

**Case Report**

Deep Vein Thrombosis Secondary to Benign Prostatic Hyperplasia Managed with Holmium Laser Enucleation of the Prostate after Prostatic Artery Embolization

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We present the case of a 76 year old patient with severe prostate enlargement and chronic bladder distension causing compression of the common iliac vein and DVT. Initial treatment was done with prostate artery embolization (PAE), but he had persistent urinary retention. The patient was ultimately treated with HoLEP, effectively resolving his lower urinary tract symptoms (LUTS). We discuss the use of PAE in significant prostate enlargement with severe symptoms and the use of HoLEP as a safe, effective salvage therapy for patients with residual LUTS after primary PAE.

Keywords: Deep Vein Thrombosis, Lower Urinary Tract Symptoms; Benign Prostatic Hyperplasia; Prostatic Artery Embolization; Holmium Laser Enucleation of the Prostate.**Introduction**

BPH is incredibly common in older men [1,2]. Prostatic artery embolization (PAE) [3], first reported in 2000 as a minimally invasive therapy for the management of LUTS, has been shown to significantly improve symptoms [3-5]. Recent AUA guidelines support its offering by trained providers, an upgrade from its prior “clinical trial only” status [6]. However, current data shows that 20-36% of patients have persistent bothersome LUTS following PAE3. Many of these men undergo a subsequent bladder outlet procedure, with initial data showing HoLEP as a safe and effective surgical option in this setting [7].

Urinary retention resulting from BPH often causes urinary tract infections, bladder stones, hydronephrosis, and acute kidney injury [8]. In severe cases, massive bladder distention secondary to urinary retention has been documented to cause compression of the iliac veins resulting in DVT-like symptoms, including lower extremity and scrotal edema. Far less frequently, bladder enlargement from urinary retention has caused venous stasis significant enough to precipitate a true DVT [9].

Case Presentation

A 76 year old male with a history of hypertension, hyperlipidemia, and benign prostatic hyperplasia presented with three days of worsening unilateral, right lower extremity edema. Outpatient ultrasound revealed a DVT and he was admitted to the hospital for evaluation and treatment. On admission, CTA demonstrated

a DVT extending from the right external iliac vein to the distal femoral vein. Notably, the scan also identified a significantly distended bladder to the level of the umbilicus, enlarged heterogeneous prostate gland (approximately 220cc), and severe bilateral hydronephrosis.

The patient promptly underwent rheolytic thrombectomy with right iliofemoral balloon venoplasty by interventional radiology. Foley catheter was placed at that time. He was initially started on a heparin drip and then transitioned to Eliquis. Repeat ultrasound showed resolution of the right lower extremity DVT and he was subsequently discharged from the hospital after 3 days with Foley in place.

On outpatient follow-up, the patient elected to move to surgical treatment rather than attempt long-term medical management given the severity of his initial presentation. At that time, treatment with PAE and HoLEP were discussed. The patient ultimately decided to undergo PAE due to its shorter postoperative recovery time. He underwent successful bilateral prostatic artery embolization with Embozene microparticles and went home post-op with Foley in place. One month post-op, he failed a void trial and transitioned to CIC.

Three months following PAE, imaging showed a 40% reduction in his prostate size to 120ccs, with increasing ability to void spontaneously, but still with post-void residual values consistently >500cc requiring continued CIC. Over the following two years, the patient's voiding efficiency remained ~20-45% with persistent residual volumes >500cc, he continued CIC 2-4 times daily and additionally was treated for numerous urinary tract infections.

Given his persistent poor voiding efficiency and recurrent infections, the patient elected to undergo a repeat bladder outlet procedure. For his prostate size still >100cc, he considered robotic simple prostatectomy and Aquablation, but ultimately decided to proceed with HoLEP.

Intraoperatively, the prostatic urethra appeared normal, with trilobar enlargement and channel obstruction. HoLEP was performed in the standard en bloc fashion with early apical release. We expected the dissection planes to be largely hemostatic given the prior PAE, but the vascularity to the prostate capsule appeared similar to non-embolized prostates. Unique to this case, there were multiple empty cavities along the posterior prostatic capsule as highlighted in the video (Link: <https://www.gavinpublishers.com/assets/videos/CaseReportVideo.mp4>), consistent with areas of avascular necrosis following PAE. The cavities were able to be connected with the traditional capsular dissection plane to complete enucleation. Morcellation was similar to non-embolized adenoma.

His postoperative course was uncomplicated, he was discharged on

POD#1, and foley was removed on POD#3. Six weeks post-op, he was seen in clinic and reported a strong urinary stream, no urinary incontinence, and measured PVR 186cc. He has discontinued CIC and his symptom control and good voiding efficiency have persisted through one year of follow-up.

Discussion

HoLEP has been shown to be an effective intervention for BPH with low complication rates and long-lasting results even in severely enlarged prostates [10]. Additionally, multiple studies show that HoLEP is feasible as a secondary treatment for recurrent symptoms after various procedures [11,12]. There is some experience with PAE followed by HoLEP [7,13] either as combination or salvage therapy—but not for such a complicated case of urinary retention.

The surgical video (Link: <https://www.gavinpublishers.com/assets/videos/CaseReportVideo.mp4>) demonstrates several intraoperative findings during HoLEP following PAE. The prostatic urethra appears normal, with pink mucosa, and the initial mucosal incision produced a “normal” amount of bleeding. Additionally, dissection along the prostate capsule demonstrated similar perforating blood vessels requiring laser coagulation. In this case, the micro particles embolized the more distal, central portions of the prostate, leaving the capsular and mucosal vasculature patent, which surgeons should prepare to address, particularly in anemic or anticoagulated patients.

The empty pockets from PAE-induced necrosis characterize the mechanism of volume loss in this patient. However, the tissue was not uniformly ischemic or softened as seen during dissection and morcellation. This finding underscores the uncertainty that comes with PAE, which may devascularize and shrink parts of the obstructive adenoma, but not all.

DVTs resulting from bladder compression of the iliac veins are rare but serious complications of untreated urinary retention. This patient's degree of urinary retention at presentation, especially with such a hazardous side effect, suggested a high degree of bladder dysfunction, and he may have been optimally treated with HoLEP initially. However, given his interest in minimally invasive treatment and willingness to comply with CIC, PAE was a reasonable first treatment to resolve his retention with the opportunity for definitive HoLEP if ultimately needed.

Conclusion

PAE has recently emerged as a promising minimally invasive intervention for BPH, but some patients (particularly when starting with severe symptoms) have incomplete resolution of their LUTS. This case displays that DVT does occur as a rare complication of chronic, large volume urinary retention. Finally, our case supports HoLEP as a safe and effective salvage therapy for patients following PAE treatment.

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References

1. Langan RC. (2019) Benign Prostatic Hyperplasia. *Prim. Care* 46: 223–232.
2. McVary K. T. (2006) BPH: epidemiology and comorbidities. *Am. J. Manag. Care* 12: S122-128.
3. Ray A. F, Powell J, Speakman MJ, Longford NT, Dasgupta R, et al. (2018) Efficacy and safety of prostate artery embolization for benign prostatic hyperplasia: an observational study and propensity-matched comparison with transurethral resection of the prostate (the UK-ROPE study). *BJU Int.* 122: 270–282.
4. Christidis D, Clarebrough E, Ly V, Perera M, Woo H, et al. (2018) Prostatic artery embolization for benign prostatic obstruction: assessment of safety and efficacy. *World J. Urol.* 36: 575–584.
5. Yu, H., Isaacson, A. J. & Burke, C. T. (2016) Review of Current Literature for Prostatic Artery Embolization. *Semin. Interv. Radiol.* 33: 231–235.
6. Sandhu J. S, Bixler BR, Dahm P, Goueli R, Kirkby E, et al. (2024) Management of Lower Urinary Tract Symptoms Attributed to Benign Prostatic Hyperplasia (BPH): AUA Guideline Amendment 2023. *J. Urol.* 211:11–19.
7. Parmar, M. Katz JE, Braun RB, Smith NA, Oneto SM, et al. (2021) Safety and efficacy of holmium laser enucleation of prostate as salvage procedure for persistent or recurrent lower urinary tract symptoms secondary to bladder outlet obstruction after prior prostate artery embolization: a match analysis. *World J. Urol.* 39: 4199–4206.
8. Bille, M. & Windsor, T. A. (2019) Urinary Retention. *Emerg. Med. Clin. North Am.* 37: 649–660.
9. Ali, E. A., Achong C, Kc N, Enriquez D, Panigrahi K, et al. (2023) Severe Urine Retention and Deep Vein Thrombosis: A Case Report and Review of the Literature on an Unusual Association. *Cureus* 15: e37568.
10. Krambeck, A. E., Handa, S. E. & Lingeman, J. E. (2010) Experience With More Than 1,000 Holmium Laser Prostate Enucleations for Benign Prostatic Hyperplasia. *J. Urol.* 183: 1105–1109.
11. Elshal, A. M, Elmansi, H. M. & Elhilali, M. M. (2012) Feasibility of holmium laser enucleation of the prostate (HoLEP) for recurrent/residual benign prostatic hyperplasia (BPH). *BJU Int.* 110: E845–E850.
12. Jaeger, C. D. & Krambeck, A. E. (2013) Holmium Laser Enucleation of the Prostate for Persistent Lower Urinary Tract Symptoms After Prior Benign Prostatic Hyperplasia Surgery. *Urology* 81: 1025–1029.
13. Li, P, Wang C, Cao Q, Zhang J, Shi H, et al. (2017) Prostatic Arterial Embolization Followed by Holmium Laser Enucleation of the Prostate as a Planned Combined Approach for Extremely Enlarged Benign Prostatic Hyperplasia. *Urol. Int.* 99: 422–428.