Prostatic Artery Embolization and the Median Lobe: Stuck in the Middle with You?

Tiago Bilhim, MD, PhD, EBIR, FCIRSE, FSIR

We read with great interest the study by Yu et al. (1) that provides in-depth knowledge on the implications of the median lobe for patients with benign prostatic hyperplasia (BPH) treated with prostatic artery embolization (PAE). Frequently, physicians and patients ask if the median lobe is a contraindication for PAE in patients with BPH and if results are worse in these patients. The present study sheds some lights on this specific topic, proving that not all median lobes are the same, but many questions arise. What is the median lobe? What type of imaging classification can we use to assess it? What is the impact of the median lobe on the natural progression of disease in patients with BPH? Does the median lobe also limit the efficacy of other minimally invasive surgical techniques such as prostatic urethral lift (PUL) or water vapor thermal therapy? What do we know already about the effect of PAE for the median lobe? Can we target the median lobe during PAE? Is PAE effective when treating patients with BPH and a median lobe?

There are many different types of intravesical prostatic protrusions (IPPs) that may be due to median lobe overgrowth, but also from the central or transitional zones of the prostate or even from the anterior fibromuscular stroma (2–5). Usually, the terminology of "median lobe" refers to the continued growth of the periurethral glands, leading to a well-demarcated expanding midline retrourethral tissue (3–5); thus, IPP connotes a broader reach encompassing both the median lobes as well as all IPP from other glandular zones of the prostate. IPPs are very frequent, with an estimated prevalence of 27% when assessed with magnetic resonance on a cohort with a median age of 65 years and a median prostate volume of 66 cm^3 (2). It seems that IPP is not prostate size or age dependent because it may be present in smaller or larger prostates regardless of patient age (2). IPPs can be classified based on their topography regarding the bladder neck (anterior, posterior, lateral) (2) if they are an isolated growth (10% of BPH patients) or concomitant to the more frequent bilateral transitional zone enlargement (lateral lobes; 46% of BPH patients) if the IPP is pedunculated or subtrigonal (less than 9% of patients) (2–5). It seems that the study from Yu et al. (1) shows that patients with pedunculated (taller than wide) IPPs have poor outcomes after PAE resulting from a "ball valve" effect type of obstruction of the bladder neck. This bladder outlet obstruction (BOO) becomes more prominent after embolization as the prostatic tissue gets softer and more mobile with ischemia.

In fact, the presence of an IPP has an identified impact on management of patients with BPH (6–8). Unfortunately, IPP cannot be accurately identified with digital rectal examination; thus, transrectal ultrasonography and/or magnetic resonance are necessary to delineate the prostatic zonal anatomy (3,4). It is important to identify the presence of an IPP in patients with BPH because it may be a cause of refractory symptoms not responding to α1-adrenoceptor antagonist therapy (6). The IPP has been shown to be a better and more reliable predictor of BOO than many other parameters such as the severity of symptoms, prostate volume, peak urinary flow rate, or postvoid residual urine volume (7). An IPP >5.5 mm has been proven to be significantly associated with BOO and higher risk of clinical progression of BPH (8–10). In patients with acute urinary retention, an IPP >10 mm has been shown to be a significant predictor of failure of a trial without a catheter (9).

The IPP can also affect outcomes and complications of prostatectomies (6). The presence of an IPP obstructing the bladder neck is considered a relative contraindication for minimally invasive surgical techniques such as PUL, but not for water vapor thermal therapy (11,12). Patients with prostate volume >80 cm^3

From the Interventional Radiology Unit, Saint Louis Hospital and Curry Cabral Hospital, CHULC, Rua Luz Soriano 182, Lisbon 1200-249, Portugal. Received August 1, 2019; final revision received and accepted August 2, 2019. **Address correspondence to** T.B.; E-mail: tiagobilhim@hotmail.com

T.B. is a paid consultant for Merit Medical (South Jordan, Utah), Terumo (Tokyo, Japan), and Philips (Eindhoven, The Netherlands), an advisory board member for Merit Medical, and a shareholder in EmbolX (Sunnyvale, California).

J Vasc Interv Radiol 2019; 30:1817–1819

https://doi.org/10.1016/j.jvir.2019.08.003

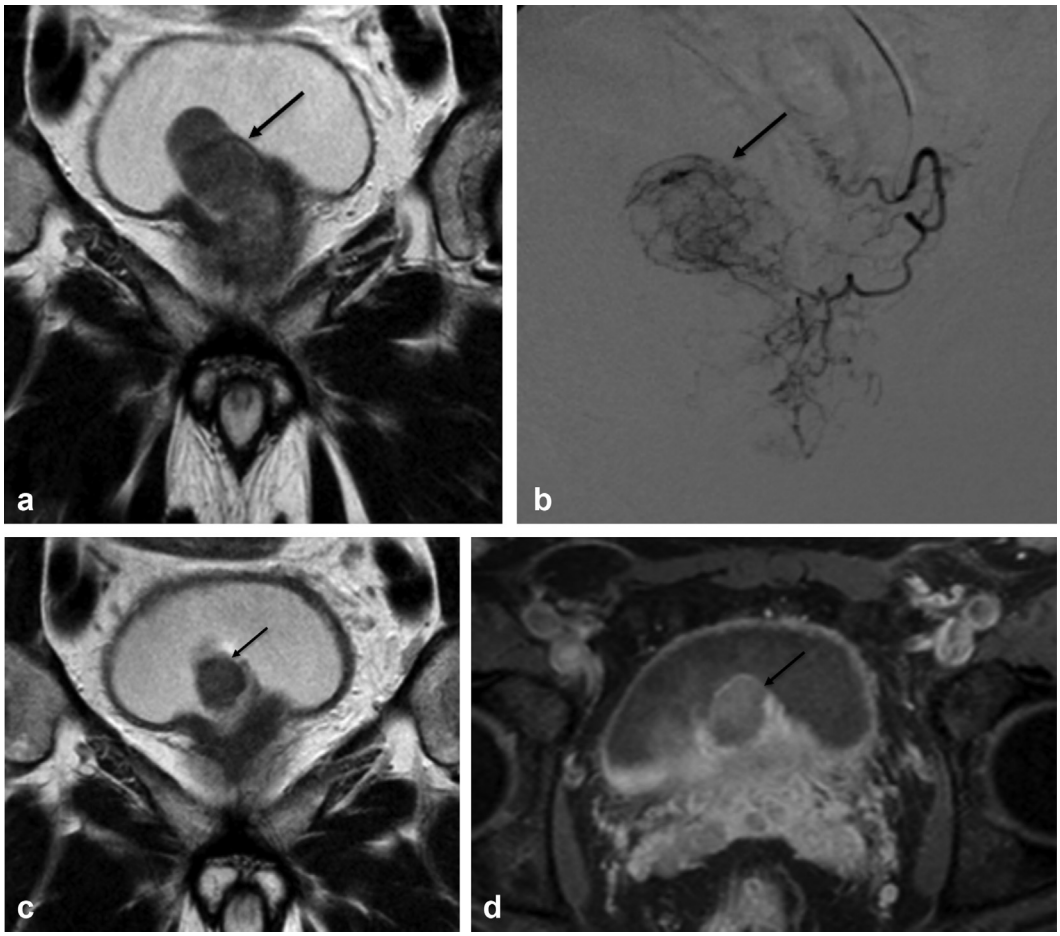

Figure 1. A 67-year-old patient with benign prostatic hyperplasia and a pedunculated IPP who had an acute urinary retention 1 month after prostatic artery embolization requiring bailout surgery. **(a)** Coronal T2-weighted magnetic resonance image shows the pedunculated IPP on the left (arrow). **(b)** Selective arteriography of the left prostatic artery depicting the feeding arteries into the IPP (arrow); magnetic resonance imaging 3 weeks after prostatic artery embolization showing **(c)** coronal T2-weighted image with volume reduction and hypointensity resulting from ischemia of the IPP (arrow). **(d)** Axial T1-weighted gadolinium-enhanced image with fat suppression depicting the ischemia of the IPP (arrow). IPP, intravesical prostatic protrusion.

with an IPP may need an adjunctive surgical resection of the IPP during the PUL procedure to be effective (13), even though some studies have shown that PUL can treat effectively BPH patients with an IPP (14).

What about PAE and the IPP? Can we reach the IPP and embolize it safely? **Figure 1** depicts a patient with a pedunculated IPP that was treated with PAE and had an acute urinary retention 1 month after embolization that required bailout surgical resection of the median lobe. As Yu et al. (1) have shown, we can, in fact, target the median lobe and embolize it. In line with previous reports by Lin et al. (15,16), it was proven that PAE can reduce the IPP size and volume. The reduction in IPP significantly correlated with symptomatic relief (16) and, actually, the IPP is the zone of the prostate with greatest ischemia and volume reduction after PAE: 26% of volume decrease versus 19% for central gland and 16% for peripheral zone (15). The study by Yu et al. (1) confirms that PAE can target the IPP, but with different clinical outcomes depending on the subtypes of IPP present. Clearly, pedunculated IPPs with taller than wide protrusions into the bladder neck are poor candidates for PAE, with 34% of patients presenting worsening of BOO symptoms, acute urinary retention, or failure to remove the bladder catheter and 11% requiring bailout surgery after embolization. One would not want to end up as Stealers Wheel: "here I am stuck in the middle with you." The good news is that these types of pedunculated IPPs have an overall reported prevalence of 10% (2–5), even though they were documented in 43% of patients from the study of Yu et al. (1), which may be due to selection bias. The vast majority of IPPs are broad-based (**Figure 2**) and respond well to PAE (1). As PAE moves forward into impending urological acceptance (17), it is important to better select patients before PAE to avoid clinical failures. The study from Yu et al. (1) shares important information regarding patient selection when an IPP is present: avoid pedunculated IPPs!

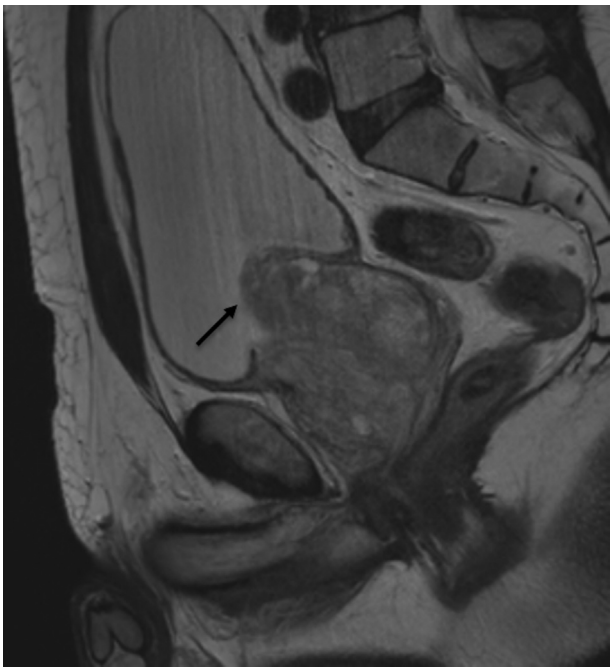

Figure 2. A broad-based intravesical prostatic protrusion (arrow) coexisting with bilateral transitional zone enlargement of the lateral lobes. This patient was treated with prostatic artery embolization with improvement of symptoms and relief of the bladder outlet obstruction.

REFERENCES

1. Yu SCH, Cho CCM, Hung EHY, et al. Thickness-to-Height Ratio of Intravesical Prostatic Protrusion Predicts the Clinical Outcome and Morbidity of Prostatic Artery Embolization for Benign Prostatic Hyperplasia. J Vasc Interv Radiol 2019; 30:1807–1816.
2. Audouin M, Girshovich A, Cussenot O, Renard-Penna R. Typology of intravesical prostatic protrusions, or so-called median lobes, in middle-aged and older men. Surg Radiol Anat 2018; 40:389–393.
3. Wasserman NF. Benign prostatic hyperplasia: a review and ultrasound classification. Radiol Clin North Am 2006; 44:689–710, viii.
4. Wasserman NF, Spilseth B, Golzarian J, Metzger GJ. Use of MRI for lobar classification of benign prostatic hyperplasia: potential phenotypic biomarkers for research on treatment strategies. AJR Am J Roentgenol 2015; 205:564–571.
5. Randall A. *Surgical Pathology of Prostatic Obstructions*. Baltimore (MD): Williams & Wilkins; 1931.
6. Gandhi J, Weissbart SJ, Kim AN, Joshi G, Kaplan SA, Khan SA. Clinical considerations for intravesical prostatic protrusion in the evaluation and management of bladder outlet obstruction secondary to benign prostatic hyperplasia. Curr Urol 2018; 12:6–12.
7. Chia SJ, Heng CT, Chan SP, Foo KT. Correlation of intravesical prostatic protrusion with bladder outlet obstruction. BJU Int 2003; 91:371–374.
8. Shin SH, Kim JW, Kim JW, Oh MM, Moon du G. Defining the degree of intravesical prostatic protrusion in association with bladder outlet obstruction. Korean J Urol 2013; 54:369–372.
9. Mariappan P, Brown DJ, McNeill AS. Intravesical prostatic protrusion is better than prostate volume in predicting the outcome of trial without catheter in white men presenting with acute urinary retention: a prospective clinical study. J Urol 2007; 178:573–577; discussion 577.
10. Lee LS, Sim HG, Lim KB, Wang D, Foo KT. Intravesical prostatic protrusion predicts clinical progression of benign prostatic enlargement in patients receiving medical treatment. Int J Urol 2010; 17:69–74.
11. Magistro G, Chapple CR, Elhilali M, et al. Emerging minimally invasive treatment options for male lower urinary tract symptoms. Eur Urol 2017; 72:986–997.
12. McVary KT, Roehrborn CG. Three-year outcomes of the prospective, randomized controlled Rezuum System study: convective radiofrequency thermal therapy for treatment of lower urinary tract symptoms due to benign prostatic hyperplasia. Urology 2018; 111:1–9.
13. Shah BB, Tayon K, Madiraju S, Carrion RE, Perito P. Prostatic urethral lift: does size matter? J Endourol 2018; 32:635–638.
14. Rukstalis D, Grier D, Stroup SP, et al. Prostatic urethral lift (PUL) for obstructive median lobes: 12 month results of the MedLift Study. Prostate Cancer Prostatic Dis 2019; 22:411–419.
15. Lin YT, Amouyal G, Correas JM, et al. Can prostatic arterial embolisation (PAE) reduce the volume of the peripheral zone? MRI evaluation of zonal anatomy and infarction after PAE. Eur Radiol 2016; 26: 3466–3473.
16. Lin YT, Amouyal G, Thiounn N, et al. Intra-vesical prostatic protrusion (IPP) can be reduced by prostatic artery embolization. Cardiovasc Intervent Radiol 2016; 39:690–695.
17. Foster HE, Barry MJ, Dahm P, et al. Surgical management of lower urinary tract symptoms attributed to benign prostatic hyperplasia: AUA Guideline. J Urol 2018; 200:612–619.