CLINICAL STUDY

Efficacy of Prostatic Artery Embolization for Catheter-Dependent Patients with Large Prostate Sizes and High Comorbidity Scores

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ABSTRACT

Purpose: To evaluate efficacy and safety of prostate artery embolization (PAE) in urinary catheter–dependent patients with large prostate volumes and high comorbidity scores.

Materials and Methods: A retrospective single-center review was conducted of 30 patients with urinary retention at time of PAE from November 2014 through February 2017. Mean (range) age was 73.1 years (48–94 y), age-adjusted Charlson comorbidity index was 4.5 (0–10), duration of urinary retention was 63.4 days (2–224 d), International Prostate Symptom Score quality-of-life (IPSS-QOL) was 5.3 (3–6), and prostate volume was 167.3 cm^3 (55–557 cm^3). These parameters were collected at 3, 6, and 12 months after PAE. Trials of voiding were performed approximately 2 weeks after PAE and, if failed, every 2 weeks thereafter. Adverse events were graded using the Clavien-Dindo classification.

Results: At a mean (range) of 18.2 days (1–72 d), 26 (86.7%) patients were no longer reliant on catheters. Follow-up was obtained in all patients eligible at 3 and 6 months and 17 of 20 (85.0%) patients eligible at 1 year. Mean (range) IPSS-QOL improved significantly to 1.2 (0–5), 0.7 (0–4), and 0.6 (0–4) at 3, 6, and 12 months (all $P < .001$). Mean (range) prostate volume decreased significantly to 115.9 cm^3 (27–248 cm^3) at 3 months ($P < .001$). Two patients experienced grade II urosepsis complications, which were successfully treated with intravenous antibiotics. All other complications were self-limited grade I complications.

Conclusions: PAE represents a safe and effective option for management of patients with urinary retention, especially patients with large prostates who are not ideal surgical candidates.

ABBREVIATIONS

BPH = benign prostatic hyperplasia, BPO = benign prostatic obstruction, CCI = Charlson comorbidity index, CIC = clean intermittent catheterization, IIEF = International Index of Erectile Function, IPSS = International Prostate Symptom Score, LUTS = lower urinary tract symptoms, PAE = prostate artery embolization, PO = per os, PVR = postvoid residual, QOL = quality of life, TURP = transurethral resection of the prostate

Traditionally, the standard of care for patients with urinary retention has been urethral catheterization followed by a trial of voiding without catheterization (1). Most of these patients may be managed conservatively and ultimately void with or without the assistance of pharmacotherapy (2,3). However, select patients may progress to chronic retention with catheter dependence necessitating surgical intervention (4). In patients who have large prostate volumes and patients who have serious medical comorbidities, there is a reduced likelihood of successfully passing a trial of voiding without catheterization (1) and an increased risk of perioperative complications (5,6). Hence, these patients are not considered to be ideal surgical candidates (7,8). Prostate artery embolization (PAE) has proven effective in the treatment of benign prostatic

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Figure E1 is available online at *www.jvir.org*.

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obstruction (BPO) and in patients with larger prostate glands (9–14). Previous reports of PAE in patients with urinary retention either have focused on patients with prostate sizes of 30–90 g or have not assessed comorbidity scores (9,15–17). This single-center series evaluated the clinical efficacy and adverse effects related to PAE in catheter-dependent patients with large prostate volumes and high comorbidity scores.

MATERIALS AND METHODS

Patients

Medical records were retrospectively reviewed for consecutive patients presenting with urinary retention who underwent PAE between November 2014 and February 2017. Data were abstracted from a Health Insurance Portability and Accountability Act–compliant, institutional review board–approved database. The series included all patients undergoing PAE at a single center who had presented with urinary retention. All patients had failed at least 2 trials of voiding without catheterization before being offered PAE, and all had received pharmacologic treatment before PAE for lower urinary tract symptoms (LUTS) presumed to be resulting from BPO.

Patients undergoing PAE were evaluated by urologists and interventional radiologists in a multidisciplinary fashion. Exclusion criteria for treatment included underlying neurogenic disorders. Patients with < 3 months of follow-up after PAE were excluded from analysis. Patients who had undergone a prior endoscopic treatment for BPO were not excluded.

Baseline demographic data are provided in **Table 1**. Mean (range) age was 73.1 years (48–94 y), age-adjusted Charlson comorbidity index (CCI) was 4.5 (0–10), duration of urinary retention was 63.4 days (2–224 d), International Prostate Symptom Score quality of life (IPSS-QOL) index was 5.3 (3–6), and prostate volume was 169.3 cm^3 (55–557 cm^3). Of patients, 24 (80.0%) had indwelling catheters, and 6 (20.0%) were using clean intermittent catheterization (CIC). The size of catheters used ranged from 14 F to 18 F. Baseline IPSS and International Index of Erectile Function (IIEF) scores were not collected, as these parameters were unable to be obtained from most patients. All patients with baseline prostate-specific antigen values > 4 ng/mL underwent a prostate biopsy to exclude malignancy before PAE. Baseline and subsequent prostate volume determinations were performed using either magnetic resonance (MR) imaging or computed tomography (CT). One patient had 2 prior transurethral resections of the prostate (TURP) performed 4 years and 2 years before PAE.

Table 1. Baseline Characteristics of Study Cohort

Variable	Mean ± SD	Median (IQR)	Range
Age, y	73.1 ± 11.3	73 (65–82.5)	48–94
Method of catheterization, n (%)			
Indwelling	24 (80.0)	—	—
Clean intermittent	6 (20.0)	—	—
Duration of urinary retention, d	63.4 ± 62.8	36 (19.5–96)	2–224
Age-adjusted CCI	4.5 ± 2.8	4.0 (2–7)	0–10
QOL	5.3 ± 1.1	6 (5–6)	3–6
Prostate volume, cm^3	167.3 ± 108.6	150 (107.0–200.0)	55–557

CCI = Charlson comorbidity index; IQR = interquartile range; QOL = quality of life.

PAE Protocol

All procedures were performed by a single operator (S.B.). All patients undergoing PAE received a prophylactic 400-mg dose of intravenous ciprofloxacin and moderate conscious sedation with 2–3 mg of intravenous midazolam and 100–150 μg of intravenous fentanyl, as needed. Vascular access for PAE was accomplished via either the right common femoral artery or the left radial artery. Transradial access was used for patients after March 2016 and limited to patients with radial artery diameters ≥ 2 mm. Briefly, a hypogastric arteriogram was obtained using a 5-F catheter, and the prostatic arteries were catheterized using a 1.8-F Finecross microcatheter (Terumo, Tokyo, Japan) and 0.014-inch Fathom guide wire (Boston Scientific, Marlborough, Massachusetts). Embolization was performed superselectively to avoid nontarget embolization using 100–300 μm or 300–500 μm Embosphere Microspheres (Merit Medical Systems, Inc, South Jordan, Utah) according to operator discretion. The microspheres were suspended in a mixture that contains 10 mL saline, 10 mL iodinated contrast material, and 2 mL embolic material. When feasible, distal embolization into the prostate gland was performed after reaching complete proximal stasis of the prostatic artery, a technique that has been described previously (18). Intraprocedural cone-beam CT was performed to confirm vascular supply to the prostate and exclude branches to other pelvic viscera.

Patients were observed overnight and for 24 hours after PAE. Patients were generally discharged home the following morning with phenazopyridine (Pyridium; Actavis Totowa LLC, Totowa, New Jersey) 100 mg per os (PO) 3 times a day × 5 days, ibuprofen 800 mg PO 3 times a day × 5 days, ciprofloxacin 500 mg PO 2 times a day × 14 days, and solifenacin succinate (VESIcare; Astellas Pharma, Northbrook, Illinois) 5 mg PO once a day × 5 days. All patients were provided with an adverse event monitoring form (**Fig E1** [available online at *www.jvir.org*]). Self-limiting dysuria, bladder spasms, or pelvic pain and/or pressure were considered an expected aspect of the post-embolization syndrome and thus were not considered adverse events of PAE. Post-procedural adverse events occurring after the procedure were assigned a grade based on the Clavien-Dindo classification.