Transurethral resection of prostatic abscess

Mark G. Biebel, MD, Wesley R. Pate, MD, Toby C. Chai, MD[1]
Boston University School of Medicine, Boston, Massachusetts, USA

BIEBEL MG, PATE WR, CHAI TC. Transurethral resection of prostatic abscess. *Can J Urol* 2021; 28(2):10638-10642.

Prostate abscess (PA) is an uncommon prostatic infection, with risk factors including indwelling catheters, acute or chronic prostatitis, bladder outlet obstruction, voiding dysfunction, recent urologic instrumentation (especially transrectal prostate biopsy), chronic kidney disease (CKD), diabetes mellitus (DM), human immunodeficiency virus (HIV), intravenous drug use (IVDU), and hepatitis C. Treatment of PA consists of antibiotics and abscess drainage via transurethral resection (TUR) or image-guided transrectal or transperineal drainage. Numerous studies have demonstrated that TUR of PA has a higher success rate and shorter hospital length of stay when compared to image-guided drainage. Despite this, TUR of PA is a relatively uncommon surgery with few useful recommendations on how to best perform this procedure. We demonstrate the TUR surgical technique for drainage of a 6 cm loculated PA in a 44-year-old man with active IVDU and hepatitis C. The patient presented with progressive voiding symptoms, urinary retention, and leukocytosis. Given the size, loculated nature of the abscess, and its proximity to the prostatic urethra, we decided to proceed to the operating room for surgical drainage as opposed to image-guided transrectal drainage. Herein we describe the transurethral technique. He clinically improved postoperatively and repeat imaging 4 days later showed decreased abscess size.
Transurethral drainage of a PA is a safe, efficient, and effective treatment option. Treatment approach should depend on abscess size, location, and presence of loculations. Combining different endourologic techniques and instruments may be necessary.

Key Words: prostate, abscess, transurethral resection of prostate, prostatitis

Introduction

Prostate abscess (PA) is an uncommon prostatic infection that accounts for approximately 0.5% of all prostatic disease. In immunocompromised patients, incidence has been reported as high as 3%-14%. PA typically occurs as a consequence of untreated acute bacterial prostatitis. Estimated mortality rate ranges from 3%-30%.[1] In the pre-antibiotic era, PA was commonly caused by *Neisseria gonorrhoeae* or *Chlamydia*, with mortality rates up to 50%. Now, PA typically occurs due to *Escherichia coli* (approximately 70%) or other gram-negative pathogens.[2,3] PA from *Staphylococcus aureus* can occur due to hematogenous spread, and is rare with only approximately 40 reported cases in the literature. Concomitant bacteremia is present in approximately 80% of these patients.[4,5] Atypical bacteria and fungi have been cultured from PA in immunocompromised patients. Recently, multi-drug resistant organisms and atypical bacteria are more commonly associated with PA, necessitating the need for treatment with broader spectrum antibiotics.[2]

Accepted for publication February 2021

A video clip is available online at www.canjurol.com

Address correspondence to Dr. Mark G. Biebel, Boston Medical Center, 725 Albany Street, Suite 3B, Boston, MA 02118 USA

Risk factors for PA include indwelling catheters, acute or chronic prostatitis, bladder outlet obstruction, voiding dysfunction, recent urologic instrumentation (especially transrectal prostate biopsy), chronic kidney disease (CKD), diabetes mellitus (DM), human immunodeficiency virus (HIV), intravenous drug use (IVDU), hepatitis C.[2,3,6] Specific risk factors for *S. aureus* PA include urologic instrumentation, diabetes, immunosuppression, hepatitis C, and IVDU.[4,5]

The most common signs and symptoms for patients with PA are dysuria, urinary frequency, urinary retention, perineal pain, lower abdominal pain, pyuria, fever, leukocytosis, and tenderness on digital rectal examination (DRE).[2,6-8]

To image PA, transrectal ultrasound (TRUS) is first-line and can characterize PA well with low cost and no radiation exposure. However, it can be quite painful in some patients with PA. It is often used to guide transrectal or transperineal drainage of PA with good accuracy and success. Computed tomography (CT) with and without intravenous contrast can also characterize PA well, but should be reserved for patients who cannot undergo TRUS as there are no apparent advantages. Prostate magnetic resonance imaging (MRI) is more sensitive than CT for prostate imaging, but has not shown benefits over TRUS and is much more expensive.[2,6,9]

Treatment of PA involves initiation of broad-spectrum antibiotics and abscess drainage via image-guided transrectal or perineal drainage or transurethral resection (TUR). Management with antibiotics alone has been described for small PA less than 1 cm, with 67% of patients not requiring further intervention.[1] Quinolone antibiotics are typically given for treatment of bacterial prostatitis. Since PA due to resistant organisms are becoming more common and there is a higher risk of progression to sepsis, broader spectrum parenteral regimens are recommended (for example, third generation cephalosporins, aztreonam, or ampicillin plus aminoglycosides).[2] TRUS-guided transrectal aspiration with a large bore needle is first line therapy in smaller, peripheral PA with few loculations. The main disadvantage is the higher rate of incomplete drainage. Open incision and drainage via a perineal approach is reserved for severe PA with extraprostatic involvement.[2]

TUR of PA is preferred for centrally-located, loculated abscesses, recurrent or residual abscesses, and PA associated bladder outlet obstruction. TUR of PA can also be accompanied by removal of obstructing prostatic adenoma in traditional transurethral resection of prostate (TURP) fashion once the abscess is drained. The risks of TUR of PA are similar to those associated with TURP, including retrograde ejaculation, urinary incontinence, urethral stricture, bleeding, damage to surrounding structures, and transiently worsening systemic infection. High bleeding risk in anticoagulated patients or those with hematologic disorders may temporarily preclude patients from this approach. Lastly, this procedure requires general or spinal anesthesia whereas image-guided procedures usually do not.[2,10] Despite the known risks, numerous studies have demonstrated that TUR of PA has a lower abscess recurrence rate and shorter hospital length of stay when compared to image-guided drainage. Recurrence rates for TRUS-guided drainage are 20%-32%. Recurrence rates for TUR of PA are 0%-6%. The difference in recurrence rates is more pronounced for larger PA.[8,10-12] Use of TRUS during TUR of PA has been described, but adequate resection and drainage is usually possible without TRUS.[13] In situations of complex abscesses or variable anatomy, it is certainly an option in the surgeon's armamentarium.

Additionally, TUR of PA has been performed with the holmium laser. Lee et al described this technique in 8 patients, with concomitant partial laser enucleation and morcellation of residual obstructive prostatic adenoma in 7 of 8 patients. Prostatic calcifications (often associated with prostatic bacterial colonization) were removed in all patients using this technique as well.[14] Zero patients required further surgery and all patients had symptom resolution and shrinkage of abscess on follow up imaging. Presumed advantages of laser over bipolar or monopolar TUR of PA are improved hemostasis and treatment of residual adenoma and prostatic stones, but no studies to date have compared the two techniques.[7]

Transurethral resection and transurethral unroofing of PA are often used interchangeably in the literature, and no direct comparisons have been performed. Goyal et al compared treatment of complex PA with full TURP versus modified TUR (avoiding resection of the bladder neck and anterior prostate) and showed similar PA resolution rates, with slightly reduced morbidity in the modified group.[15] We feel that full transurethral resection of PA (including resection of internal loculations) is a superior procedure with regard to maximal drainage of a complex PA when compared to transurethral unroofing. We demonstrate our technique of transurethral resection of a large, multi-loculated prostate abscess and offer surgical technique suggestions to improve drainage and patient outcomes.

Method and technique

A 44-year-old man with active IVDU and hepatitis C presented with 5 days of progressive difficulty

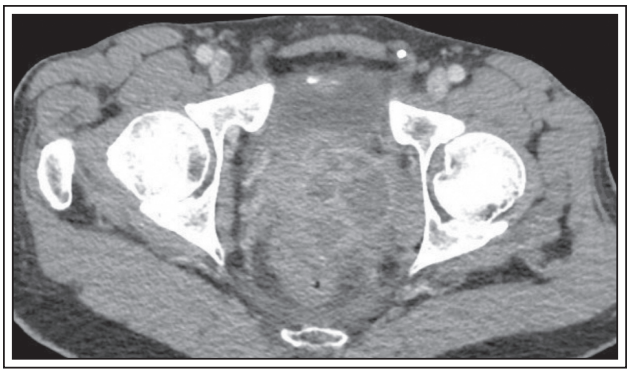

Figure 1. Axial CT imaging of 6 cm loculated left-sided prostatic abscess.

urinating, dysuria, and lower abdominal and left flank discomfort, as well as 1 day of subjective fevers. DRE revealed a tender, enlarged, and firm prostate. Laboratory testing documented leukocytosis and a positive urinalysis. A CT scan revealed a 6 cm loculated left prostatic abscess, approximately 0.8 cm from a compressed and laterally deviated prostatic urethra with associated bladder distension. There was also apparent left ureterovesical junction obstruction and mild left hydroureteronephrosis, Figure 1. An indwelling urethral Foley catheter was placed without difficulty with return of 800 mL of urine. He was started on intravenous vancomycin and ceftriaxone.

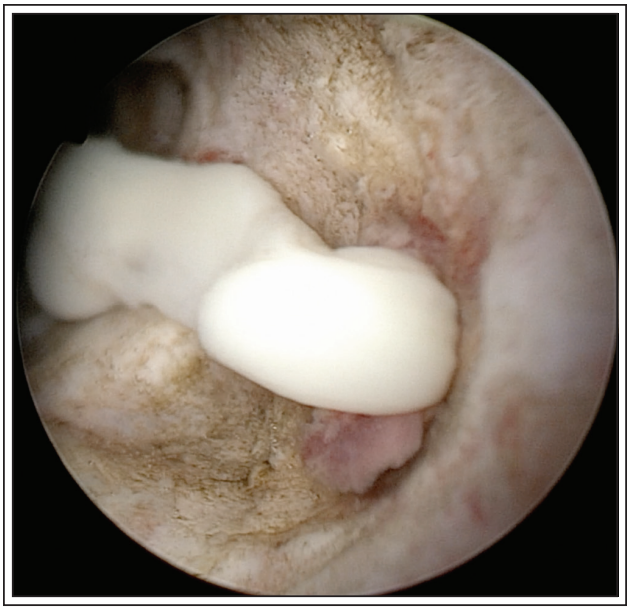

Figure 2. Initial expression of pus from the prostatic abscess after transurethral resection with the bipolar loop at the left side of the prostatic urethra.

Given the large size, loculated nature of the abscess, and its proximity to the prostatic urethra, we decided to proceed to the operating room for transurethral surgical drainage.

A bipolar resectoscope was inserted, and no obvious areas of prostate fluctuance were seen. Based on careful preoperative imaging review, we started resection of the prostate at the 3 to 6 o'clock position. Deeper resection of the left prostate eventually resulted in unroofing of the abscess and extrusion of a large volume of pus, Figure 2. Using a combination of the bipolar loop, bipolar Collins knife, and bipolar button we were used to incise the opening to the point that we were able to direct the scope inside the abscess cavity. Multiple loculations were seen containing additional pus, so we further resected the septations to open each of the loculations and clear them out of purulent fluid. We then fulgurated the lining of the abscess cavity (see video clip online www.canjurol.com). Given the posterior extent of the abscess cavity, we performed an intraoperative rectal exam revealing intact rectal mucosa and a notable decrease in prostatic fluctuance. A 20-French three-way indwelling urethral Foley catheter was over a wire into the bladder at the end of the case. The third port was left capped as hematuria was minimal. Both blood and abscess cultures grew methicillin-sensitive *S. aureus*. His pain, fevers, and leukocytosis resolved by postoperative day 1. Foley catheter was removed on postoperative day 3 and he voided spontaneously with low post-void residual bladder scans. Repeat CT on postoperative day 4 showed decreased abscess size and resolution of the left hydroureteronephrosis. The patient was discharged on postoperative day 5 with a 3-week course of levofloxacin (per infectious disease consultation) and plans for close follow up.

When approaching TUR of PA, we recommend the following based on current literature and our own experience:

1. Manage PA with TUR if it is large (4 cm or above), multi-loculated, and centrally located.[8,10-12]
2. Review preoperative imaging to determine where to resect. Measuring the distance from urethra to abscess cavity can help judge the proper depth of resection. Intraoperative TRUS is not mandatory, but it should be considered if difficulty is encountered in locating the abscess.[13]
3. Once the PA is unroofed and pus drains, open it sufficiently to drain deeper loculations.
4. A combination of bipolar loop, bipolar Collins knife, and bipolar button can be helpful once inside the abscess cavity to open loculations, manually remove pus, obtain hemostasis, and fulgurate the abscess wall.

5. An indwelling urethral Foley catheter (at least 20-French, 3-way in case it is needed later for continuous bladder irrigation) should be placed over a wire if a large abscess cavity was created to ensure positioning in the bladder. The duration of catheter drainage will depend on amount of prostatic resection and bleeding encountered during the case.
6. Send abscess fluid for culture to direct antibiotic therapy.
7. Repeat imaging several days after surgery to assess for the potential of undrained abscess cavities.

Complications of TUR of PA include retrograde ejaculation, urinary incontinence, urethral stricture, bleeding, damage to surrounding structures, and transiently worsening systemic infection, Table 1. To avoid these complications, resection should be limited to the prostatic abscess and any obstructive prostatic adenoma. Avoiding bladder neck, verumontanum, and anterior prostatic resection may minimize incontinence, stricture, and retrograde ejaculation.[15] For patients with higher bleeding risk the procedure may be delayed a few days if the patient is clinically stable and placed on parenteral antibiotics, allowing time for correction of coagulopathies or holding anticoagulants. To avoid worsening infection and sepsis, pre-procedural broad-spectrum antibiotics should be used. Lastly, to avoid injury to surrounding structures care must be taken when resecting inside the deeper abscess cavity. In our case, the abscess extended posteriorly so the risk of rectal injury or fistula was considered. We avoided deep posterior resection within the cavity and performed a rectal examination after completion of the resection to ensure no rectal injury occurred inadvertently.

Discussion

From review of the literature and our prior experiences, decision to proceed with TUR of PA should be made for any PA over 4 cm, with multiple loculations, and/or adjacent to the prostatic urethra in order to maximize drainage of the abscess and avoid progression to sepsis and recurrence of the PA.[8,10-12] This case presentation and video emphasizes the importance of full resection of the PA and its loculations, as simple unroofing would have left behind a large amount of pus in the deeper abscess cavities. No studies have directly compared transurethral unroofing to full resection of PA and they are often used interchangeably in the current literature, but our experience here suggests that it is important to fully resect all loculations in complex abscesses. As mentioned in the introduction, for PA under 1 cm a trial of antibiotics alone is reasonable.[1,2] For PA 1 cm-4 cm without multiple loculations, TRUS-guided drainage of PA is an effective strategy. Transurethral holmium laser use to treat PA has been shown to be safe and effective, but should be reserved for surgeons with experience using the holmium laser for prostate enucleations.[7] Further studies are needed to compare use of the holmium laser to bipolar TUR of PA.

The techniques recommended above are derived from literature-based recommendations and our own experience. There are multiple ways to perform this procedure, but we feel these tips would help a urologist who does not perform this procedure routinely. Further studies are needed to determine the evidence-based best practice recommendations for TUR of PA.

Since TUR of PA is relatively rare, complication rates are difficult to estimate. Table 1 shows complication rates documented in the literature from several small case series.[8,11,12,15] Unfortunately, complications

TABLE 1. **Complication rates noted in the four largest series of transurethral resection of prostate abscess**

	Abscess persistence/ recurrence	**Urinary incontinence**	**Retrograde ejaculation**	**Urethral stricture**	**Epididymoorchitis**
Goyal et al[15] (n = 11)	0.0%	0.0%	45.0%	-	-
Purkait et al[11] (n = 25)	4.0%	-	-	-	-
Selem et al[8] (n = 16)	6.3%	-	-	12.5%	18.8%
Jang et al[12] (n = 23)	0.0%	-	-	-	-

were poorly studied in some of these series. When counseling men on complications prior to TUR of PA, there is scant literature to cite but the risks of retrograde ejaculation, incontinence, urethral stricture, rectal injury/fistula, or recurrence should all be mentioned. To minimize these risks, resection of healthy prostate tissue, bladder neck, verumontanum, and deep abscess cavity should be avoided.

The main limitation of this paper and technique description is that it is explained in a single case report format. Literature review supports our management decision to proceed with TUR for this large, loculated abscess, but the specific techniques detailed here need to be studied and compared to other techniques in a randomized, controlled format with larger cohorts of patients. Stratifying treatment groups based on prostatic abscess size and number of loculations would be useful as well, though since PA are uncommon, it is unlikely that a high-level evidence-based approach will be determined.

Conclusions

Prostate abscesses are an uncommon prostatic infection with multiple risk factors, causative pathogens, diagnostic strategies, and treatment options. Transurethral resection in addition to broad-spectrum antibiotics is an ideal treatment option for large, loculated, and centrally-located PAs. Imaging review is critical to localize the abscess in the OR, as it may not be obvious at first. Combining different endourologic techniques and instruments may be necessary for optimal drainage. The techniques described above for TUR of PA allow for a safe, efficient, and effective treatment option for PA. □

References

1. Ludwig M, Schroeder-Printzen I, Schiefer HG, Weidner W. Diagnosis and therapeutic management of 18 patients with prostatic abscess. *Urology* 1999;53(2):340-345.
2. Ackerman AL, Parameshwar PS, Anger JT. Diagnosis and treatment of patients with prostatic abscess in the post-antibiotic era. *Int J Urol* 2018;25(2):103-110.
3. Reddivari AKR, Mehta P. Prostate Abscess. StatPearls. Published online November 20, 2019. Accessed April 1, 2020. https://www.statpearls.com/kb/viewarticle/27832
4. Carroll DE, Marr I, Huang GKL, Holt DC, Tong SYC, Boutlis CS. Staphylococcus aureus prostatic abscess: a clinical case report and a review of the literature. *BMC Infect Dis* 2017;17(1):509.
5. Walker B, Heidel E, Shorman M. Clinical characteristics and outcome of staphylococcus aureus prostate abscess, Ten-year experience at a tertiary care center. *Open Forum Infect Dis* 2019;6(10):z372).
6. Chou Y-H, Tiu C-M, Liu J-Y, et al. Prostatic abscess: transrectal color Doppler ultrasonic diagnosis and minimally invasive therapeutic management. *Ultrasound Med Biol* 2004;30(6):719-724.
7. Lee CH, Ku JY, Park YJ, Lee JZ, Shin DG. Evaluation of holmium laser for transurethral deroofing of severe and multiloculated prostatic abscesses. *Korean J Urol* 2015;56(2):150-156.
8. Selem M, Desoky E, Eliwa A et al. Transrectal ultrasound-guided aspiration versus transurethral deroofing of prostatic abscess: A prospective randomized study. *Urol Ann* 2018;10(3):291-295.
9. Lim JW, Ko YT, Lee DH et al. Treatment of prostatic abscess: value of transrectal ultrasonographically guided needle aspiration. *J Ultrasound Med* 2000;19(9):609-617.
10. El-Shazly M, El-Enzy N, El-Enzy K, Yordanov E, Hathout B, Allam A. Transurethral drainage of prostatic abscess: points of technique. *Nephro-Urol Mon* 2012;4(2):458-461.
11. Purkait B, Kumar M, Sokhal AK, Bansal A, Sankhwar SN, Bhaskar V. Outcome analysis of transrectal ultrasonography guided aspiration versus transurethral resection of prostatic abscess: 10 years' experience from a tertiary care hospital. *Arab J Urol* 2017;15(3):254-259.
12. Jang K, Lee DH, Lee SH, Chung BH. Treatment of prostatic abscess: case collection and comparison of treatment methods. *Korean J Urol* 2012;53(12):860-864.
13. Kinahan TJ, Goldenberg SL, Ajzen SA, Cooperberg PL, English RA. Transurethral resection of prostatic abscess under sonographic guidance. *Urology* 1991;37(5):475-477.
14. Shoskes DA, Lee C-T, Murphy D, Kefer J, Wood HM. Incidence and significance of prostatic stones in men with chronic prostatitis/chronic pelvic pain syndrome. *Urology* 2007;70(2):235-238.
15. Goyal NK, Goel A, Sankhwar S, Dalela D. Transurethral resection of prostate abscess: is it different from conventional transurethral resection for benign prostatic hyperplasia? *ISRN Urol* 2013;2013:109505.