Radiology Case Reports 19 (2024) 1986–1989

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Case Report

Prostatic artery embolization via inferior epigastric collateral in chronic total occlusion of the anterior division of the left internal iliac artery ☆,☆☆

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ARTICLE INFO

Article history:
Received 2 February 2024
Accepted 5 February 2024

Keywords:
Benign prostatic hyperplasia
Chronic total occlusion
Prostatic artery embolization

ABSTRACT

Prostatic artery embolization (PAE) is one of the new treatment therapies for lower urinary tract symptoms in male patients with benign prostatic hyperplasia. PAE is considered a minimally invasive option besides other famous traditional therapies such as transurethral resection of the prostate (TURP) and open surgery. Additionally, PAE has a specific advantage in managing the elderly group and underlying health conditions like anticoagulation. In this article, we presented the case of an 83-year-old male patient who has chronic urinary retention due to benign prostatic hyperplasia, left coronary artery stent placement, and long-term anticoagulation. The preinterventional computed tomography angiography showed chronic total occlusion of the anterior division of the left internal iliac artery. Bilateral PAE was performed successfully, and his urinary symptoms were significantly improved. Computed tomography allows for the accurate detection of prostatic anatomy and facilitates planning prostatic artery embolization.

☆ Acknowledgments: This study was not supported by any funding.
☆☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
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https://doi.org/10.1016/j.radcr.2024.02.013

Introduction

Prostatic artery embolization (PAE) is a minimally invasive, safe, and effective treatment for benign prostatic hyperplasia (BPH) [1]. According to previous reports, PAE has significantly facilitated the outcome and prognosis and reduced the risk of treatment complications like urinary dysfunction, retrograde ejaculation, or injury of the sphincter muscles [2]. The embolization process of prostate arteries by embolization agents leads to progressive tissue necrosis, atrophy, and relieving lower urinary tract symptoms (LUTS). PAE is an ongoing challenge because of its small diameter and complex anatomic variants [3]. Particularly in the cases of severe atherosclerotic conditions, the selection of embolization branches indeed requires technical skill. We present our experience of performing PAE successfully via collateral from the left inferior epigastric artery in an 83-year-old man with chronic total occlusion of the anterior division of the left internal artery.

Case presentation

An 83-year-old man who had left coronary artery stent placement and long-term anticoagulation presented to our hospital because of LUTS due to BPH. He had been undergoing conservative treatment for a year without any improvement. In a short period, his symptoms gradually worsened, and he had to come to the hospital multiple times to insert a urinary catheter. His International Prostate Symptom Score (IPSS) was 27, and his Quality of Life (QoL) was 5. The laboratory test revealed no evidence of renal failure. His free prostate-specific antigen (PSA) was 0.13 ng/mL, with a total PSA of 2.4 ng/mL. Ultrasonography showed that his prostate volume was 76 mL. The intravesical prostatic protrusion part is about 10 mm, and the parenchyma was homogeneously hypoechoic with a distinct border. Abdominopelvic computed tomography angiography (CTA) was performed for preinterventional prostatic arteries evaluation (256-slice MSCT, REVOLUTION GE) and WorkStation 4.7 for image processing. CTA report highlighted severe atherosclerosis of the arterial system in the abdominopelvic region. Moreover, a significant stenosis at the origin of the left internal iliac artery and a chronic total occlusion of its anterior division were seen. Distal branches of the anterior division (including the left prostatic artery) were supplied by collateral from the left inferior epigastric artery via the left obturator artery (Fig. 1). The right prostatic artery originated from the internal pudendal artery without occlusion or stenosis.

Subsequently, PAE was performed through the right common femoral artery. Firstly, the right prostatic artery was embolized without difficulty with a mixture of histoacryl and lipiodol (1:8 ratio). Following the right PAE, the left internal iliac artery angiogram was performed, demonstrating a complete obstruction of the anterior trunk of the left internal iliac artery. We tried but failed to cross the occlusion to proceed with the planned PAE. Because of finding the collateral from the left inferior epigastric artery on CTA, a selective angiography of the left inferior epigastric artery was performed to detect

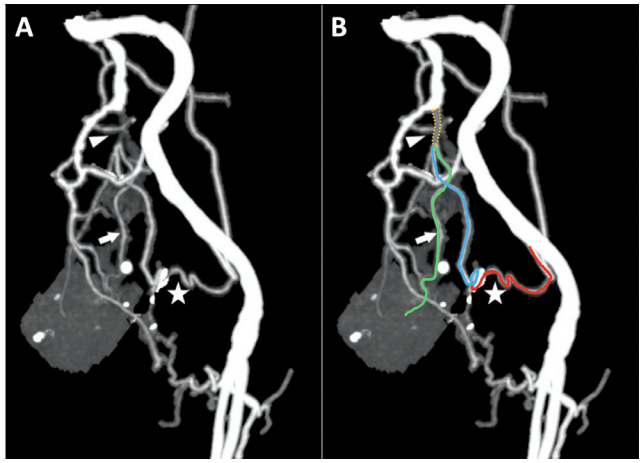

Fig. 1 – (A). MIP CTA image shows severe atherosclerosis and total occlusion of the anterior division of the left internal iliac artery (*arrow head*). The distal portion of the anterior division is supplied by a collateral blood from the left inferior epigastric artery (*star*) to the obturator artery. The left prostatic artery originates from this segment (*arrow*). (B) MIP CTA image with explantation. Anterior division of the left internal artery (*yellow dots line*); collateral from left inferior epigastric artery (*red line*); left obturator artery (*blue line*); left prostatic artery (*green line*).

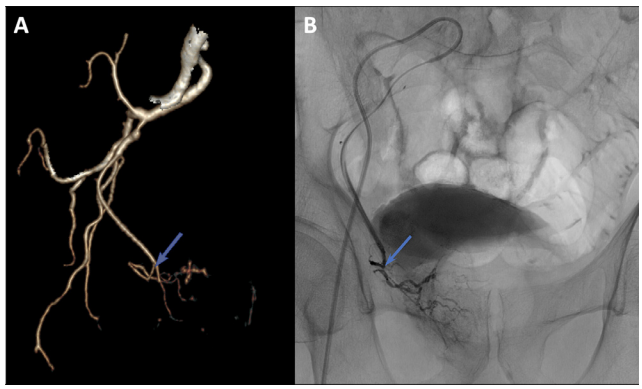

Fig. 2 – (A) Right prostatic artery (*arrow*) on 3D reconstruction of an abdominopelvic CTA and the right prostatic artery originates from the right pudendal artery; (B) Selective angiography image of right prostatic artery before embolization (*arrow*).

the collateral to the left prostatic artery. Then, via the collateral, the left prostatic artery was successfully super-selected by microcatheter 1.8Fr (Tokai Microcatheter) and guidewire 0.014 inches (Transcend, Boston Scientific). After ruling out extraprostatic supply, the left PAE was performed by the mixture of histoacryl and lipiodol (1:8 ratio) (Fig. 3 A-C).

Postembolisation management was antibiotics, anti-inflammatory drugs, and intermittent urinary catheterization before being removed at week 3. In a 2-month follow-up, the urinary condition improved remarkably; the IPSS was 15, and QoL was 2. The prostatic MRI performed at month-3

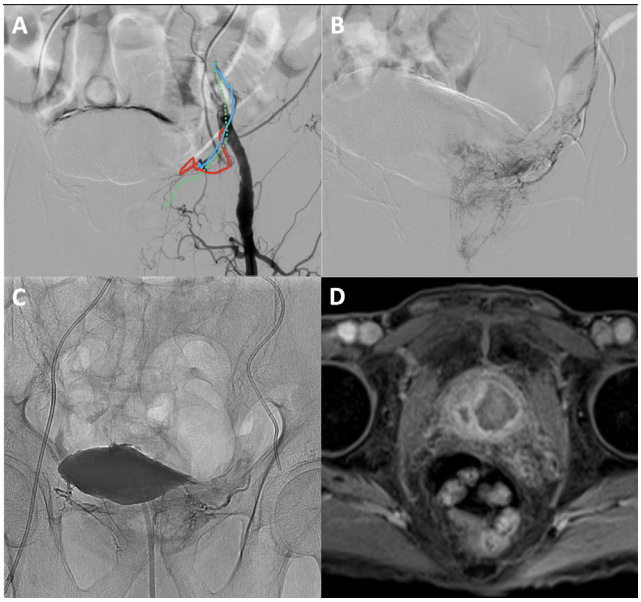

Fig. 3 – (A). The left external iliac arteriography shows collateral from the left inferior epigastric artery (*red line*) to the left prostatic artery (*green dots line*) via left obturator artery (*blue line*). (B). Selective imaging of the left prostatic artery through the collaterals. (C). Single shot image after bilateral prostatic artery embolization. (D). MRI at the 6-month follow-up showed significantly decreased prostatic volume with central necrosis zones.

and month-6 after embolization revealed a remarkably decreased prostatic volume (39 mL(-48.7%), and 32 mL (-57.9%), respectively) with central necrosis zones (Fig. 3D).

Discussion

Benign Prostatic Hyperplasia (BPH) is a benign prostate disease based on the benign proliferation of stromal cells and epithelial cells. Due to fibroid hyperplasia and an increase in the glands of the prostate, the entire prostate eventually increases in size [4]. BPH treatment methods depend on the severity of urinary symptoms, encompassing conservative treatment, minimal invasion, and surgery. PAE was first introduced in 2000 as a LUTS managing therapy in BPH patients, especially in patients with significant medical comorbidities or high risks of bleeding [5]. PAE is unique in that it can be performed without sedation in patients at high risk for anesthesia. In particular, PAE can be performed in patients with antiplatelet or anticoagulation at the same time if necessary. Other advantages include shorter hospitalization and lower costs [6].

However, PAE is still a challenging procedure. According to reports in the literature, the technical failure rate in PAE can be up to 20% [7]. Technical failures are often related to atherosclerosis, occlusion, or tortuosity of the prostatic artery. The technique of crossing the chronic total occlusion to access the prostatic artery was described by Bagla et al. [8]. However, this technique does not consistently achieve the expected effect, especially in cases of prolonged total occlusion. Mohan et al. reported a chronic total occlusion of the left prostatic artery, which was successfully embolized via the collateral of the ipsilateral internal pudendal artery [9].

CTA before PAE could be valuable in determining arterial anatomy and facilitating procedural planning. According to Maclean et al, CTA allowed accurate identification of the prostatic arterial supply in 97.3% and presented the anastomoses with sensitivity of 59.0% and specificity of 94.2% [10]. In contrast, Kim et al. reported that the accuracy of detecting prostatic arteries on MRI was only 76.5% (26 of 34 prostatic arteries in 17 patients) [11].

In our patient, the chronic total occlusion of the anterior division of the left internal iliac artery leads to the development of collateral from the ipsilateral inferior epigastric artery to corresponding visceral branches (including the left prostatic artery). Owing to the detection of this collateral on CTA, the left PAE was successfully performed with saving time and radiation exposure.

Conclusion

PAE via inferior epigastric collateral in chronic total occlusion of the anterior division of the left internal iliac artery is feasible. Preinterventional abdominopelvic CTA is valuable in assessing the anatomy of prostatic arteries, reducing the interventional time and radiation exposure, and enhancing the treatment outcome.

Ethics approval

For this type of study formal consent is not required.

Patient consent

Written informed consent was obtained from the patient for publication of this case report.

CRediT authorship contribution statement

Le Nguyen Vu: Conceptualization, Methodology, Project administration, Writing – review & editing. **Le Thanh Dung:** Conceptualization, Formal analysis, Project administration, Visualization, Writing – review & editing. **Than Van Sy:** Conceptualization, Data curation, Project administration, Writing – review & editing. **Le Quy Thien:** Conceptualization, Project administration, Writing – review & editing. **Ngo Quang Duy:** Conceptualization, Data curation, Formal analysis, Project administration, Writing – original draft, Writing – review & editing. **Pham Huu Khuyen:** Conceptualization, Project administration, Visualization, Writing – review & editing.

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