrasound, if warranted by the findings. Consideration was given to repair of the contralateral IIAA. Although the left IIAA had not ruptured, it was of a size to be treated surgically. Because the patient was hypotensive, tachycardic, acidotic, and coagulopathic after the right IIAA repair, we decided not to proceed with repair of the left IIAA. Any further surgery seemed to carry more risk than benefit. The patient was offered the option to intervene on the contralateral IIAA aneurysm at his 6-month follow-up visit. He refused any further surgery or surveillance. The patient was also offered native arterial duplex ultrasound studies to search for aneurysms elsewhere (ie, femoral or popliteal), which the patient also declined.

## CONCLUSIONS

We present a case in which a patient presents with progressive growth of bilateral IIAAs, leading to rupture of the right IIAA, despite surgical ligation of the origin of the internal iliac artery at aorta-bi-iliac bypass, 13 years earlier. The IIAA sac was filled from the pelvic and gluteal collateral vessels originating from the profunda femoris artery, which supplied enough pressure to allow for subsequent aneurysmal degeneration. Open repair was successfully performed, and the patient recovered without incident. This case report highlights the importance of consideration of definitive management of IIAAs at open surgical repair of AAAs and the importance of ongoing surveillance of small iliac artery aneurysms after repair of AAAs. Further studies are needed to determine the true epidemiology and outcomes of isolated IIAAs.

## REFERENCES

1. Brunkwall J, Hauksson H, Bengtsson H, Bergqvist D, Takolander R, Bergentz SE. Solitary aneurysms of the iliac arterial system: an estimate of their frequency of occurrence. J Vasc Surg 1989;10:381-4.
2. Lucke B. Studies on aneurysm: I. General statistical data on aneurysm. JAMA 1921;77:935-40.
3. Wilhelm BJ, Sakharpe A, Ibrahim G, Baccaro LM, Fisher J. The 100-year evolution of the isolated internal iliac artery aneurysm. Ann Vasc Surg 2014;28:1070-7.
4. Krupski WC, Selzman CH, Floridia R, Strecker PK, Nehler MR, Whitehill TA. Contemporary management of isolated iliac aneurysms. J Vasc Surg 1998;28:1-3.
5. Dix FP, Titi M, Al-Khaffaf H. The isolated internal iliac artery aneurysm—a review. Eur J Vasc Endovasc Surg 2005;30:119-29.
6. Laine MT, Björck M, Beiles CB, et al. Few internal iliac artery aneurysms rupture under 4 cm. J Vasc Surg 2017;65:76-81.
7. McCready RA, Pairolero PC, Gilmore JC, Kazmier FJ, Cherry KJ, Hollier LH. Isolated iliac artery aneurysms. Surgery 1983;93:688-93.
8. Markowitz AM, Norman JC. Aneurysms of the iliac artery. Ann Surg 1961;154:777.
9. Rispoli P, Raso AM, Varetto G, Moniaci D. Aneurysms of the hypogastric artery following surgery of the abdominal aorta: a report of 2 cases and review of the literature. J Cardiovasc Surg 2003;44:647.
10. Kasulke RJ, Clifford A, Nichols WK, Silver D. Isolated atherosclerotic aneurysms of the internal iliac arteries: report of two cases and review of the literature. Arch Surg 1982;117:73-7.
11. Manaster BJ, Greenborg M, Rubin JM. Isolated internal iliac artery aneurysms. J Comput Assist Tomogr 1982;6:842-4.
12. Parry DJ, Kessel D, Scott DJ. Simplifying the internal iliac artery aneurysm. Ann R Coll Surg Engl 2001;83:302.
13. Kabutey NK, Siracuse JJ, Gill H, Kundi R, Meltzer AJ, Schneider DB. Percutaneous transgluteal coil embolization of bilateral internal iliac artery aneurysms via direct superior gluteal artery access. J Vasc Surg 2014;60:226-9.
14. 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.

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