DOI: 10.14744/ejmi.2019.93957
EJMI 2019;3(2):132–136

Research Article

Internal Urethrotomy in Patients with Bulbar Urethral Strictures After Transurethral Resection of the Prostate: Is it Reliable?

Engin Kolukcu,[1] **Murat Beyhan**[2]

[1]Department of Urology, Tokat State Hospital, Tokat, Turkey
[2]Department of Radiology, Tokat State Hospital, Tokat, Turkey

Abstract

Objectives: This study aimed to evaluate the reliability of internal urethrotomy in the treatment of bulbar urethral strictures developed after transurethral resection of the prostate (TURP).

Methods: The data of 62 patients who developed bulbar urethral stricture following TURP and underwent internal urethrotomy as a treatment method between January 2014 and March 2018 were analyzed retrospectively. The demographic data of the patients, presenting findings, operative time, urinary catheterization time, complication rates were evaluated according to the modified Clavien classification system.

Results: The mean age of the patients was 63.46±10.75 years. Complications related to internal urethrotomy were as follows: four patients had urethrorrhagia, three patients had urinary tract infection, two patients had hematuria, one patient had acute urinary retention, and one patient had penile edema. The mean operative time was 31.29±16.46 minutes. When the operative complications were evaluated according to the modified Clavien classification six patients had grade 1, four patients had grade 2, and one patient had grade 3A complications.

Conclusion: The findings of our study have led us to conclude that internal urethrotomy is a highly reliable treatment modality in the treatment of bulbar urethral strictures following TURP.

Keywords: Bulbar urethral stricture, internal urethrotomy, transurethral resection

Cite This Article: *Kolukcu E, Beyhan M. Internal Urethrotomy in Patients with Bulbar Urethral Strictures After Transurethral Resection of the Prostate: Is it Reliable? EJMI 2019;3(2):132–136.*

Urethral stricture is defined as scarring of the suburethral tissue of the corpus spongiosum. It alters the natural structure of the urethral lumen and constricts it.[1] This group of diseases is among the highly complex issues in urological practice due to its high recurrence rates. Urethral strictures may cause many lower urinary tract symptoms such as difficulty in urgency, frequency, nocturia, urge incontinence and stress incontinence. Besides, some of the affected patients may have pathologies secondary to urethral strictures such as recurrent urinary tract infections, hydroureteronephrosis, lower urinary tract stone disease, gross hematuria, acute urinary retention and renal failure.[2, 3]

There is no comprehensive cross-sectional study reflecting the incidence of urethral strictures in our region. However, according to the United States data, an average of 1.5 million patients are diagnosed with urethral strictures under outpatient conditions, and nearly 5000 of them are treated inpatient. Urethral strictures occur primarily due to iatrogenic causes. However, many factors such as recurrent uri-

Address for correspondence: Engin Kolukcu, MD. Tokat Devlet Hastanesi, Radyoloji Bolumu, Tokat, Turkey
Phone: +90 535 400 23 85 **E-mail:** drenginkolukcu@gmail.com
Submitted Date: February 04, 2019 **Accepted Date:** February 26, 2019 **Available Online Date:** March 14, 2019

nary infections, urinary stone diseases, trauma, endourological interventions, and urethral catheter applications play a direct role in the etiopathogenesis.[3, 4]

Although there are many studies on the treatment outcomes of urethral strictures, the number of publications dealing with bulbar urethral strictures following transurethral resection of the prostate (TURP) is limited. The aim of this study was to investigate the reliability of internal urethrotomy in the management of bulbar urethral strictures following TURP. We used the modified Clavien classification system in our analysis.

Methods

This study included 62 patients who underwent TURP previously, and developed bulbar urethral strictures. They received internal urethrotomy as a treatment method between January 2014 and March 2018. The analyses were carried out on electronic patient records retrospectively. We have fully complied with the Declaration of Helsinki at every stage of the study. The analysis involved the patients' ages, presenting findings, duration after TURP, uroflowmetric evaluation before the operation, operation time, complication rates and urinary catheterization time. We categorized each patient individually according to the modified Clavien classification system and evaluated the complication rates accordingly. The study involved only the patients with no missing data.

Preoperative evaluation consisted of a physician recorded history, urine analysis and uroflowmetry. In addition to these, we used at least one imaging method for each patient. The imaging modalities used were retrograde urethrocystography, micturition cystourethrography, intravenous pyelography, urinary ultrasonography and abdominal computed tomography. Patients who underwent internal urethrotomy and had pathologies requiring secondary surgical interventions such as lower urinary tract stone diseases, prostate hyperplasia, and bladder neck stenosis were not included in the study, as they would affect the reliability of the procedure.

A sterile urine culture was obtained before all endourological interventions. A 2% lidocaine gel was applied to the urethra in the lithotomy position. Cystourethroscopy was performed using a 19.5 Fr or 22 Fr endoscope with a 0 degree lens, and the stricture area was directly observed. When a long segment of stricture was observed in the detected area and the proximal part of the urethral lumen could not be analyzed clearly or more than one lumen was observed, we applied urethral stent to the patients. The internal urethrotomy was performed by a 21-F optical internal urethrotome (Karl Storz, Germany). All fibrous tissue that could be identified to the proximal cut of the stricture was completely cleared up to the normal connective tissue. Then, the entire urethra and bladder were evaluated in detail for a second time. Endourological procedures applied to all patients were based on similar surgical principles. An 16, 18 or 20-F urethral catheter was inserted postoperatively. According to the depth of the pathology observed in the endourological evaluation, the urethral catheters remained for 3-7 days. All patients were administered prophylactic antibiotics postoperatively.

Patient data were expressed as mean±standard deviation (minimum and maximum). We used the Statistical Package for the Social Sciences (SPSS) 18.0 software for the data analysis.

Results

The mean age of the 62 patients included in the study was 63.46±10.75 (51-87) years. Clinical evaluation of the patients revealed the main findings to be as follows: 54 patients presented with lower urinary tract symptoms such as frequent urination, difficulty starting or stopping urinating, and nocturia, while six patients had hematuria, and two patients had urethrorrhagia. The mean duration of stricture development following TURP was 14.09±10.59 (1-36) months. Uroflowmetry analysis results showed the maximum preoperative flow rate to be 6.85±1.87 ml/sec and the mean flow rate to be 4.16±1.35 ml/sec. The mean operation time was 31.29±16.46 minutes, while the mean postoperative urinary catheter duration was 4.29±1.46 (3-7) days. In all patients, strictures were located in the bulbar urethra. Mean length of stricture was 1.03±0.2 cm. We found that 16% of the patients had positive urine culture before the procedure. When urine cultures were examined, 7 patients had Escherichia coli, 2 patients had Klebsiella Pneumoniae and one patient had Enterococcus Faecalis.

Complications related to internal urethrotomy were as follows: four patients had urethrorrhagia, three patients had urinary tract infection, two patients had hematuria, one patient had acute urinary retention, and one patient had penile edema. When the urinary tract infections were examined, 2 of the patients were diagnosed as cystitis and one of them was diagnosed as epididymitis. None of the patients had complications requiring additional hospitalization such as bacteremia and septicaemia. Regular dressing change was the only intervention applied in the patients with urethrorrhagia. Postoperative hematuria disappeared within 24 hours requiring no additional intervention such as bladder irrigation or blood transfusion. The patient who had urinary retention was re-catheterized and followed up for three days. At the end of this period,

we observed no urinary retention following the removal of urinary catheter. One patient developed penile edema as a result of prolonged operation time and leakage of the irrigation solution into tissues. We did not take any additional measures other than anti-inflammatory treatment for the penile edema. It led to a significant decline in the edema within seven days.

We evaluated postoperative complication rates of the patients according to the modified Clavien classification. This classification defines Grade 1 complications as normal changes in postoperative period. Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical,endoscopic and radiological interventions. Allowed therapeutic regimens are drugs as antiemetics, antipyretics,analgesics, diuretics, electrolytes and physiotherapy. Grade 2 complications are defined as cases requiring medical drugs other than the therapeutic regimens that were allowed in Grade 1 complications such as blood transfusion and total parenteral nutrition. Complications of Grade 3 and 4 were re-categorized within themselves as A and B. Cases requiring surgical, endoscopic or radiological intervention fell into the Grade 3 complications. 3B involves those requiring general anesthesia, and 3A without general anesthesia. The cases evaluated in the 4A group of complications indicate life-threatening conditions with single organ dysfunction, while 4B complications are defined as multiorgan dysfunction. Finally, Grade 5 complications mean the patients' loss of their lives.[5] In this context, six patients had Grade 1, four patients had Grade 2, and one patient had Grade 3A complications. No patients had life-threatening complications of Grade 4 and higher.

Discussion

Benign prostatic hyperplasia is a common pathology in aging male population. It often causes lower urinary tract symptoms and 29% of the cases require surgical intervention. Along with advancing technological opportunities, many authors report TURP as the gold standard in the surgical treatment of prostatic hyperplasia, which causes bladder outlet obstruction.[6] After TURP, patients may experience early and late-stage complications such as hematuria, urinary system infections, prostate capsule perforation, electrolyte imbalance, urinary incontinence, bladder neck contracture and urethral stricture.[7] The incidence of urethral stricture following TURP varies between 2.2% and 9.8%. The most common site of stricture is bulbar urethra.[8] The pathogenesis of bulbar urethral stricture following TURP still remains unclear. However, many factors including lack of proper lubrication during the intervention with a resectoscope, leakage during energy transmission, duration of resection, diameter and duration of the transurethral catheter are implicated in the etiology.[7, 8]

Urethral strictures may cause lower urinary system complaints by physically preventing the flow of urine which impacts the quality of life of the patients negatively. Besides, various complications such as increased residual urine volume and urinary infections secondary to urinary retention, renal failure, and bladder stones may occur.[3, 4] Therefore, it is very important to diagnose urethral strictures at the right time and to treat them appropriately. There are various imaging methods used in the diagnosis. Among the first-line examinations are intravenous pyelography, cystography, and post-miction cystography. When urethral strictures remain untreated for a long time, bilateral hydronephrosis and large-capacity bladder are observed in intravenous pyelography. Besides, cystography examination may show trabeculation, sacculation and diverticula as well as irregularities in the bladder wall. The increase in residual urine volume is among the other findings in post-micturition cystography. The lower urinary tract stones secondary to urethral strictures are the other findings. Micturition cystourethrography has an important role in the diagnosis of urethral strictures. This imaging method is frequently used in urology practices. The bladder is filled completely with the contrast agent via a transurethral or suprapubic catheter. Subsequently, the patient's bladder neck and urethra are displayed during their micturition.[9] Another imaging modality commonly used in patients with urethral stricture is retrograde urethrography. In this method, contrast material is given from external meatus. The aim is to display the entire urethra following spot images taken in oblique position.[10] If applied appropriately, the jet flow of the contrast into the bladder neck and the bladder can be seen. It is currently the gold standard for the diagnosis of urethral stricture, as recognized by many authors. If retrograde urethrography revealed a urethral stricture after ruling out the narrow segment of the membranous urethra, it should be interpreted in favor of the pathological stricture. The patient should be in oblique position in order to optimize the evaluation of bulbous urethra.[11] When performed by experienced clinicians, ultrasonography demonstrates urethral strictures and the degree of fibrosis in the corpus spongiosum. Periurethral fibrosis manifests itself during the examination as a thickened, irregular and tight tissue extending into the urethral lumen. Periurethral spongiofibrotic changes are considered to be serious when sonourethrography reveals posterior shadowing and the lumen diameter <3 mm along the maximum retrograde distention.[9, 12] Magnetic resonance imaging (MRI) is considered as the best auxiliary imaging method to evaluate pelvic anatomy. Multiplanar T2-weighted MRI enables to evaluate the position of the

prostate and the amount of pelvic fibrosis. It also helps to determine the length of the prostatomembranous defect allowing the measurement of the distance between the prostatic apex and the proximal corpus spongiosum, and the urethra entry level. Multiplanar T2-weighted MRI is an alternative to traditional radiographic methods. It is used to identify male anterior and posterior urethral strictures, and described as a promising examination method.[9, 13] Computed tomography is a rarely used diagnostic tool to examine the urethra. Its indications are limited. It is aimed to determine the fluid collection accumulated during inflammation in the urethra and the formation of gas after trauma or necrotic state.[14]

There are many different treatment methods used for the treatment of urethral strictures. Among them are metallic urethral stents, urethral dilatations, buccal mucosa or urethroplasty options described by different graft techniques, cold knife incision, and laser internal urethrotomy. In 1974, a new era was started by Hans Sachse in the treatment of urethral stricture with optical urethrotomy. Emerging technological opportunities and easy access of many clinics to these facilities cause urologists to prefer endourological methods in urethral strictures. The most important advantage of endoscopic treatment methods is that they enable the evaluation of the urethra as a whole and allow the surgical interventions to be performed safely. Endoscopic incision of the urethral epithelium and the underlying spongiosum tissue accompanied by visual guidance is called internal urethrotomy.[15] The bulbar urethra is known as the most common site of anterior urethral strictures. There are many different approaches to the problem. However, the endoscopic urethrotomy is the first treatment method for bulbar urethral strictures unless they are long-segmented. More complicated surgical procedures, such as open urethroplasty, are considered in recurrent or very long segment bulbar urethral strictures.[16] In the management of urethral strictures, internal urethrotomy is the most successful in the group that involves bulbar urethra, <1.5 cm and not accompanied by spongiofibrosis.[17, 18] The success of the internal urethrotomy is directly related to the clinician's knowledge and the surgical method as is the case with many surgical procedures. Sufficient incisional depth in the stricture area directly affects the success rate of the operation and leads to a significant reduction in the rate of recurrence.[19] In order to prevent possible corpus cavernosum injury, all internal urethrotomy incisions should be made at 12 o'clock position. Deep incisions form a fistula between the corpus cavernosum and the corpus spongiosum which may lead to erectile dysfunction. Similarly, prolonged operation time causes excessive irrigation solution to leak into the tissues which can result in penile edema. Additionally, scrotal abscess, urinary retention, orchitis, urinary incontinence, epididymitis, hematuria and urethrorrhagia are among the other complications of this endourological intervention. Previous studies reported an overall complication rate of 6.5%.[18-20] Complications of the patients in our study revealed no life-threatening pathology of Grade 4 and higher in any patient according to the modified Clavien classification system. Complications were as follows: urethrorrhagia in four patients, urinary tract infection in three patients, hematuria in two patients, penile edema in one patient, and acute urinary retention in one patient.

Our study has some limitations worth mentioning which are as follows: The number of cases to be analyzed was limited. The study was a retrospective study. Besides, the long term evaluation of the results of treatment for urethral strictures was not available.

Conclusion

In conclusion, the treatment modalities applied in urethral strictures are still among the most prominent issues that clinicians need to discuss with all the short and long-term outcomes. Problems encountered in the treatment processes include very frequently observed recurrences, high number of hospital readmissions and negative impacts on quality of life of patients. Our study evaluated the short term complication rates. Results of the present study showed that internal urethrotomy is a safe treatment modality with low complication rates for the treatment of bulbar urethral strictures following TURP. However, multicentered, randomized and prospective studies are needed to support our findings.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – E.K., M.B.; Design – E.K.; Supervision – E.K., M.B.; Materials – E.K.; Data collection &/or processing – E.K.; Analysis and/or interpretation – E.K., M.B.; Literature search – E.K., M.B.; Writing – E.K.; Critical review – E.K., M.B.

References

1. Mundy AR, Andrich DE. Urethral strictures. BJU Int 2011;107:6–26.
2. Kölükçü E, Mercimek MN, Erdemir F. Efficacy and safety of holmium laser lithotripsy in the treatment of posterior urethral stones. J Clin Anal Med 2018;9:552–6.
3. Horsanalı MO, Balcı U, Özer K, Görgel SN, Erdal AC. Üretra Dar-

lıklarında Üriner Kateterizasyon Kime? Ne Kadar Süre? JAREM 2015;5:121–4.
4. Batur AF, Kutman KG, Akdeniz E, Bolat MS. Erkek Üretra Darlıkları ve Tedavi Stratejileri. Thecystoscope 2015;279–87.
5. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Annals of surgery 2004;240:205–13.
6. Çöçelli LP, Erturhan S, Tanrıverdi GÖ, Şen H, Erbağcı A, Öner Ü. Transüretral Rezeksiyon Girişimlerinde Bipolar ve Monopolar Rezektoskop Kullanımının Hemodinami ve Serum Elektrolitlerine Etkisi. Gaziantep Tıp Dergisi 2009;15:31–7.
7. Selimoğlu A, Boz MY, Balaban M, Cangüven Ö, Horuz R, Albayrak S. Transüretral rezeksiyon sonrası gelişen üretra darlıkları ve buna neden olan etkenlerin geriye dönük olarak araştırılması. Türk Üroloji Dergisi 2010;36:375–9.
8. Hızlı F, Selvi İ, Başar H. Prostatektomi Sonrası Gelişen Üretra Darlıkları. Endoüroloji Bülteni 2014;7:86–8.
9. Kawashima A, Sandler CM, Wasserman NF, LeRoy AJ, King BF, Goldman SM. Imaging of urethral disease: A pictorial review. RadioGraphics 2004;24:195–216.
10. Sandler CM, Corriere JN Jr. Urethrography in the diagnosis of acute urethral injuries. Urol Clin North Am 1989;16:283–9.
11. Maciejewski C, Rourke K. Imaging of urethral stricture disease. Transl Androl Urol 2015;4:2–9.
12. Morey AF, McAninch JW. Role of preoperative sonourethrography in bulbar urethral reconstruction. J Urol 1997;158:1376–9.
13. Osman Y, El-Ghar MA, Mansour O, Refaie H, El-Diasty T. Magnetic Resonance Urethrography in Comparison to Retrograde Urethrography in Diagnosis of Male Urethral Strictures: Is It Clinically Relevant? European Urology 2006;50:587–94.
14. Pavlica P, Menchi I, Barozzi L. New imaging of the male urethra. Abdominal imaging 2003;28:180–6.
15. Başeskioğlu B, Elmaağaç B, Yenilmez A, Üre İ. Komplet Üretral Darliklarinin Endoskopik Tedavisi 'Cut To The Light'. Bozok Tıp Derg 2017;7:25–8.
16. Akgül M, Kaya C. Tekrarlayan Bulbar Üretra Darlıkları: Güncel Yaklaşım. Kontinans ve Nöroüroloji Bülteni 2015;2:93–7.
17. Pansadoro V, Emiliozzi P. Internal urethrotomy in the management of anterior urethral strictures: longterm follow up. J Urol 1996;156:73–5.
18. Naude AM, Heyns CF. What is the place of internal urethrotomy in the treatment of urethral stricture disease? Nature Clinical Practice Urology 2005;2:538–45.
19. Giannakopoulos X, Grammeniatis E, Gratzios A, Sachse urethrotomy versus endoscopic urethtrotomy plus transurethral resection of the fibrous callus (Guillemin's technique) in the treatment of uretral stricture. Urology 1997;49:243–7.
20. Jin T, Li H, Jiang L-H, Wang L, Wang K-J. Safety and efficacy of laser and cold knife urethrotomy for urethral stricture. Chinese Medical Journal 2010;123:1589–95.