

Balloon occlusion microcatheter use to provide an option for distal protection in prostatic artery embolization

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Avoiding particle reflux during prostatic artery embolization (PAE) is important to prevent nontarget organ injury. The occlusion balloon of the Sniper microcatheter can be used to provide distal protection from non-target embolization in addition to its traditional use in preventing non-target embolization through pressure direction and reflux avoidance.

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Abbreviations: BPH = Benign Prostatic Hyperplasia, PAE = Prostatic Artery Embolization, IPSS = International Prostate Symptom Score, DSA = Digital Subtraction Angiography

CASE PRESENTATION

A 70-year-old male, with history of BPH and severe bladder outlet obstruction, was symptomatic on medical management and had an IPSS Score of 34 (severe symptom score). He was deemed a candidate for bilateral prostatic artery embolization.

PROCEDURE DESCRIPTION

Under ultrasound guidance, arterial access was achieved in the right common femoral artery with placement of a 6-F sheath. A 5-F Contra-2 diagnostic catheter was advanced through the sheath over a 0.035" guidewire (Bentson, Cook Medical, Bloomington, Indiana) and positioned in the left common iliac artery. DSA demonstrated that the left external and internal iliac arteries were patent, however the path to the left prostatic artery was tortuous.

The planned PAE procedural approach was to first embolize the right prostatic artery. The Contra-2 catheter was advanced into the internal iliac artery and then swapped for a 5-F Berenstein diagnostic catheter. Through this, a balloon occlusion microcatheter (Sniper, Embolx, Sunnyvale, California) was advanced over a 0.016" guidewire (Fathom, Boston Scientific, Natick, Massachusetts) into the anterior division of the right internal iliac artery and then into the proximal right prostatic artery. 200 mcg of intra-arterial nitroglycerin was injected, followed by embolization of the right prostatic artery using 100-300 μm microsphere particles

(Embospheres, Merit Medical, South Jordan, Utah) until stasis was achieved within this vessel.

With successful right prostatic artery embolization, the left prostatic artery was then targeted for embolization to complete the PAE procedure. The Berenstein diagnostic catheter and balloon occlusion catheter were removed. The 6-F vascular sheath was exchanged for a contralateral 6-F sheath (Flexor Balkin, Cook Medical, Bloomington, Indiana) which was successfully advanced into the left common iliac artery. The 5-F Berenstein diagnostic catheter was advanced through the sheath into the left common iliac artery, and then into the left internal iliac artery.

The balloon occlusion microcatheter and 0.016" guidewire were then successfully advanced into the proximal anterior division. DSA and 3-D CT imaging demonstrated multifocal atherosclerosis with narrowing and associated abnormal anatomy. The distal anterior division of the internal iliac artery, including a common trunk of the pudendal and inferior gluteal arteries, was completely occluded, with reconstitution via the superior gluteal and obturator arteries. A small collateral vessel off the obturator artery was seen to reconstitute the inferior vesicular artery.

Due to non-target embolization concern, it was decided to embolize from the obturator artery with the balloon occlusion microcatheter deployed to protect the downstream obturator artery territory (Figure 1). This

was accomplished by positioning and inflating the balloon downstream of the prostatic artery origin, and then advancing the 5-F catheter tip over the microcatheter to a point just proximal to the origin of the prostatic artery. The balloon was then inflated, and once downstream occlusion by the balloon was confirmed, the left prostatic artery was treated by injection of 100-300 μ m microsphere particles through the rotating hemostatic valve and 5-F diagnostic catheter. Complete occlusion of the left prostatic artery was demonstrated by follow-up angiography with the microcatheter balloon inflated, and then preserved patency of the downstream obturator artery was subsequently confirmed by contrast injection with the balloon deflated. The procedure was then concluded.

FOLLOW-UP AND DISCUSSION

At one-month follow-up, the patient reported he was doing well. He initially had some prolonged inflammatory-related pain in the initial days after the procedure that was managed with Toradol. His IPSS score at one-month follow-up was 12 (65% reduction).

In this case, when attempting left prostatic artery embolization, the patient's atherosclerotic disease made his anatomy difficult to navigate. The occlusion of the pudendal and inferior gluteal arteries led to reconstitution via the superior gluteal and obturator arteries. This led to reconstitution of the inferior vesicular artery from the obturator artery. Selection of the inferior vesicular artery was not possible given its size, position, and orientation. The balloon occlusion microcatheter was used to occlude the obturator artery just distal to the origin of the inferior vesicular artery. Embolization was achieved by injecting the microsphere particles through the 5-F base catheter and around the microcatheter with the balloon occlusion microcatheter providing distal protection from non-target embolization.

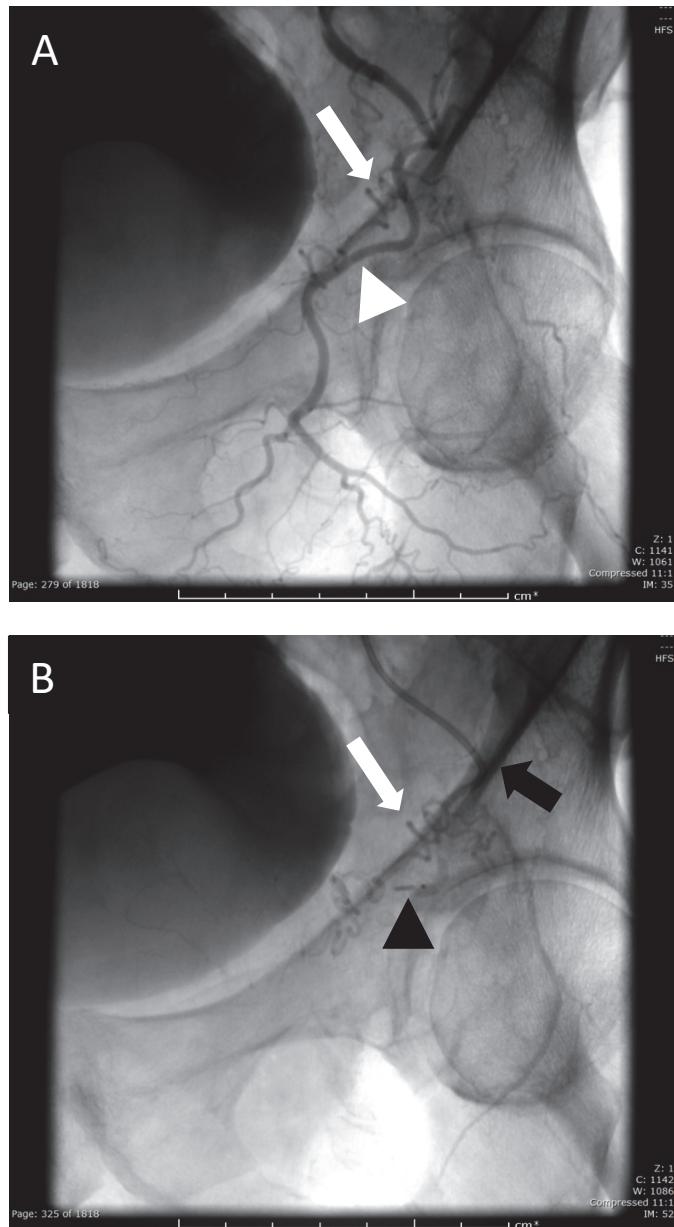


Figure 1: Patient Case Imaging. **(A)** DSA shows prostatic artery (white arrow) arising from the obturator artery (white arrow head). **(B)** Balloon occlusion microcatheter (black arrow head) inflated providing distal obturator artery protection while allowing embolization of the prostatic artery (white arrow) via the outer catheter (black arrow).