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Giant internal iliac artery aneurysm successfully treated with endovascular stent-graft placement

--Manuscript Draft--

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An 88-year-old male high surgical risk patient was presented with left sciatic pain symptoms and a palpable pulsatile left lower abdominal mass. He was operated 8 years ago for a large infrarenal aortic aneurysm. Computed tomography angiography (CTA) revealed a giant 16.1 cm left internal iliac aneurysm with multi-locular appearance and left sacral bone erosion causing the symptoms. Endovascular repair was successfully performed using a mono-tubular iliac stent-graft. Follow-up CTA showed absence of contrast enhancement and a fully thrombosed sac. Patient recovered fully after one month and was discharged in a relative good condition, nevertheless sciatic symptoms remained.

Keywords:

Internal iliac artery – Aneurysm – Endovascular repair – Stent grafts - Interventional radiology

Introduction

Internal iliac artery aneurysms (IIAA) are relative rare and should be treated over a size of 3-4 cm [1-5]. They usually remain asymptomatic until rupture [2, 3]. If they get symptomatic, they can be presented with flank pain or with symptoms caused by pressure or erosion of adjacent anatomic structures [2, 3, 6]. Median size of isolated IIAA at discovery time is reported 7.7 cm, with a 33% incidence of rupture [7]. Symptomatic IIAA and patients with aneurysmal size >5 cm should be expeditiously repaired [8, 9]. Multi-detector thin slice computed tomography angiography (CTA) delineates vascular anatomy, relations to other adjacent structures and is essential for pretreatment planning [2, 3]. Over the last decade, interventional techniques established alternatives to open elective surgery particularly for elderly patients with multiple co-morbidities, in order to exclude the aneurysmal sac from arterial circulation [9]. Emerging endovascular techniques show promising results in the management of IIAA.

Case Report

An 88-year-old male patient with a history of pulmonary hypertension, respiratory and cardiac insufficiency, was presented with symptoms of left sciatic pain of the lower limb and a palpable and pulsatile left lower abdominal mass. Patient was successfully operated 8 years ago for a large infrarenal abdominal aortic aneurysm. At that time, CTA showed a small left internal iliac aneurysm of 16 mm diameter (Fig. 1). New CTA revealed a giant left internal iliac aneurysm, starting about 1 cm after arterial origin, embracing ipsilateral external iliac artery, which showed a significant stenosis in the first centimeter (Figure 2a). The aneurysm had a multi-locular appearance (Figure 2b) and a maximum size of 16.1X11.7 cm with relative small amount of thrombus (Figure 2c). In its posterior portion, erosion of the left sacral bone was revealed, probably due to chronic pressure and so causing the sciatic symptoms (Figure 2d). The right side iliac arteries were normal.

Due to patient's high surgical risk condition, endovascular repair was decided under left groin local anesthetic infiltration for surgical preparation of the left common femoral artery. After catheterization through the ipsilateral external iliac stenosis, digital subtraction angiography confirmed CTA's findings and revealed a relative slow contrast filling of the aneurysmal sac through the short internal iliac neck (Figure 3a). An iliac stent-graft of 7 cm length, proximal width of 16 mm and distal of 10 mm was inserted and successfully deployed. Small type Ia endoleak from the common iliac was seen despite multiple balloon dilatations (Figure 3b). Post-operative recovery was complicated by left groin bleeding due to prolonged bleeding-parameters. A follow-up CTA sixteen days later was ordered due to the haematocrit drop of about 10 units but no intra-abdominal collections were found. Regarding the aneurysm, absence of contrast enhancement in a fully thrombosed sac was seen (Figure 3c). Groin bleeding stopped one week later, without further consequences. Patient got blood transfusion of 3 units and recovered fully after one month when he was discharged in a relative good condition, nevertheless sciatic symptoms remained.

Discussion

Iliac artery aneurysms, mostly of the common iliac, have an estimated incidence of just 2% of all abdominal aneurysmal disease [2, 4, 8, 9]. Isolated internal iliac artery aneurysm (IIAA) is defined as a twofold diameter increase without co-existing aneurysm at another location and can be characterized as an unusual variant of aorto-iliac aneurysm disease, representing only 0.3% of all aorto-iliac aneurysms and a general population prevalence of 0.03% based on large autopsy series [1-4, 6]. Most of the IIAAs are diagnosed in association with other intra-abdominal aneurysms [8]. Institutional data reveal that IIAAs are present in 10.2% of patients with aorto-iliac aneurysms [1]. Most common etiologic factor for developing IIAA is a degenerative process of the vascular wall mainly associated with arteriosclerosis, while other conditions, such as infection, trauma, connective tissue- and arterial wall disorders, and rarely traumatic childbirth, high forceps deliveries or Caesarian section have been implicated in the pathogenesis [2, 3, 6, 8, 9].

Patients with IIAA are usually elderly males occurring in the seventh to eight decade of life (mean age 75.1±7 years) with a male to female ratio 6:1 [1-3]. The vast majority of patients remain asymptomatic until rupture symptoms occur. Because most of the symptoms are not directly related to the vascular system, diagnosis of IIAA is often delayed. Due to rare occurrence and depth within the pelvis, IIAA elusive physical examination and are usually incidentally discovered during abdominal imaging examinations or at the time of rupture [2, 3, 8]. Many authors describe that IIAAs can be clinically manifested as a tender, palpable, pulsatile mass in the hypogastrium or the iliac fossa, ascertained by rectal or vaginal examination [2, 3, 6, 8]. Less frequently, patients are presented with flank pain, local pressure symptoms or by complains caused by erosion of adjacent anatomic structures [2, 3, 8]. Complains include abdominal discomfort (constipation, tenesmus, rectal bleeding), urinary symptoms (hydronephrosis, pyelonephritis, renal failure, hematuria), neurological symptoms, groin-, hip- or buttock pain, deep vein thrombosis and even pulmonary embolism [2, 3, 6]. Neurologic signs are usually present secondary to compression of the pelvic and lumbosacral nerve roots due to IIAA location within pelvis, like in our case, where left sciatic pain caused by deep ipsilateral sacral bone erosion was patient's main symptom.

Untreated IIAAs continue expansion, with an average rate of aneurysm growth up to 4 mm/year [1]. In our case, IIAA expanded from 16 mm in year 2009 up to 16 cm eight years later. This is an impressive growth rate of about 18.1 mm/year. According to a study by Dix et al, the median size of isolated IIAA at diagnosis was 7.7 cm (range 2-13 cm), and death was significantly associated with rupture [3]. It seems that an association between rupture risk and IIAA size is not yet found, but obviously increasing size is associated with higher rupture risk like in patients with aorto-iliac aneurysms [3, 6]. There is also no documented relation between aneurysm rupture and patient's age [3].

Symptomatic IIAAs and patients with an aneurysmal size >5 cm should be expeditiously repaired [8]. There are several studies suggesting elective repair for a threshold size of 3-4 cm in asymptomatic patients [1, 3, 4]. For asymptomatic patients with IIAAs of 3-3.5 cm in size, a serial follow up with CTA or B-mode ultrasound at 6 months intervals can be advised, since the smallest reported ruptured IIAA was 3 cm [8-10]. Laine et al, suggest that a 4 cm threshold for elective treatment might be quite safe, due to low incidence of rupture in IIAA <4 cm [5]. So, probably above this size, also asymptomatic aneurysms should be treated in order to prevent rupture.

Conservative management is associated with continued expansion of the aneurysm and much higher operative mortality rate if emergency rupture occurs (33-50%) compared to elective treatment (7-11%), due to uncontrolled massive bleeding and intra-operative management difficulties [1, 3, 9]. Open surgical procedure is challenging because these aneurysms extend deep into the pelvis, thus carrying high risk of complications and should be therefore reserved for candidates who are unfit for interventional treatment [1]. Treatment selection should take into consideration the aneurysm size, involvement of other aortic segments, presence of bilateral/unilateral aneurysmal disease, compression symptoms as well as patency of IIA branches. Open surgical techniques involve proximal ± distal aneurysm ligation, entire aneurysm resection with outflow revascularization and proximal ligation with endo-aneurysmorrhaphy [2, 3, 11]. Surgical excision of the entire aneurysm is a hazardous procedure with high mortality rate due to increased hemorrhage risk or damage to nearby structures [2, 3].

Over the last decade, interventional techniques became established alternatives to open elective surgery, particularly for elderly patients with multiple co-morbidities [9, 11]. Endovascular treatment is a minimal invasive option associated with lower morbidity, less blood loss and shorter hospital stay compared to traditional open surgery [8, 9, 11]. It is important that treatment preserves pelvic blood flow, in order to prevent ischemic complications. Bilateral involvement of IIA is challenging because exclusion of both IIAs carries higher risk of serious ischemic complications [1]. There are several endovascular technique options depending on patient's vascular anatomy. IIAAs with compressive symptoms should be treated with open surgery because endovascular approach cannot lead to immediate decompression [2]. In our case we chose to perform endovascular repair without sacral decompression due to patient's co-morbidities and increased rupture risk.

There are no specific absolute contraindications to interventional treatment beside those related to percutaneous interventions in general, like bleeding diathesis, severe coagulopathy, and groin sepsis [9]. The key objective of interventional treatment, as with surgery, is to exclude the aneurysmal sac from the arterial circulation. Most of these interventional techniques are done by means of metallic coil embolization, placement of endovascular plugs, stent graft coverage, glue/lipiodol, and human thrombin [3, 9]. According to a study performed by Uberoi et al, the reported technical success rate for elective interventional repair of asymptomatic IIAA approaches 100%, with an overall 0-5.5% mortality rate and peri-operative and delayed complication rate of up to 20% [9]. Re-intervention for endoleak or graft occlusion has been reported and performed as late as 5 years after the initial repair [9].

Usually, endovascular treatment includes a combination of coil embolization and stenting. These procedures may be performed staged or simultaneously. Several iliac stent-grafts are available either in form of balloon expandable or self expanding stent-grafts [9]. Self-expanding devices are favored because they conform better to the tortuous anatomy and allow potential future expansion [9]. When endovascular iliac artery repair is preferred, IIAA and IIA branches can be initially embolized by coils in case a sufficient orifice of >15 mm length in the proximal IIAA is found. If the arterial orifice is shorter or absent, proximal side can be supported by a stent-graft with extension into the external iliac, while the IIA branches are

embolized [2, 6]. However in cases of bilateral IIAAs, if proximal orifices are <15mm on both sides, open surgery is recommended to preserve at least one IIA [6]. Many authors recommend that placement of embolic agents should be as proximal as possible to maintain patency of more distal IIA branches as well as to prevent interference with pelvic collateral circulation [3]. However risk of distal embolization should be avoided by using soft tipped wires and catheters and few manipulations. Potential embolization complications include buttock claudication (12-55%) and erectile dysfunction (1-13%) [3]. In our case, a short neck of 10 mm did not allow coil placement. Also coiling of deep IIAA branches was considered as hazardous and very time consuming and perhaps increasing the rupture risk.

In conclusion, interventional elective IIAA repair has been shown to be safe and effective with good mid-term results. To our best knowledge this is the largest non-ruptured IIAA ever reported and which could be successfully managed by endovascular means.

Conflict of interest Disclosure:

All Authors declare that they have no conflicts of interest.

Consent, for the publication of this case report and any additional related information was taken from the patient/next of kin involved in the study.

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Legends

Figure 1. Abdominal CTA 8 years ago, shows a small left internal iliac aneurysm of 16 mm diameter.

Figure 2a. New abdominal CTA reveals a giant left internal iliac aneurysm, starting about 1 cm after arterial origin embracing ipsilateral external iliac artery, which has a significant stenosis in the first centimeter.

Figure 2b. The aneurysm has a multi-locular appearance .

Figure 2c. Aneurysm has a maximum size of 16.1X11.7 cm with relative small amount of thrombus.

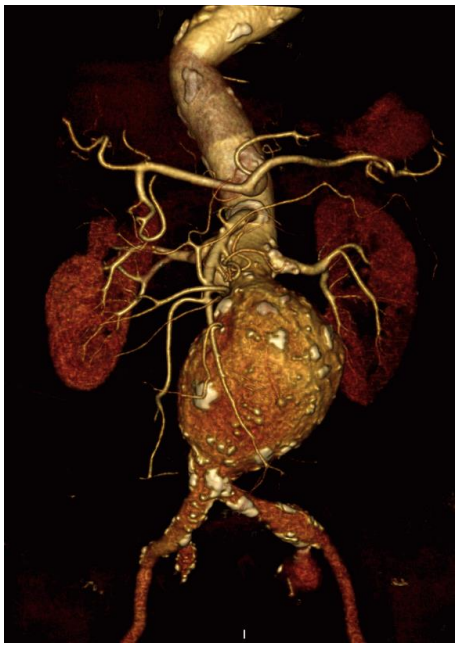
Figure 2d. There is erosion of the left sacral bone due to chronic pressure, so causing the sciatic symptoms.

Figure 3a. Digital subtraction angiography reveals slow contrast filling of the aneurysmal sac through a short internal iliac neck.

Figure 3b. An iliac stent-graft of 7 cm length, proximal width of 16 mm and distal of 10 mm is inserted and successfully deployed. Small endoleak from the common iliac is seen.

Figure 3c. Post-repair CTA shows absence of contrast enhancement in a fully thrombosed sac.

Figures



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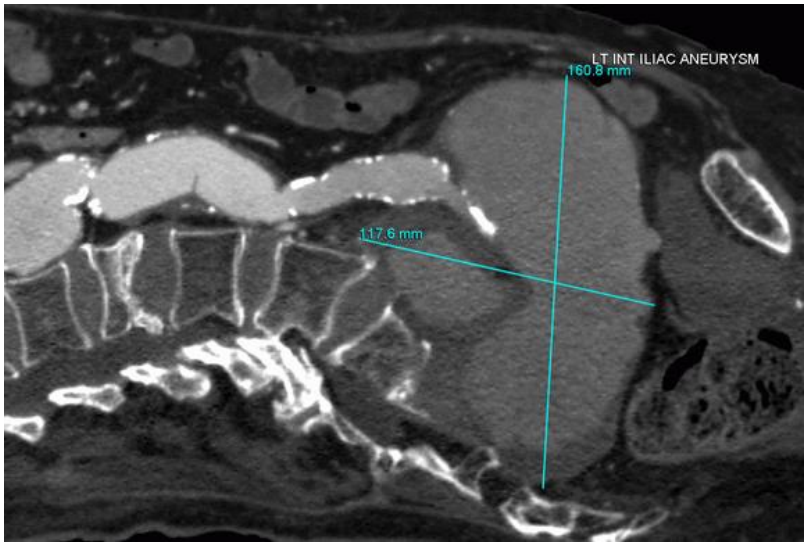

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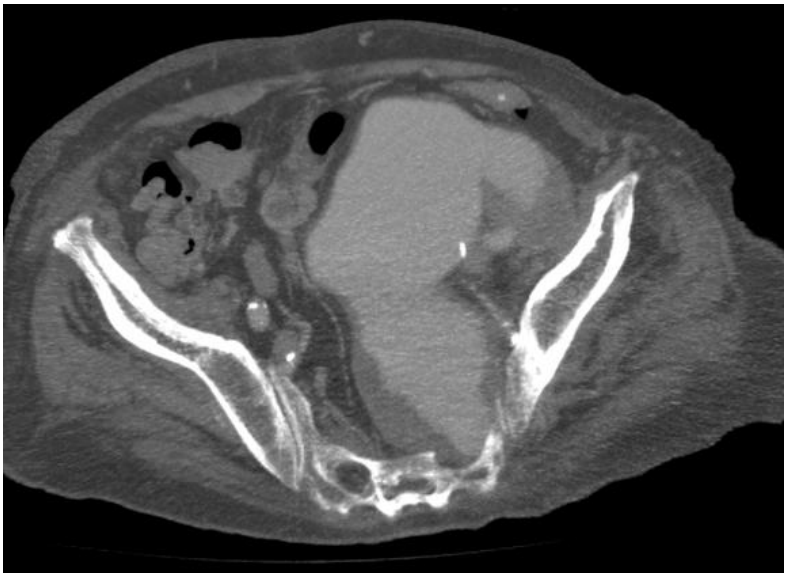

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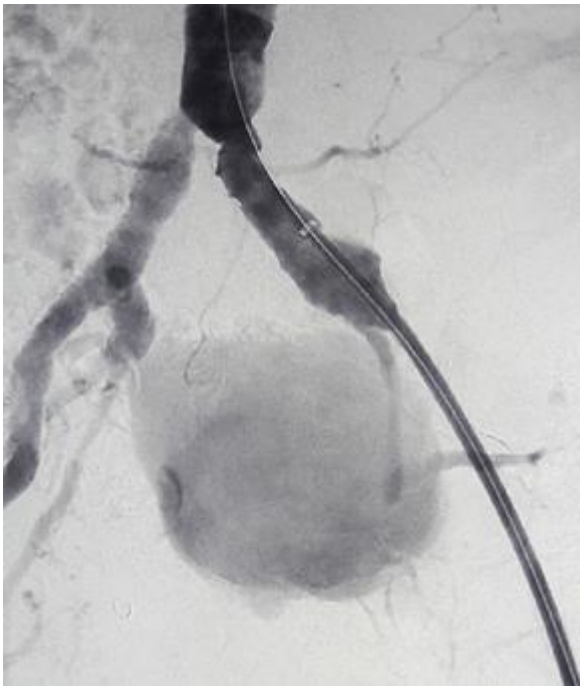

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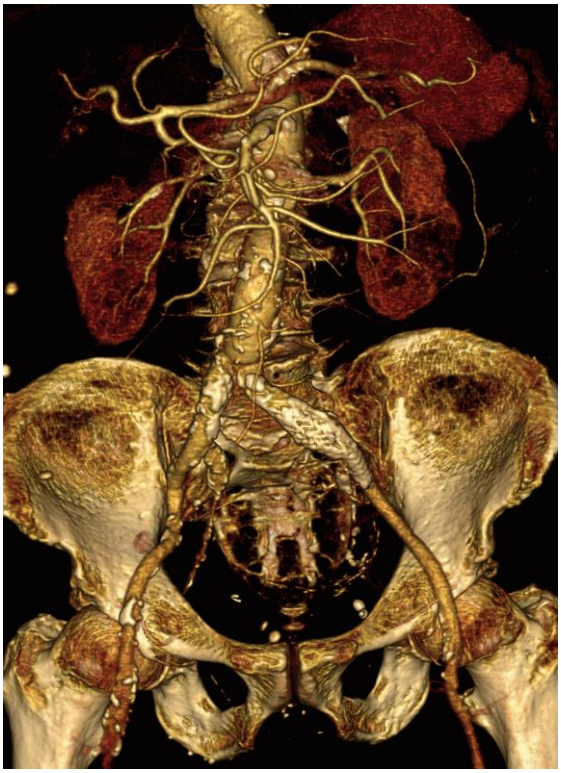

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