



ORIGINAL ARTICLE

# Role of prostatic artery embolization in management of symptomatic benign prostatic hyperplasia



Mohamed Shaker<sup>a,\*</sup>, Karim A. Abd El Tawab<sup>a</sup>, Khaled H. Abd El Tawab<sup>b</sup>,  
Mohamed El-Gharib<sup>a</sup>

<sup>a</sup> Interventional Radiology Unit, Radiology Department, Ain Shams University, Cairo, Egypt

<sup>b</sup> Urology Department, National Institute of Urology and Nephrology, Cairo, Egypt

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## KEYWORDS

Prostatic artery;  
Embolization;  
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**Abstract Objectives:** To assess the feasibility and efficacy of prostatic artery embolization in relieving symptoms of benign prostatic hyperplasia.

**Materials and methods:** In a prospective study 28 patients with symptomatic benign prostatic hyperplasia were presented for prostatic artery embolization between June 2012 and June 2014. Patients age was 48–85 years with mean age 68.5 years  $\pm$  10.6 SD. International Prostate Symptoms Score (IPSS) before intervention measured 20–35 with mean score 26.3  $\pm$  6.8 SD. Prostatic volume before intervention ranged between 48 and 166 cc<sup>3</sup> with mean of 82.6  $\pm$  11.2 SD.

**Results:** Technical success was achieved in all cases (100%). All patients were followed for 6 months after the procedure. IPSS improved at 6 months in all patients with post embolization mean of 12.2  $\pm$  3.4 SD with significant *P* value of 0.0006. Mean post-procedure prostatic volume at 6 months was 49.8 cc<sup>3</sup>  $\pm$  16.9 SD with 39.7% mean volume reduction. No major complications were recorded. We achieved clinical success in 27 patients (96.4%) with only one non responding patient (3.6%).

**Conclusion:** Prostatic artery embolization is a feasible technique and preliminary short-term results show promising high technical and clinical success rates in symptomatic patients with benign prostatic hyperplasia.

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**Abbreviations:** IPSS, International Prostate Symptoms Score; BPH, benign prostatic hyperplasia; PSA, prostate specific antigen; PVR, post-void residual volume; PAE, postatic artery embolization; PVA, polyvinyl alcohol; TURP, transurethral resection of the prostate; QOL, quality of life score

\* Corresponding author at: 13, Mostafa Refaat St., Masaken Sheraton, Cairo, Egypt. Tel.: +20 1005263793.

E-mail address: [mohamedshakerghazy@yahoo.com](mailto:mohamedshakerghazy@yahoo.com) (M. Shaker).

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## 1. Introduction

The prevalence of benign prostatic hyperplasia (BPH) in men above 50 years old is high (1). BPH is presented with lower urinary tract symptoms mainly obstructive symptoms including; hesitancy, weak urinary stream, incomplete emptying, nocturia, frequency and urgency (2,3). Surgery is considered a problem solver in improving symptoms and hindering disease progression yet availability of effective pharmacotherapy made its use reserved for patients with resistant symptoms despite medical treatment (4). Surgical treatment by transurethral resection of the prostate (TURP) is by far the gold standard in BPH treatment. Age, grade of obstruction, baseline prostate volume, International Prostate Symptom Score (IPSS), peak urinary flow (Qmax), serum prostate specific antigen (PSA) value, and post-void residual (PVR) volume are important outcome predictors (5). Despite the efficacy of the surgical treatment, complications are common and include urinary tract infection, strictures, postoperative pain, incontinence or urinary retention, sexual dysfunction, and blood loss (6). This warranted looking for minimally invasive treatments to improve treatment strategy aiming for equivalent efficacy and avoiding surgery related complications (7).

It has been suggested that endovascular treatment of symptomatic BPH by prostatic artery embolization (PAE) may become a popular treatment option as uterine fibroid embolization (8). Preliminary studies of PAE have shown promising outcome (9). PAE is a challenging technique with reported technical failure in 2–3% of patients and around 15% of patients undergo unilateral embolization due to technical difficulties (8).

In PAE many embolic agents can be used as microspheres measuring 300–500  $\mu\text{m}$  and polyvinyl alcohol particles measuring 150–250  $\mu\text{m}$  (10).

In the current study we assess the feasibility of the technique of prostatic artery embolization and evaluate its efficacy in relieving symptoms of patients with symptomatic benign prostatic hyperplasia.

## 2. Materials and methods

This prospective study started in June 2012 and through 2 years till June 2014; 28 patients were presented to the interventional radiology unit in Ain Shams University, Cairo, Egypt, with symptomatic BPH. Their age ranged between 48 and 85 years with mean of 68.5 years  $\pm$  10.6 SD. Inclusion criteria were male patients with age > 45 years with a diagnosis of BPH with significant lower urinary tract symptoms refractory to medical treatment for at least 6 months, developing adverse reactions from medical treatment, unfit for surgery or refusing surgery with IPSS score  $\geq$  20, QOL score  $\geq$  3, Qmax < 12 ml/s, prostate volume > 40 cc<sup>3</sup>. Exclusion criteria were established diagnosis of cancer prostate, uncorrectable coagulation profile, renal insufficiency, active urinary tract infection and neurogenic bladder. 8 patients were presented with acute urinary retention with inserted bladder catheters.

Before the procedure all patients were subjected to questionnaire to measure the IPSS score and quality of life (QOL) score, uroflowmetry with Qmax measurement, PSA level (Free/Total), pelvic and transrectal US were done in all patients with measurement of prostatic volume and PVR.

Prostatic biopsy was performed in one case of suspected prostatic malignancy based on a suspicious focal lesion detected on transrectal US with elevated PSA; however, malignancy was excluded and PAE was performed 1 month later.

All patients were informed about the embolization technique and possible complications and all of them signed informative consent.

### 2.1. Definitions and outcome measures

The IPSS is a validated questionnaire which is used to assess the symptoms as regard type and severity and to evaluate the outcome after treatment. The questionnaire yields a total score ranging from 0 to 35 (1–7 for mild symptoms, 8–19 for moderate, and 20–35 for severe) (11,12).

QOL is another questionnaire by which symptom severity can be assessed by asking the patients how they feel about their current urinary symptoms yielding a score from 0 (delighted) to 6 (terrible). Objective measurement of uroflowmetry variables such as Qmax and PVR gives useful information on micriturition, and the results can be used to assess severity of obstruction and predict the likelihood of disease progression and response to treatment (13). The normal Qmax in a young healthy adult male subject is approximately 25 ml/s, whereas the Qmax in a patient with BPH reflects a weaker stream as a result of urethral compression. When the Qmax measured by uroflowmetry is lower than 12 ml/s, generally it is indicative of BPH (11).

### 2.2. Technique

Procedure was performed on an outpatient basis. Two catheter laboratory machines were used in the study; Toshiba machine Infinix INFX-8000V and Toshiba machine Max 1000 P. Embolization procedure was performed as follows: under local anesthesia via right femoral artery puncture, a 6F vascular sheath (Cordis, Warren, New Jersey; USA), then a 5F Cobra head catheter (Cordis, Warren, New Jersey; USA) was introduced in right femoral artery to catheterize the left Internal Iliac artery then catheterizing its anterior division. Then an ipsilateral oblique view (30–40°) was obtained for differentiation of prostatic artery from other branches of anterior division & for identification of prostatic artery origin which is then selectively catheterized as distal as possible with a 2.7F coaxial microcatheter (Progreat; Terumo, Tokyo, Japan). For embolization, nonspherical 150–250  $\mu\text{m}$  PVA (Contour TM, Boston Scientific; Natick, MA, USA) was used with slow injection under fluoroscopy guidance. The endpoint for embolization was stasis in the prostatic artery. Then a loop was formed by the Cobra catheter to catheterize the right internal iliac artery and the right prostatic artery was catheterized by the microcatheter with ipsilateral oblique view (30–40°) and embolized in the same way as the left side (Fig. 1). In 16 patients identification of prostatic blush was facilitated by an inserted UB catheter at the beginning of the procedure including 8 patients presented by previously inserted catheter due to urine retention with identification of the blush below the catheter inflated balloon, and in 12 patients we depended upon anatomical findings only without catheter insertion.

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