



SUCCESSFUL URGENT ENDOVASCULAR TREATMENT OF IATROGENIC POST-ANGIOPLASTY RUPTURE OF COMMON AND EXTERNAL ILIAC ARTERY WITH MULTIPLE STENT GRAFTS

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ABSTRACT – Iatrogenic injury of the peripheral arteries is becoming more common as the number of endovascular interventions grows. Percutaneous angioplasty of the iliac artery may cause a variety of problems, including arterial rupture, which can be fatal. We report a patient with simultaneous iatrogenic rupture of the right common and external iliac arteries during percutaneous transluminal angioplasty resulting in a life-threatening retroperitoneal haemorrhage that was treated successfully with the use of three balloon expandable stent grafts to seal the rupture.

Key words: *iliac artery, rupture, angioplasty, stent graft*

Introduction

Iatrogenic injury of the peripheral arteries is becoming more common as the number of endovascular interventions grows¹. Rupture, perforation, pseudoaneurysm, and arteriovenous fistula are the most common lesions in the iliac vascular bed^{2,3}. Percutaneous angioplasty of the iliac artery may cause a variety of problems, including arterial rupture, which can be fatal. Many post angioplasty iliac artery ruptures go unreported and their frequency and severity are underestimated⁴. We report a patient with simultaneous iatrogenic rupture of the right common and external

iliac arteries during percutaneous transluminal angioplasty resulting in a life-threatening retroperitoneal haemorrhage. Three balloons expandable BeGraft stent grafts were used to successfully seal the rupture.

Case report

A 67-year-old male patient with multiple comorbidities was admitted in our institution for elective percutaneous transluminal angioplasty (PTA) of the highly calcified stenoses of the right common iliac artery (CIA) and external iliac artery (EIA). Pre-procedural MSCT angiography showed significant “coral reef” type focal stenosis (> 80%) of the distal CIA and proximal EIA (Fig 1). The patient’s walking distance was reduced to less than 100 meters, with the occurrence of intermittent claudication affecting his lifestyle. The ankle-brachial index (ABI) before intervention was 0.76 on the right, and 1.16 on the left leg.

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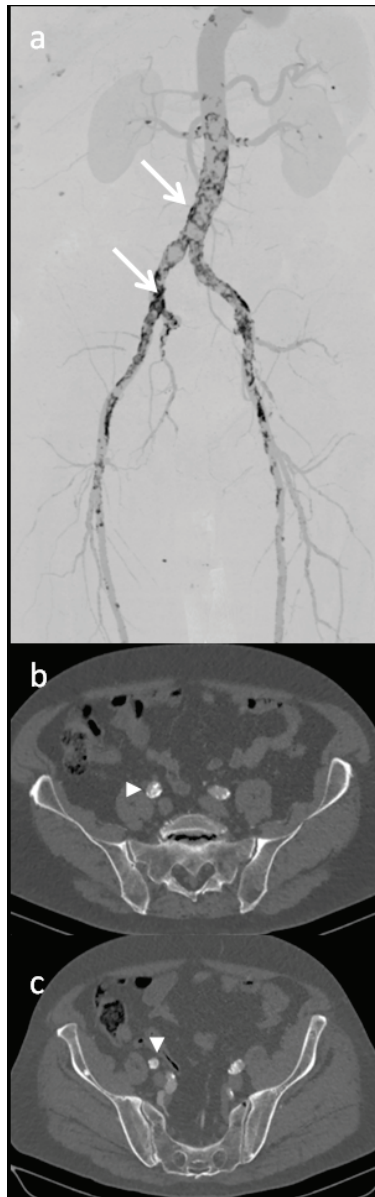


Figure 1

MSCT angiography

- a) MIP projection image of the abdominal aorta and iliac arteries shows diffuse wall calcifications (white arrows)*
b) and c) Axial slices with significant "coral reef" type stenoses of the right common and external iliac artery (white arrowhead)

The procedure was performed in the angio suite using ipsilateral transfemoral approach under local analgesia and sedation through the 6F introducer. A 5000 international units of heparin intra-arterially were administered in the bolus. Balloon angioplasty of the iliac

artery stenotic lesions was performed with a balloon catheter of 10 mm in diameter (Armada 35, Abbott Vascular, USA) for the right EIA, and 12 mm in diameter (Armada 35, Abbott Vascular, USA) for the right CIA. On the control angiographic series arterial rupture with extravasation of the contrast medium from CIA and EIA was observed (Fig 2). Immediate urgent balloon occlusion of both arteries was performed using 12×80 mm balloon catheter inflated to a diameter of 12.4 mm, and 6F introducer has been replaced by 11F introducer. Intervention was converted to urgent stent graft implantation. Due to significant arterial diameter mismatch, three balloon expandable stent grafts sizing 8×37 mm (BeGraft Peripheral, Bentley, Germany), 14×29 mm and 16×48 mm (BeGraftAortic, Bentley InnoMed, Germany) were implanted (Fig 3) over the rupture sites on the right EIA and CIA using "stent-in-stent" technique, respectively. After postdilatation and stent grafts conformation, a normal lumen diameter and hemodynamic of the EIA and CIA were established, and the origin of the right internal iliac artery was covered with the patent distal branches filled retrogradely. There were no signs of contrast medium extravasation, corresponding to a successful rupture treatment. The arterial access site was closed with a double suture-mediated vascular closure system (Perclose Proglide, Abbott Vascular, USA). During observation after the procedure, the patient complained of abdominal and flank pain with a moderate decrease of haemoglobin level. Emergency contrast-enhanced abdominal and pelvic MSCT revealed a right retroperitoneal hematoma, cranially compressing the kidney, with no signs of active contrast medium extravasation, with normal patency and stent grafts lumen width (Fig 4). In agreement with the vascular surgeon, we decided on further conservative treatment with parenteral antimicrobial therapy, replacement of crystalloids and titration of chronic therapy. In the further course of the treatment, the patient was hemodynamically stable, with no signs of bleeding, sustained diuresis and stable renal function. On the third day of follow-up, the abdominal ultrasound exam revealed the partial regression of the psoas muscle hematoma with no signs of obstructive uropathy. Control ABI indicated an excellent post-procedural result with measured ABI values 1.24 on the right and 1.20 on the left leg. The patient was discharged five days after the procedure and was hemodynamically stable, showing no signs of other complications.

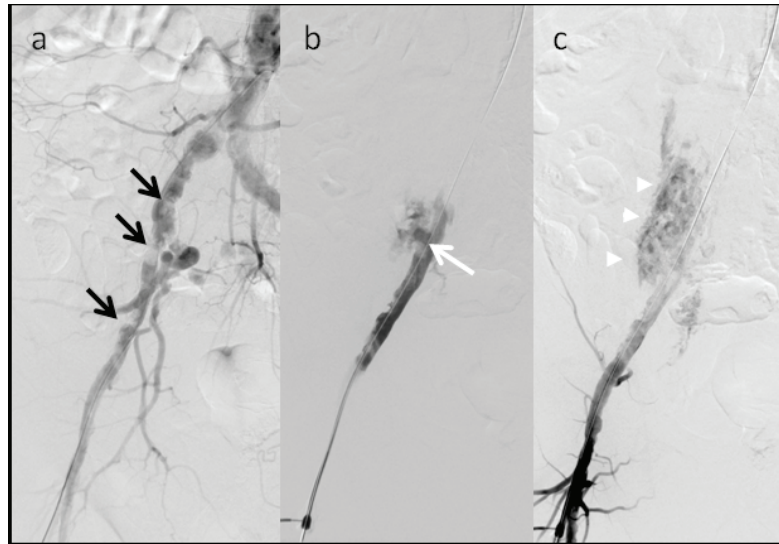


Figure 2

Digital subtraction angiography

- a) Patent distal part of the infra-renal abdominal aorta, common and right iliac artery with multiple significant heavily calcified stenoses (black arrows)
- b) Post angioplasty rupture site of the right common and external artery with contrast medium extravasation (white arrow)
- c) Profuse extravasation of the contrast medium into the right retroperitoneum (white arrowhead)

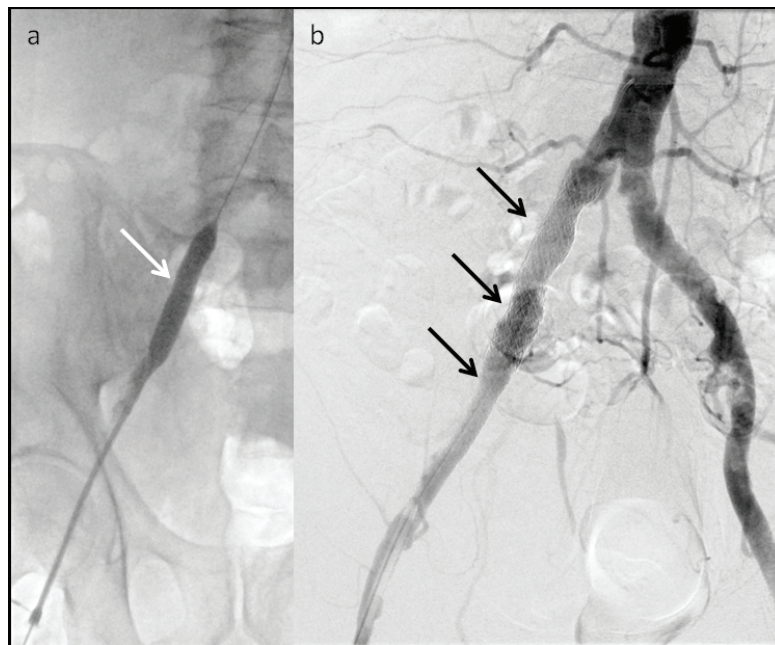


Figure 3

Digital subtraction angiography

- a) Balloon catheter occlusion of the bleeding sites in the right common and external iliac artery (white arrow)
- b) Three balloon expandable stent grafts implanted over the rupture sites using "stent-in-stent" technique for bleeding control and definitive treatment (black arrows)

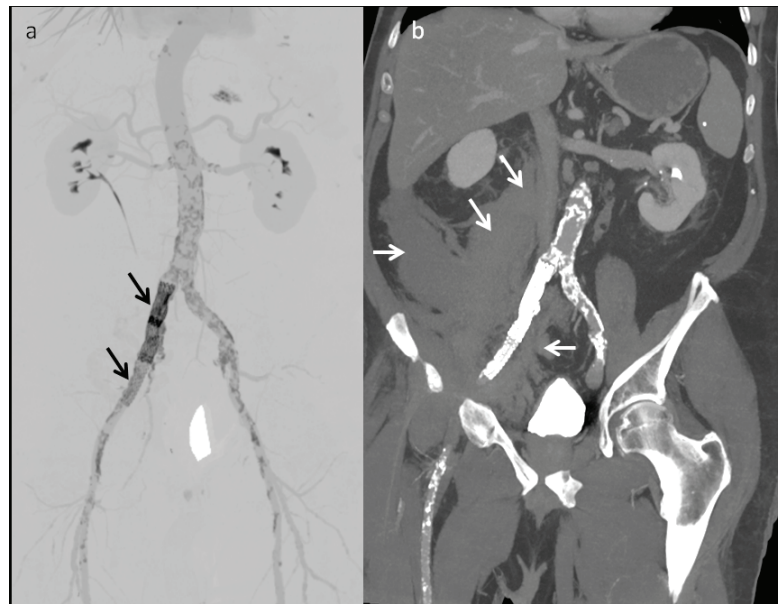


Figure 4

Contrast enhanced abdominal and pelvic MSCT

- a) MIP projection image of the abdominal aorta and iliac artery shows normal patency and stent grafts lumen width (black arrows)*
- b) "Oblique" projection image reveals the right retroperitoneal hematoma with no signs of active contrast medium extravasation (white arrows)*

Discussion

Endovascular therapy is a recommended treatment option for short stenotic lesions or occlusions of the iliac arteries (<5 cm) due to a low risk of complications. It leads to good long-term patency rate $\geq 90\%$ over 5 years⁵. In our case, the procedure was performed in accordance to recent guidelines recommendations for the treatment of short iliac artery stenosis in patients with lifestyle-limiting intermittent claudication. It has previously been shown that endovascular treatment of stenoses or occlusions of the iliac arteries with a balloon or a stent carries the risk of the iliac artery rupture. In the published literature, the studies on the iliac artery rupture after angioplasty are extremely rare and the rupture rate is probably underestimated. Rare published studies indicate that the post-angioplasty iliac artery rupture occurs in 0.8 - 3% cases^{4,6,7}. There are no compelling parameters for predicting the time and location of the iliac artery rupture during angioplasty. Risk factors for arterial rupture include comorbidities that promote medial arterial calcification leading to increased stiffness, such as hypertension, diabetes, and

chronic renal failure⁸. Therefore, due to multiple comorbidities and heavily calcified lesions, our patient had a high risk of iliac artery rupture. The rupture of the iliac artery can lead to acute bleeding and death, as the iliac artery is located in the pelvic cavity and is only covered by a thin retroperitoneum^{7,9}. Signs of iliac artery rupture after angioplasty are usually diagnosed very early^{4,9,10}, and usually, as in our case, they appear during or immediately after the PTA. Once the bleeding site is identified, subsequent treatment is the occlusion of the bleeding site with a balloon catheter. In our case, we performed the occlusion of rupture sites with a slightly oversized and overinflated angioplasty balloon to provide haemostasis. A definitive treatment for the iliac artery post-angioplasty rupture includes open surgical reconstruction or endovascular implantation of stent grafts^{11,12}. Endovascular repair of the iatrogenic arterial injury using stent grafts has been proposed as a valuable alternative to surgical repair. Rapid treatment, reduced morbidity associated with minimally invasive management, and the ability to treat patients with multiple comorbidities support the usage of the stent graft^{1,13}. In our institution, all acute

complications of endovascular procedures are primarily treated with minimally invasive and interventional methods, and for that reason we used stent grafts on our patient. In this context, it is very important that all institutions providing endovascular treatment of the iliac arteries in high-risk patients have sufficient quantities of differently sized stent grafts available in the angio suite. In our case, this proved to be crucial for the definitive treatment due to discrepancies in the dimensions of iliac arteries.

Conclusions

The use of stent grafts in the treatment of post-angioplasty rupture of iliac arteries is a feasible and effective method. An immediate endovascular balloon catheter occlusion represents the first step in bleeding control. Permanent availability of various dimensions of stent grafts in the angio suite is crucial for timely and definitive successful treatment of the urgent iliac artery rupture.

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Sažetak

USPJEŠNO HITNO ENDOVASKULARNO LIJEČENJE IJATROGENE POSTANGIOPLASTIČNE RUPTURE ZAJEDNIČKE I VANJSKE ILIJAČNE ARTERIJE S VIŠESTRUKIM STENT GRAFTOVIMA

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Jatrogena ozljeda perifernih arterija sve je češća kako raste broj endovaskularnih intervencija. Perkutana angioplastika ilijačne arterije može uzrokovati razne probleme, uključujući rupturu arterije, koja može biti smrtonosna. Izvještavamo o bolesniku s istovremenom jatrogenom rupturom desne zajedničke i vanjske ilijačne arterije tijekom perkutane transluminalne angioplastike koja je rezultirala po život opasnim retroperitonealnim krvarenjem uspješno liječenim korištenjem tri balonom šireća stent grafta za zatvaranje rupture.

Ključne riječi: *ilijačna arterija, ruptura, angioplastika, stent graft*