

## Benign Prostatic Hyperplasia Treated Entirely by Unilateral Prostate Artery Embolization

### Abstract

Prostate artery embolization (PAE) is a minimally invasive, safe, and effective treatment for benign prostatic hyperplasia. PAE can often be technically challenging due to atherosclerosis and tortuous anatomy, leading to failure of catheterizing one side of prostatic supply, resulting in unilateral PAE, which markedly reduces clinical success. Major anastomosis between both prostatic halves can be exploited for embolizing the entire prostate from a unilateral approach when one side cannot be catheterized. If this anastomosis is extensive enough, clinical success is assumed to be equivalent to bilateral PAE. There is a limited number of published cases in this regard; our case report shows how to detect and exploit this anastomosis.

**Keywords:** Benign prostatic hyperplasia, lower urinary tract symptoms, Proximal Embolization First Then Embolize Distal (PERFECTED), prostate, prostate artery embolization

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### Introduction

Prostate artery embolization (PAE) is a safe and effective treatment option for lower urinary tract symptoms attributed to benign prostatic hyperplasia by achieving significant symptomatic and urodynamic improvement.<sup>[1]</sup>

Compared to the current standard transurethral urological procedures e.g., transurethral resection of the prostate (TURP), PAE is performed under local anesthesia as an outpatient operation, has less serious adverse effects (incontinence, retrograde ejaculation, erectile dysfunction, and hematuria), suitable for markedly enlarged prostates (>90 cc), and has lower overall cost.<sup>[2-5]</sup>

PAE can often be technically challenging, mainly due to atherosclerosis and tortuous anatomy, leading to failure of catheterizing one side of prostatic supply, resulting in unilateral PAE, which markedly reduces clinical success. Some patients have major anastomosis between both prostate halves (3%). This anastomosis has been exploited to embolize the whole gland from a unilateral approach alone. This is invaluable for patients who can only be catheterized unilaterally due to atherosclerosis or tortuous anatomy.<sup>[6]</sup>

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### Case Report

A 63-year-old patient had tried conventional medical therapy (tamsulosin 0.8 mg once daily) with no satisfactory outcome. Preoperative International Prostate Symptom Score (IPSS) was 17 with an estimated prostate volume of 109 cc (by transabdominal ultrasound). The patient refused TURP and decided to undergo PAE under local anesthesia. Institution review board waiver was granted, and informed consent for the procedure was acquired. Our routine preoperative practice includes intravenous hydration, analgesic (paracetamol), and prophylactic antibiotic (ciprofloxacin). We do not routinely perform urinary catheterization.

Anterior divisions of both internal iliac arteries were catheterized by 5-french cobra head catheter through right femoral access. Selective catheterization was achieved by 2.4Fr Progreat microcatheter (Terumo, Tokyo, Japan).

The left prostatic artery (PA) was seen arising from the left internal pudendal artery [Figure 1]. First angiography run showed a blush of the left hemi-prostate, with downstream branches supplying nontarget territory (penile supply), visualized in two projections [Figures 2

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and 3]. This penile supply was bypassed by advancing the microcatheter further; then, the next angiography run showed the absence of nontarget blush [Figure 4]. However, we noted a significant finding; reflux of contrast into an additional prostatic feeder [Figure 4] that originated with superior vesical artery. We catheterized and embolized this additional feeder afterward [Figure 5].

Interestingly, with stronger injection in the main prostatic feeder, the right hemi-prostate blush appeared when the microcatheter was introduced deeper into the intraprostatic portion of the left PA. At this position, the embolization would affect the entire prostate, not just the left half, due to extensive horizontal anastomosis [Figure 6]; we used 300–500  $\mu\text{m}$  Embospheres (Merit Medical, Salt Lake City, USA).

Postembolization control angiogram confirmed complete absence of the entire prostatic blush with filling of the contralateral main PA trunk [Figure 7]. We decided to

confirm adequate embolization of the entire prostate by checking the right side supply. As expected, the selective angiogram of the right PA showed no prostatic blush; only seminal vesicle and bladder wall blush were noted with forceful contrast injection. No further embolization was required [Figure 8].

No perioperative complications were encountered. Procedure time was 89 min; fluoroscopy time was 54 min; and radiation dose was 662 mGy. Postoperative prophylactic antibiotic (ciprofloxacin) and anti-inflammatory were prescribed. Two weeks after the operation, alpha-1 blockers had been stopped with no symptomatic consequences. Three months after the operation, the patient reported significant improvement, with IPSS of six and estimated prostate volume of 61 cc (44% volume reduction assessed by transabdominal ultrasound).

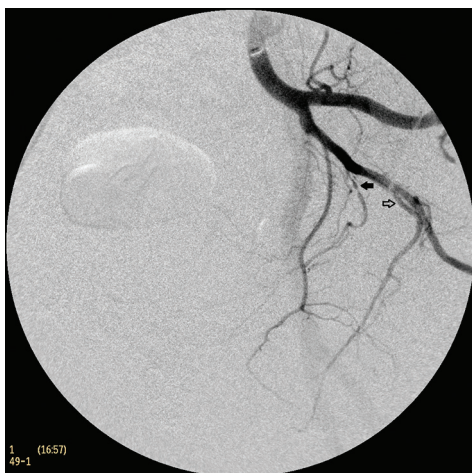


Figure 1: Left anterior oblique digital subtraction angiogram showing left prostatic artery (arrow) arising from the left internal pudendal artery (hollow arrow). Note the plaque just distal to the origin of the prostatic artery



Figure 3: Frontal digital subtraction angiogram showing microcatheter tip inside proximal segment of the left prostatic artery (arrow). Note extraprostatic penile supply (hollow arrow)



Figure 2: Left anterior oblique digital subtraction angiogram showing microcatheter tip inside proximal segment of the left prostatic artery (arrow). Note extraprostatic penile supply (hollow arrows)

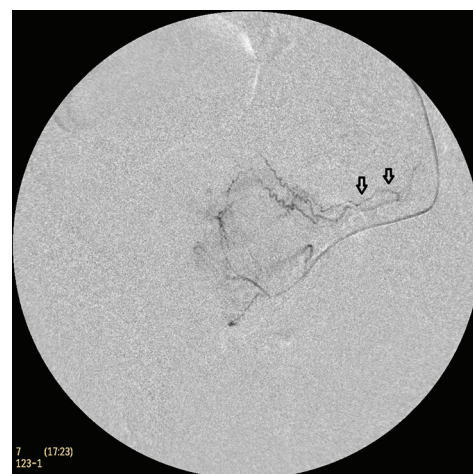


Figure 4: Left anterior oblique digital subtraction angiogram showing the position of microcatheter suitable for safe embolization after bypassing nontarget extraprostatic supply. Blush of the left hemi-prostate is seen. Reflux of contrast was noted into an additional prostatic feeder (hollow arrows) that originated with superior vesical artery; it was subsequently embolized



Figure 5: Frontal digital subtraction angiogram showing residual left prostatic blush, supplied by an additional prostatic artery that originated with left superior vesical artery

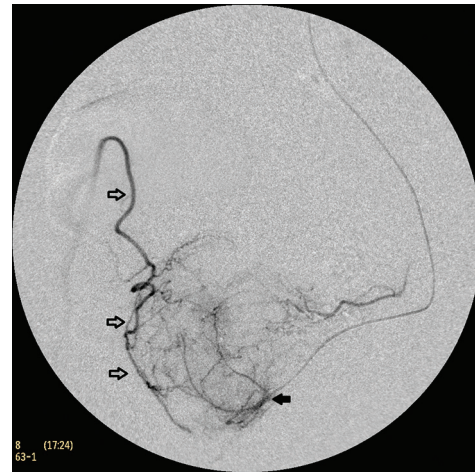


Figure 6: Left anterior oblique digital subtraction angiogram after introducing the microcatheter deep intraprostatic into the left prostatic artery (arrow). Blush of the entire prostate is visualized, not just the left half. At this position, embolization would affect the whole gland. Note filling of the contralateral right prostatic artery (hollow arrows) denoting major anastomosis



Figure 7: Left anterior oblique digital subtraction control angiogram after embolization, showing absent prostate blush, denoting adequate embolization of the entire gland. Note intraprostatic microcatheter tip (arrow)



Figure 8: Frontal digital subtraction angiogram showing microcatheter tip inside the right prostatic artery (arrow). No prostate blush is seen. Only seminal vesicle and bladder wall blushes are noted

## Discussion

In this case report, we found that embolization of the entire prostate through a single PA is safe and effective within 3 months; more case reports and case series with longer follow-up are required to consolidate safety and efficacy. We recommend attempting Proximal Embolization First Then Embolize Distal technique (PErFecTED) whenever possible, where the microcatheter is introduced as deep as possible inside the prostate gland.<sup>[7]</sup> As seen in the previous images, unless the microcatheter was navigated deeper, the anastomosis would not have been detected, leading to possibly inferior outcome compared to conventional unilateral PAE.

Intraprostatic major anastomosis connecting the right and left hemi-prostate is present but uncommon (about 3% of patients). This anastomosis is extremely useful in cases where prostate supply is identified/accessible on one side only, for

example, severe atherosclerosis and tortuous anatomy which are frequently encountered in elderly population,<sup>[6]</sup> because we assume that unilateral embolization of the entire prostate blush is more effective than unilateral embolization of hemi-prostate only. More studies are required to consolidate our observation, bearing in mind that bilateral PAE is the standard practice and should always be attempted.

We also recommend scrutiny in searching for possible additional ipsilateral prostatic feeders, like what we have encountered in this case. These additional feeders may act as collateral pathways contributing to future recurrence (clinical failure).<sup>[8]</sup>

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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