

Patient Workup Algorithm for Prostate Artery Embolization

An algorithm-based approach for patient workup is critical for optimizing patient selection and achieving standard-of-care outcomes.

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Prostate artery embolization (PAE) is a minimally invasive, angiographic procedure that safely and effectively treats the sequelae of benign prostatic hyperplasia (BPH). Now that PAE has become an accepted treatment option in BPH management algorithms published by both North American and European urological societies,^{1,2} PAE has become arguably one of the largest areas of growth for the specialty of interventional radiology. As patient interest and referral volumes for PAE continue to increase, so too will the number of interventional radiologists (IRs) who are performing this procedure. Accordingly, a strong working knowledge of the pathophysiology, preprocedure patient evaluation, and postprocedure follow-up are important to treat patients successfully, maintain excellent outcomes, and guarantee continued success of this procedure. This article provides an algorithm-based approach for PAE patient workup that can help ensure a thorough evaluation that optimizes patient selection and thereby promotes excellent procedural results.

1

Define the indication(s) for treatment.

Clearly establish the clinical indication(s) for considering PAE in order to focus the subsequent patient evaluation. The common sequelae of BPH include both-

ersome lower urinary tract symptoms (LUTS) caused by prostatic bladder outlet obstruction; urinary retention when the obstruction is severe; and gross hematuria originating from a bleeding hyperplastic prostate, which can lead to obstruction from clots and even severe bleeding requiring transfusion and continuous bladder irrigation. PAE can effectively treat any of these indications. PAE can also be considered for shrinking and devascularizing the gland in preparation for other treatments, such as external beam radiation or radical prostatectomy for prostate cancer.

2

Confirm that symptoms are caused by BPH.

LUTS

When evaluating LUTS, distinguishing bladder emptying or voiding symptoms (weak stream, straining, sensation of incomplete emptying, intermittent stream) from bladder storage symptoms (frequency, urgency, nocturia) is critical to ensure that the patient's problem is BPH-related and worthy of procedural treatment.³

Voiding symptoms may be due to bladder outlet obstruction caused by prostatic enlargement from BPH, although entities such as urethral strictures, bladder neck contractures, and bladder underactivity can also cause voiding symptoms. A careful history can elicit events such as sexually transmitted diseases, stone passage,

prior surgeries, or other urethral instrumentation that could have caused strictures or scarring. A cystoscopy allows direct visualization of the urethra if such issues are suspected. For mild voiding symptoms, especially when there is no associated elevated postvoid residual (PVR), medical therapy should be trialed first, commonly with an α -blocker and/or phosphodiesterase inhibitor to help with flow and possibly coupled with a 5 α -reductase inhibitor to help shrink glands > 50 mL.⁴ However, procedural intervention becomes warranted if, despite optimal medical therapy, symptoms reach moderate severity or if a significantly elevated PVR persists.⁴

Storage symptoms are not necessarily specific to BPH and can be present in other common conditions: overactive bladder, urinary tract infection (UTI), bladder stones, bladder cancer, neurogenic bladder, poorly controlled diabetes mellitus, sleep apnea, polydipsia, and nocturnal polyuria. Central nervous system disorders such as Parkinson's disease, multiple sclerosis, stroke, and spinal cord injury can also adversely affect bladder function. Careful history taking, urinalysis, cystoscopy, and, when necessary, a urodynamic study can establish whether confounding entities are present that would not be indications for PAE. Importantly, these conditions can coexist with BPH-related bladder outlet obstruction.⁵ Hence, establishment of any of these conditions does not rule out treatment of symptomatic BPH but rather should be addressed to promote realistic expectations about post-PAE symptom improvement. Indeed, these conditions can be treated in parallel to symptomatic BPH. However, patients in whom storage symptoms dominate should have those addressed before considering a procedure to treat bladder outlet obstruction.

Urinary Retention

Acute urinary retention can occur in patients who were voiding despite bladder outlet obstruction until an inciting event (eg, UTI, antihistamine administration, general anesthesia). Patients may also gradually progress to complete retention after months or years of bladder function deterioration from high-resistance outlet obstruction. When considering treating patients with urinary retention, first assess how complete the retention is. Is the patient dependent on an indwelling urethral catheter or is he self-catheterizing with or without intermittent spontaneous voiding? What are his PVRs when he self-catheterizes after voiding? Has he had any recent spontaneous voiding? Is a urodynamic study warranted to assess remaining detrusor function? Sometimes patients appear to be voiding appropriate

volumes with appropriate frequency and minor LUTS but are then found to have large occult PVRs. In such cases, if the large PVR is not leading to UTIs, bladder stones, or upstream hydronephrosis, then a procedure may not be indicated, provided that the patient is monitored with vigilance for complications of urinary retention. Also, one should assess if any central nervous system process is affecting bladder function. Whatever the situation, if there is a reasonable chance that the patient will be able to return to a sustainable voiding pattern after a successful PAE, then the risk/benefit analysis usually favors proceeding with treatment.

Gross Hematuria

Large vascular prostate glands are common sources of gross hematuria.⁶ However, other potential causes of gross hematuria should be ruled out before embarking on a treatment plan. The workup includes upper urinary tract evaluation with a CT urogram to look for renal/urothelial malignancy or nephroureteral lithiasis and lower urinary tract evaluation with cystoscopy to rule out bladder malignancy or bladder stones and otherwise rule in a large vascular prostate gland. Urine culture is obtained to rule out UTI as a cause of bleeding, and any history of urinary tract trauma should be screened. Next, one must decide if the amount of prostate-related gross hematuria merits treatment. Is the bleeding visible but otherwise asymptomatic? Or, does the patient's bleeding lead to clot retention, frequent urgent clinical encounters, or inpatient treatment requiring blood transfusions or continuous bladder irrigation? A significant risk of prostatic bleeding during another planned cystoscopic procedure can also be an appropriate indication to proceed with PAE. These indications may be more urgent if a patient is on an anticoagulation medication that cannot be stopped safely.

Gland Volume Reduction

Lastly, some referring providers may request that PAE be performed solely for the purpose of shrinking the gland to make other interventions safer or more effective. For example, decreasing prostate volume prior to radiation therapy for prostate cancer can help decrease the dose required to treat the targeted tissue and thereby reduce the risk or severity of complications like radiation proctitis or cystitis. Gland volume reduction may also be helpful for a patient who needs repeated cystoscopic evaluation for bladder cancer surveillance, for example. For such indications, the gland volume should be verified ideally using MRI, and cystoscopic evaluation is important to confirm that the prostate size would indeed be prohibitive for cystoscopic procedures.

3

Screen for management challenges and contraindications.

Elderly patients may be referred for PAE because they have medical comorbidities that preclude surgical treatment. Patients will commonly be taking anticoagulation medications that may need to be paused for a PAE procedure, although using radial arterial access can obviate the need for such precaution. Relevant medication allergies require vigilant premedication, and phosphodiesterase medications generally should be held prior to PAE if intra-arterial nitroglycerin is to be used. Any history of prior UTI should prompt careful selection of a periprocedural antibiotic that will be effective against any persistent urinary tract flora. Patients may often have marginal renal function, although judicious contrast use by an experienced PAE operator will usually be sufficient to manage this. Concern for challenging vascular access, such as a history of severe atherosclerotic disease or endovascular aortic repair, may merit obtaining a CTA of the pelvis for planning purposes. However, these studies often overestimate the vascular access challenges and may ultimately result in unnecessary testing for an experienced PAE operator who is otherwise comfortable with such procedural challenges.

Once an appropriate indication has been established, contraindications to the procedure are few. Treating during an active UTI should be avoided, although emergent PAE for transfusion-dependent hematuria occasionally must be performed in the setting of infection. If a patient has a biopsy-proven prostate cancer that will result in radical prostatectomy, then PAE would be superfluous unless preoperative gland shrinkage is desired. Some studies suggest that an enlarged prostatic median lobe may yield suboptimal outcomes, but that remains a topic of debate, and not all groups have observed this trend.⁷

4

Coordinate periprocedural logistics.

Finally, to build a successful PAE practice and ensure that patients receive appropriate care, one must maintain good working relationships with referring urologists and collaborate with them to evaluate patients who self-refer to interventional radiology before undergoing a urologic evaluation. This will ensure that patients have a thorough understanding of their treatment options before choosing to undergo PAE. For patients with indwelling urinary catheters, the catheter should ideally be exchanged within a few days prior to PAE, to minimize catheter-associated UTIs. Post-PAE voiding trials must also be coordinated for these patients if they will not be performed by the IR. Importantly, the IR

should partner with a urologist when managing unexpected post-PAE problems such as acute urinary retention, passage of obstructing necrotic prostate tissue, or urinary catheter blockage issues. This is even more important for patients who travel long distances to undergo PAE and may not be able to return for urgent unexpected issues or routine follow-up. For such patients, remote telemedicine visits with local in-person follow-up should be arranged.

CONCLUSION

Mastering the evaluation of a BPH patient can seem daunting to the IR who is starting to build a PAE practice. However, just as with the many other clinical service lines that IRs have mastered, using an algorithmic approach to evaluating the BPH patient can eliminate much of the uncertainty in the process. Such an approach combined with a focused, standardized history and basic set of diagnostic tests will provide a strong foundation for a PAE practice that delivers excellent outcomes. ■

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