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Urethral Stricture
Original article

Urethral stricture disease after bipolar prostatectomy: Is it a concern?

A.A. Zamel , A.I. Kassem *, T.Z. Orban , I.R. Saad , A.S. Bedair

Urology Department, Faculty of Medicine, Cairo University, Cairo, Egypt

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KEYWORDS
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Abstract
Introduction: bipolar Transurethral Surgery of Prostate (BTUSP) is growing increasingly popular in the management of Benign prostatic hyperplasia related lower urinary tract symptoms (BPH-related LUTS). Compared to monopolar transurethral resection of the prostate (TURP), BTUSP has the potential advantages of less toxicity related to irrigation fluid absorption, and better hemostasis. However, there have been reports of BTUSP being associated with increased incidence of urethral stricture disease (USD). We aim at 2 years results of B-TUSP with special emphasis on USD and continence.
Patients and methods: This is a retrospective study of patients who underwent BTUSP (resection, vaporization and enucleation) for BPH-related LUTS at Cairo University Hospital from January 2013 to December 2014. Perioperative parameters were assessed. Patients were evaluated 2 years postoperative to assess international prostate symptom score (IPSS), continence, urinary tract infection (UTI) uroflowmetry and post voiding residual urine (PVR). For patients with suspicion of USD (maximum flow rate "Qmax" $\leq$15 ml/s, PVR $\geq$100 cc,), retrograde and voiding cystourethrogram and/or cystoscopy were done.
Results: A 2-years follow-up was available for 32 patients. Mean age was 66.2 $\pm$ 8.2 years. 16/32 patients were catheter dependent due to bladder outlet obstruction. Mean preoperative flowmetry, IPSS and adenoma size were 9.1 $\pm$ 3.02 ml/s, 23.1 $\pm$ 2.3 and 60.1 $\pm$ 28.1 g, respectively. Of our patients 11/32 (34%), 14/32 (44%) and 7/32 (22%) underwent BTU-enucleation, resection and vaporization of prostate, respectively. There was a difference in mean adenoma size for vaporization, enucleation and resection patients (29.57 $\pm$ 11.9 g, 83.36 $\pm$ 26.49 g and 58.71 $\pm$ 17.82 g, respectively) ($p < 0.05$). Mean postoperative catheter time was 2.7 $\pm$ 1.3 days, IPSS, Qmax, and PVRU at 2 years, were 4.53 $\pm$ 1.29 (2–7), 17.94 $\pm$ 2.7 (11–22) and 3.13 $\pm$ 7.7 (0–35) respectively, this was significantly different from preoperative Qmax and IPSS ($p < 0.05$). Eight patients with Qmax $\leq$15 ml/s (11–15 ml/s) were assessed and found not to have USD. None of our patients reported incontinence. At 2 years, there was no significant difference in mean Qmax for vaporization, resection and enucleation (18 ml/s $\pm$ 3.4, 18.71 ml/s $\pm$ 2.86, and 16.9 ml/s $\pm$ 1.86, respectively) ($p = 0.267$).

* Corresponding author.
E-mail address: dr_ayman_kasem@cu.edu.eg (A.I. Kassem).
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Conclusion: BTUSP is a safe and effective modality for surgical management of BPH-related LUTS. With no evidence of increased incidence of USD, and with significant improvement of flowmetry and IPSS after 2 years follow up.

Introduction

Transurethral resection of the prostate (TUR-P) is still considered the gold standard for surgical treatment of symptomatic benign prostatic enlargement (BPE) [1]. This is backed up by durable results in number of studies including more than 10,000 patients followed up for up to 5 years in the form of substantial improvement in Q-max, IPSS and postvoid residual urine (PVRU) [2,3]. Nevertheless, it still requires hospitalization and can be complicated by bleeding, clot retention, and TUR syndrome [4].

Several novel minimally invasive therapies have been introduced in recent decades, aiming to improve the safety profile for transurethral resection of the prostate (TURP) [5]. In recent years bipolar electrosurgical technology has gained worldwide attention in surgical management of BPH, with the aim of minimizing the morbidity of the standard monopolar TURP (M-TURP) while maintaining efficacy and durability [6]. Ahyai et al., evaluated 10 randomized controlled trials (RCTs) of bipolar TURP (B-TURP) and they found comparable results to M-TURP with less complications especially TUR syndrome and bleeding [7].

It is theorized that bipolar current has a smaller depth of tissue penetration due to lower peak voltage and high frequency [8]. However, there were reports about its association with increased incidence of urethral stricture disease (USD) following bipolar transurethral prostatic surgery (B-TUPS). Telfekli et al., reported a USD incidence of 6% in B-TUPS in comparison to 2% in M-TURP [9]. Komura et al., reported a higher urethral stricture rate in TURis compared to M-TURP (20% in TURis vs 2.2% in M-TURP; $p = 0.012$) [10].

We aim at evaluating the long-term results of B-TUPS (resection, vaporization or enucleation) with special emphasis on USD.

Subjects and methods

In the current retrospective study, 32 patients who underwent B-TUPS (resection, vaporization or enucleation) for symptomatic SPE requiring surgery at Kasr Alainy Hospital, Cairo University, Cairo, Egypt in the period from January 2013 to December 2014 were followed.

All enrolled patients had signed informed consent form. The study was carried out in accordance with the Helsinki Declaration and local ethical committee approval at Department of Urology, Kasr Alainy Hospital, Cairo University, Cairo, Egypt.

Preoperative patient data included detailed history taking with IPSS and examination findings. Routine labs included serum chemistry, complete blood count (CBC), coagulation profile, urinalysis with or without culture to exclude infection and prostatic specific antigen (PSA). Patients who were not in refractory urinary retention underwent uroflowmetry. Imaging data included abdominopelvic and transrectal ultrasound (TRUS) for total gland and adenoma volume assessment. Patients were considered candidates for surgery if there had bothersome symptoms with IPSS > 18 despite medical treatment, refractory urine retention, bladder stones, recurrent urinary tract infections, hematuria, or renal impairment due to SPE. Patients with suspicion of neurogenic bladder dysfunction, prostate cancer or previous prostatic surgery were excluded from the analysis. UES-40 Surg-Master (Olympus Winter & Ibe GmbH, Hamburg, Germany) bipolar high-frequency generator was used.

All patients received preoperative antibiotics. In all patients, the procedure was done under spinal or spinal/epidural anesthesia. Cystoscopy was the first procedure done in all patients to assess the urethra, any bladder pathology, prostate size, and lobe configuration. This was followed by resection, vaporization or enucleation depending upon prostate size and lobe configuration using 26 French continuous irrigation sheeth. All cases were done by a single experienced surgeon.

For bipolar transurethral vaporization of the prostate (B-TUVP) bipolar vaporization electrode produced by Olympus which has a semispherical shape and is "mushroom" like was used. The current was set to 290–320 W for vaporization and 150 W for coagulation. The prostate was gradually debulked by repeatedly moving in a circular fashion around the whole gland, as in peeling an onion. The motion was slow and gentle and well controlled, and the procedure was carried out in a bloodless manner. For B-TURP, a technique similar to standard M-TURP originally described by Mebust was used [11]. The current was set to 290–320 W for cutting and 120–140 W for coagulation. For bipolar transurethral enucleation of the prostate (B-TUEP) an incision of the prostatic apex just proximal to the verumontanum from 5 to 7 o'clock position was done until the level of the prostatic capsule was reached. The beak of the resectoscope sheath was then used in a similar fashion as the surgeon's finger in conventional simple open prostatectomy to enucleate the whole gland toward the bladder neck to near completion from the capsule. The enucleated adenoma was then retrieved from the bladder either by morcellation or open extraction.

Operative data, duration of surgery, catheterization time and hospital stay were retrieved. Recorded postoperative data included IPSS, uroflowmetry, and post voiding residual urine (PVRU) at one month All patients were then evaluated postoperatively at 2 years with an IPSS, urine analysis, uroflowmetry, and PVRU. For patients with suspicion of infra-vesical obstruction (Q-max

≤15 ml/s or PVRU ≥100 cc), a retrograde urethrography and micturating cystourethrography were done. If no USD was diagnosed, cystoscopy was done to exclude any residual adenoma as a cause for low Q-max or high residual urine. In absence of residual adenoma on cystoscopy, pressure flow study was done.

Statistical analysis

Data were statistically described in terms of mean ± standard deviation, and range, or frequencies (number of cases) and percentages when appropriate. Correlation between various variables was done using Pearson moment correlation equation. p values less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

Results

Retrospective analysis of data included 32 patients who had undergone B-TUPS. Mean patient age was 66.2 ± 8.1 years (50–86). Sixteen patients (50%) had refractory urine retention. Thirteen patients had a mean IPSS of 23.1 ± 2.3 (19–27) with bothersome symptoms despite of medical treatment. Three patients had bladder stones.

Preoperative uroflowmetry was done for 13/32 patients showing a mean Qmax of 9.1 ± 3.02 ml/s (4.6–15). Prostate size using TRUS showed mean gland size of 74.3 ± 25.6 g (33–167) and mean adenoma size of 60.1 ± 28.1 g (14–145). Mean PSA was 7 ± 5.45 ng/ml (0.14–19).

Nine (27.9%) patients underwent B-TUEP and open extraction of prostatic lobes. Two (6.3%) patients underwent bipolar transurethral enucleation and resection (B-TUR/EP) of the prostate. Forteen (43.8%) patients underwent B-TURP. Seven patients (22%) underwent vaporization.

Mean operative time was 99 ± 44.8 min (20–210). Mean preoperative hemoglobin was 13.5 ± 1.46 g/dl, while mean postoperative hemoglobin was 11.9 ± 1.52 g/dl. Mean preoperative serum Na was 140.34 ± 4.8 mmol/L while mean postoperative serum Na was 140.20 ± 4.79 mmol/L. Statistical analysis showed no significant difference in pre- and postoperative hemoglobin or Na levels.

Mean postoperative catheterization time was 2.7 ± 1.3 days (1–5). Mean postoperative hospital stay was 3.5 ± 1.4 days (1–6). None of the cases needed re-catheterization after catheter removal or required intraoperative or postoperative blood transfusion.

IPSS, maximum urine flow rate and PVRU at 3 months {mean ± SD (range)}, were {4.56 ± 1.62 (2–8)}, {17.67 ± 3.9 ml/s (10–26)} and {7.5 ±11.9 ml (0–37)} respectively. IPSS, maximum urine flow rate, and PVRU at 2 years, were {4.53 ± 1.29 (2–7)}, {17.94 ± 2.7 ml/s (11–22)} and {3.13 ± 7.7 ml (0–35)} respectively.

None of our patients reported any form of urinary incontinence. Four patients (12.5%) had culture proven UTI that was treated with appropriate antibiotics.

Eight patients were found to have Qmax ≤15 ml/s (11–15 ml/s) and were assessed for USD with retrograde urethrography and micturating cystourethrography. None of those 8 patients showed any evidence of USD. Hence, cystoscopy was done to exclude residual adenoma as a cause for low Qmax. No obstructing residual adenomas were found in any of these patients. Pressure flow study was subsequently done for them and revealed hypocontractile detrusor as a cause of low Qmax in this cohort.

Discussion

One of the concerns that exist for many B-TUR systems is the potential for postoperative urethral stricture formation. The proposed explanation for a higher stricture rate with B-TURP is the larger resectoscope diameter (27F), especially if the urethra is not adequately pre-dilated before passage of the resectoscope, a higher incident power (even if in short bursts), and a long operation time in case of a large prostate [9].

Morishita et al. mentioned that urethral stricture formation post-TURP may be closely related to electrical resistance and current leakage [12]. Research and development department in Olympus evaluated the current leakage in bipolar and monopolar system and they found that current leakage in bipolar system is 6–7 (mA) and from 26 (mA) to 40 (mA) in monopolar system.

Urethral stricture disease associated with TURP may present anywhere in the urethra. The most common location is the bulbomembranous urethra, followed by the fossa navicularis and penile urethra [13,14]. Over the past three decades, the risk of urethral stricture remained the same. This may be explained by the persistent need for large-caliber sheaths for TURP causing pressure ischemia to the fixed bulbo-membranous urethra and narrow caliber fossa navicularis subsequently increasing stricture formation in these regions. Penile urethral strictures may be due to compression and to insufficient use of lubricant [13].

Our study included 32 patients who underwent bipolar prostatectomy and were evaluated after 2 years subjectively by IPSS and objectively by uroflowmetry and PVRU.

Komura et al. evaluated 136 patients who underwent bipolar and monopolar TURP. They reported that at 3 years follow up in patients with a prostate volume ≤70 there was no difference in stricture rate between monopolar and bipolar TURP (3.8% in M-TURP vs 3.8% in TURis), but in patients with a prostate volume >70 ml in the TURis group there was a significantly higher urethral stricture rate compared with the M-TURP group (20% in TURis vs 2.2% in M-TURP; p = 0.012) [10]. In our study, no cases of urethral stricture were reported. This may be due to small sample size and shorter follow up than in the Komura study.

Michielsen and Coomans evaluated 518 patients for a mean follow up of 32 months. The study included 255 patients treated with conventional TURP and 263 patients with TURis. There was no significant difference in USD in the two groups (1.5% for TUR is compared to 2.4% for M-TURP) [13].

Elsakka et al. evaluated 84 patients (42 M-TURP and 42 in B-TUVP) for 6 months and found no urethral stricture in bipolar group com-

pared to 2 cases (4.8%) in M-TURP [15]. These results are similar to results of our current study albeit with shorter follow up.

Falahatkar et al. report only a 2% (1/49) risk of urethral stricture disease after B-TURP with a cutting current of 280 W. The authors compared bipolar transurethral ablation of the prostate with B-TURP and found that bipolar ablation had no strictures (0/39) [16]. Again, these results are comparable to results of our current study. We found that despite of the variation in operative time and different energy setup among the three techniques for B-TURP, no cases of urethral stricture diseases had been reported.

The main limitation of the current study is being a retrospective non-comparative one, with a relatively small sample size. However, although being retrospective, all factors that may affect the incidence of urethral stricture disease (duration of surgery, size of sheeth, current set) were mentioned and analyzed, in addition, incidence of urethral stricture disease after bipolar TURP is not known to be affected by any preoperative factors.

Conclusions

In our small patient group with a two-year follow-up, there appears to be no increase in the incidence of USD after bipolar electrosurgical technology and it is safe and effective modality in treating patients with symptomatic benign prostatic enlargement. We recommend a prospective randomized study with longer follow up and larger numbers of patients to confirm these favorable preliminary results

Authors contributions

Ayman I. Kassem: analysis of statistical results, writing, editing and revision of the paper.

Ahmed Abo Zamel: data collection, revision and editing.

Tamer Z. Orban: performing the statistical analysis.

Ismail R. Saad: revision and editing.

Ahmed S. Bedair: the idea of the study, supervision, performing the procedure.

Ethical committee approval

The study protocol had been approved by ethical committee of the Department of Urology, Kasr Alainy Hospital, Cairo University, Egypt.

Conflict of interest

No conflict of interest.

Source of funding

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