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Transurethral Resection of the Prostate in Saline Versus Nonconductive Solution to Treat Benign Prostatic Hyperplasia: A Randomized Controlled Study

Taha Abo-Almagd Abdel-Meguid

Department of Urology, King Abdulaziz University Hospital, Jeddah, Saudi Arabia; Department of Urology, El-Minia University, El-Minia, Egypt

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ABSTRACT

INTRODUCTION: The objective of this prospective randomized controlled study was to compare transurethral resection of the prostate in saline (TURPis) using the TURis system with the standard monopolar TURP, to determine evidence of safety and efficacy.

METHODS: Patients with symptomatic benign prostatic hyperplasia (BPH), aged 50 years or older, with estimated prostate volume (PV) ≤ 80 mL, maximum flow rate (Qmax) ≤ 15 mL/s, and an International Prostate Symptom Score (IPSS) ≥ 14 were included in the study. A total of 38 patients ranging in age from 52-78 years completed the study. Patients were randomly allocated to receive either TURP or TURPis in a 1:1 ratio. Primary endpoints were: (1) declines in serum sodium (Na+) and hemoglobin (Hb); (2) incidence of TUR syndrome; and (3) changes in IPSS, quality of life (QoL), and maximum flow rate (Qmax). Secondary endpoints included: (1) differences in procedure, irrigation, catheterization, and hospitalization times; (2) variations in blood transfusion, recatheterization, and clot retention rates; (3) changes in prostate specific antigen (PSA), prostate volume (PV), and postvoid residual urine (PVR); and (4) incidences of postoperative complications. Patients were followed for 6 months.

RESULTS: The mean PV for the entire study population was 44.1 mL (SD = 2.0; range, 29-78 mL). There were no significant differences between groups on any of the baseline variables. Mean (standard deviation) declines in serum Na+ were 4.8 (1.1) and 0.9 (0.3) mmol/L for the patients receiving TURP and TURPis, respectively ($P < .001$). Mean declines in Hb were 1.5 (0.6) and 0.7 (0.4) g/dL for the patients receiving TURP and TURPis, respectively ($P < .002$). The patients receiving TURPis had significantly smaller declines for both of these variables. When compared with the patients receiving TURP, those receiving TURPis had significantly shorter mean times for the procedure ($P < .03$), irrigation ($P < .001$), catheterization ($P < .02$), and hospitalization ($P < .02$). The patients receiving TURPis had significantly fewer clot retentions ($P < .05$) than the patients receiving TURP. None of the patients in either group required blood transfusion or demonstrated TUR syndrome. One patient receiving TURP developed a bladder neck contracture; 1 patient receiving TURPis experienced urethral stricture. Efficacy outcomes (IPSS, QoL, Qmax, PSA, PV, and PVR) revealed that all changes from baseline were statistically significant in both groups ($P < .05$). However, none of the between-group comparisons reached statistical significance.

CONCLUSION: TURPis has the potential to be the new gold standard for BPH treatment. The present study demonstrated that over a 6-month period, TURPis has efficacy similar to TURP. TURPis has additional advantages of smaller declines in serum sodium and hemoglobin, reduced irrigation and catheterization times, shorter hospital stay, and elimination of TUR syndrome.

KEYWORDS: Benign prostatic hyperplasia; Bipolar; Bipolar transurethral resection; Prostate; Transurethral resection syndrome

CORRESPONDENCE: Dr. Taha Abo-Almagd Abdel-Meguid, PO Box 80215, Jeddah 21589, Saudi Arabia (tahaaboalmagd@yahoo.com).

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is the only tumor that inevitably affects almost every aging male, and there is consensus on its progressive nature. For many decades, transurethral resection of the prostate (TURP) has been considered the benchmark of surgical management for BPH, due to the procedure's outstanding, well-documented, long-term treatment efficacy [1].

The ideal irrigant for TURP would be a nonconductive medium that does not interfere with diathermy, has a high degree of translucency, has osmolality similar to that of serum, and causes only minimal side effects when absorbed. Traditionally, a 1.5% glycine solution is used for irrigation during TURP. The absorption of irrigating fluid is a consistent cause of complications. One unique complication of TURP is transurethral resection (TUR) syndrome, a dilutional hyponatremia that occurs when the irrigant solution is absorbed into the bloodstream. Additionally, there are still concerns regarding other complications (eg, bleeding, the need for blood transfusion, urethral strictures, bladder neck contracture). A prospective multicenter study on 10654 patients treated with TURP showed that mortality has decreased (0.1%) but morbidity, although reduced (11.1%), continues to be high [2].

There are many alternatives and modifications of TURP that aim to improve the outcome and reduce the associated morbidity. The most significant recent technical modification of TURP is the incorporation of bipolar technology. Bipolar TURP (B-TURP) addresses a fundamental flaw of monopolar TURP (M-TURP) by allowing resection in normal saline, and the technique seems to be promising [3-5]. The goal of B-TURP is to allow immediate debulking of a large obstructing prostatic adenoma with the same benefits of monopolar resection, but with a lower incidence of complications from systemic absorption of hypotonic irrigant. Recent evidence derived from systematic reviews and meta-analyses of randomized clinical trials (level 1a evidence) [4,5] has shown that B-TURP in saline shares similar clinical efficacy and durability with traditional M-TURP, with low long-term complication rates. Additionally, it has minimized risk of bleeding and clot retention and it has eliminated the TUR syndrome. There is also no evidence of a statistically significant increase in urethral strictures when bipolar is compared with monopolar current [3-5]. With such findings, it is hypothesized that B-TURP could be the new reference standard for treatment of BPH [5].

The various bipolar systems represent distinct technological advancements, based on different electrophysiological principles regarding current flow. Consequently, efficacy and safety concerns should be cautiously and separately evaluated for each system [6,7]. The PlasmaKinetic® system ([PK], Gyrus ACMI, Southborough, MA, USA) has had extensive evaluation in randomized controlled trials, and results have shown an improved safety profile. Similar data on a transurethral resection in saline (TURis) system (Olympus, Tokyo, Japan) are not yet mature enough to permit safe conclusions [4]. The current prospective randomized controlled study was designed to compare transurethral resection of the prostate in saline (TURPis) using the TURis system with the standard M-TURP, to determine level 1b evidence of safety and efficacy.

METHODS

Participants

The present prospective randomized controlled study was conducted in the author's institution between March 2008 and October 2009. The inclusion criteria were: (1) age 50 years or older with symptomatic BPH, (2) estimated prostate volume (PV) ≤ 80 mL, (3) maximum flow rate (Qmax) ≤ 15 mL/s, and (4) an International Prostate Symptom Score (IPSS) ≥ 14. Indications for surgical intervention included failed medical therapy with alpha-blockers and/or 5-alpha reductase inhibitors, refractory or repeated episodes of acute urinary retention (AUR), recurrent urinary tract infections, and hematuria. Exclusion criteria were: (1) patients with prostate cancer, bladder cancer, bladder calculi, neurogenic bladder, previous prostate or urethral surgery, urethral stricture, or renal impairment; (2) patients unfit for surgery; and (3) patients who refused randomization. Patients who were lost to follow-up before completing a minimum of 6 months of reevaluations were also excluded. Forty patients met the inclusion criteria at baseline and were recruited for the study.

Study Design

The 40 patients were randomly assigned to one of the 2 treatment modalities (TURP or TURPis) in a 1:1 ratio. Primary endpoints were: (1) declines in serum sodium (Na+) and hemoglobin (Hb), (2) incidence of TUR syndrome, and (3) changes in IPSS, quality of life (QoL), and maximum flow rate (Qmax). Secondary endpoints included: (1) differences in procedure, irrigation, catheterization, and hospitalization times; (2) variations in blood transfusion, recatheterization, and clot retention rates; (3) changes in prostate specific antigen (PSA), prostate volume (PV), and postvoid residual urine (PVR); and (4) incidences of postoperative complications. The study protocol was approved by the ethics committee and a written informed consent was obtained from each patient at enrollment.

Evaluation

At baseline, the patients were evaluated by: (1) history and clinical examination; (2) assessment of IPSS, QoL (IPSS subtest), Qmax, and PSA; and (3) estimation of their PV and PVR using transrectal ultrasound (TRUS) and pelvic ultrasound. Serum Na+ and Hb were obtained in the operating room immediately before commencing the procedure (baseline), and then repeated immediately at the end of the procedure. Postoperatively, patients were assessed during their hospital stay and at 1, 3, and 6 months of follow-up. Durations of the procedure, irrigation, catheterization, and hospital stay were documented. Any complications (eg, TUR syndrome, clot retention, blood transfusion, or need for recatheterization) were noted. Patients were assessed during follow-up visits for IPSS, QoL, Qmax, PVR, and for complications (eg, retrograde ejaculation, urethral stricture, or bladder neck contracture). PSA and PV were reevaluated at the 3-month follow-up visit.

Equipment and Techniques

Bipolar TURPis (B-TURPis) was performed using the TURis system (Olympus, Tokyo, Japan). This system includes a UES-40 SurgMaster™ high frequency generator and 26 Fr rotatable continuous flow resectoscope. The generator settings for cutting and coagulation were 180-250 W and 75-100 W, respectively. Saline solution was used for irrigation during surgery.

M-TURP was performed using the Autocon® II 400 generator SCB® high-frequency surgery unit (Karl Storz, Tuttlingen, Germany) and a 26 Fr continuous flow rotatable resectoscope. The generator settings for cutting and coagulation were 100-175 W and 50-75 W, respectively. The solution used for irrigation was 1.5% glycine.

All operations were performed under general or spinal anesthesia. There were no differences in the B-TURPis and M-TURP surgical techniques. At completion of the operation, a 22 Fr 3-way Foley catheter was inserted for continuous bladder irrigation.

Statistical Analysis

Study data were compiled with Microsoft® Office Excel® 2007 software. Statistical analysis was performed using SPSS 11.0 software (SPSS, Inc., Chicago, Illinois). Analysis of variance was used for testing continuous numeric data. Related variables were compared using the Wilcoxon signed-rank test. Chi-square test was used for categorical data. A 2-sided P value < .05 was considered statistically significant. Results were presented as mean, standard deviation (SD), range, number of cases, or percentage of n.

RESULTS

Out of the 40 patients (20 patients in each group) initially recruited to the study, 2 patients (1 receiving TURP; 1 receiving TURPis) were lost to follow-up and were excluded from the analysis. Therefore, a total of 38 patients ranging in age from 52-78 years completed the study (Figure 1). The mean prostate volume for the entire study population was 44.1 mL (SD = 2.0; range, 29-78 mL).

Figure 1. Patients Allocated to Treatment Groups and Patients Excluded From the Study.
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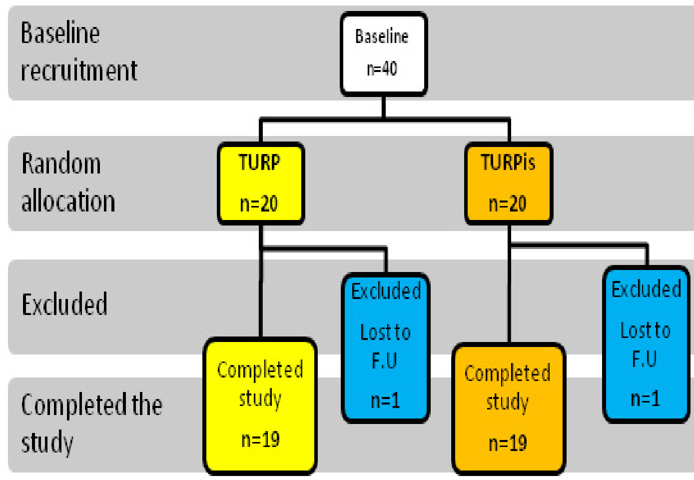

Abbreviations: TURP, transurethral resection of the prostate; TURPis, transurethral resection of the prostate in saline; FU, follow-up.

The baseline characteristics of age, PV, IPSS, Qmax, PVR, and PSA are contained in Table 1 for each group. Analysis of Qmax and PVR at baseline and during follow-up was done in patients without preoperative indwelling catheters (13 in TURP group; 14 in TURPis group). There were no significant differences between groups on any of the variables.

Table 2 contains the postoperative declines in laboratory values for serum sodium and Hb. It also contains the times for the procedure, irrigation, catheterization, and hospitalization. Mean (SD) serum sodium declined from 139.1 (1.2) to 134.3 (0.9) mmol/L and from 138.8 (1.5) to 137.9 (0.8) mmol/L, for the patients receiving TURP and TURPis, respectively. The group receiving TURPis had a significantly smaller decline (P < .001). Similarly, the mean (SD) Hb declined from 13.8 (1.3) to 12.3 (1.4) g/dL and from 14.3 (0.9) to 13.6 (1.1) g/dL for the patients receiving TURP and TURPis, respectively. The group receiving TURPis had a significantly smaller decline (P < .002). When compared with the patients receiving TURP, those receiving TURPis had significantly shorter mean times for the procedure (P < .03), irrigation (P < .001), catheterization (P < .02), and hospitalization (P < .02).

Table 1. Baseline Characteristics for Patients Receiving Transurethral Resection of the Prostate in Saline (TURPis) Versus Nonconductive Solution (TURP) (N = 38).

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Characteristic	TURP (n = 19)			TURPis (n = 19)		
	Mean	SD	Range	Mean	SD	Range
Age (years)	65.8	6.1	54-78	63.2	7.4	52-76
Prostate volume (mL)	42.3	4.1	29-73	44.2	7.1	33-78
IPSS (score)	22.3	5.4	14-30	24.2	6.0	16-32
Maximum flow rate[a] (mL/s)	7.6	3.8	2.6-12.7	6.9	4.4	1.6-13.3
Postvoid residual volume[a] (mL)	88	16	25-120	65	12	25-98
Prostate specific antigen (ng/mL)	2.2	0.9	1.1-3.8	2.6	1.0	0.3-4.2

[a]Completed in patients without preoperative indwelling catheters.
Abbreviation: IPSS, International Prostate Symptom Score.

Table 3 contains the number of patients in each group experiencing clot retention, recatheterization, stress urinary incontinence (SUI), urethral stricture, bladder neck contracture, and retrograde ejaculation. None of the patients in either group required blood transfusion and none demonstrated TUR syndrome. The patients receiving TURPis had significantly fewer clot retentions ($P < .05$) than the patients receiving TURP. One patient in each group was unable to void on first voiding trial, necessitating recatheterization for an additional 1 week. Neither of these 2 patients had a history of AUR prior to surgery. One patient receiving TURP developed a bladder neck contracture; 1 patient receiving TURPis experienced urethral stricture. Each of these patients required a secondary procedure. Retrograde ejaculation was comparable in both groups. None of the patients had stress urinary incontinence at the 6-month follow-up.

Table 4 contains the efficacy outcomes for IPSS, QoL, Qmax, PVR, PSA, and PV. All changes from baseline were statistically significant ($P < .05$) in both groups. However, the efficacy outcomes were comparable between groups and none of the group comparisons reached statistical significance.

DISCUSSION

In the current study, although there were statistically significant differences between groups in decline of serum Na+ and Hb, none of the patients in either group demonstrated TUR syndrome or required blood transfusion. The better hemostasis in the TURPis group contributed to the statistically significant decrease in procedure, irrigation, and catheterization times, and, consequently, shorter hospitalization time. The current study further demonstrated comparable efficacy outcomes for both modalities, with statistically significant changes from baseline for IPSS, QoL, Qmax, PSA, PV, and PVR within each

Table 2. Postoperative Declines in Serum Sodium and Hemoglobin, and Procedure Times for Patients Receiving Transurethral Resection of the Prostate in Saline (TURPis) Versus Nonconductive Solution (TURP) (N = 38).

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Variable	TURP (n = 19)			TURPis (n = 19)			*P*
	Mean	SD	Range	Mean	SD	Range	
Serum Na+ decline (mmol/L)	4.8	1.1		0.9	0.3		<.001
Hemoglobin decline (g/dL)	1.5	0.6		0.7	0.4		<.002
Procedure time (minutes)	53	12	24-66	41	8	28-59	<.03
Irrigation time (hours)	30	6	18-48	8	1	6-12	<.001
Catheterization time (hours)	55	8	40-75	27	3	20-34	<.02
Hospitalization time (hours)	73	8	50-92	36	6	28-48	<.02

Abbreviation: Na+, sodium.

Table 3. Surgical Outcomes for Patients Receiving Transurethral Resection of the Prostate in Saline (TURPis) Versus Nonconductive Solution (TURP) (N = 38).
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Outcome	TURP (n = 19)		TURPis (n = 19)		*P*
	n	% n	n	% n	
Clot retention	2	10.5	0		<.05
Recatheterization	1	5.2	1	5.2	ns
Stress urinary incontinence	3	15.8	2	10.5	ns
Urethral strictures	0		1	5.2	ns
Bladder neck contractures	1	5.2	0		ns
Retrograde ejaculation[a]	8	66.7	7	63.6	ns

[a]Sexually active patients only (TURP n = 12; TURPis n = 11).
Abbreviation: ns, not significant ($P > .05$).

group but nonsignificant between-group differences.

In spite of its morbidity [2], TURP has long been considered the *gold standard* for treatment of BPH. The therapeutic effect of TURP relies on the immediate removal of the obstructing prostatic tissue in pieces. To minimize its morbidity, several minimally invasive alternatives have been described. Most of the alternatives attributed either immediate vaporization or coagulation with delayed sloughing of prostatic tissue. Aside from their morbidities, the outcomes of these alternatives were inferior to TURP in terms of efficacy [1].

The use of B-TURP and TURPis as an alternative to M-TURP for men with symptomatic BPH has gained increasing acceptance

Table 4. Efficacy Outcomes at Baseline and Follow-up Evaluations for Patients Receiving Transurethral Resection of the Prostate in Saline (TURPis) Versus Nonconductive Solution (TURP) (N = 38). doi: 10.3834/uij.1944-5784.2010.02.05t4

Variable	Group	Baseline			1 Month				3 Months				6 Months			
		Mean	SD	Range	Mean	SD	Range	% Δ[a]	Mean	SD	Range	% Δ[a]	Mean	SD	Range	% Δ[a]
IPSS (score)	TURP	22.3	5.4	14-30	9.5	1.1	7-14	-57.4	6.1	0.5	5-8	-72.6	7.2	0.7	5-10	-67.7
	TURPis	24.2	6.0	16-32	8.3	1.3	6-11	-65.7	6.0	0.3	5-7	-75.2	6.2	0.5	4-11	-74.4
QoL (score)	TURP	3.9	0.2	2.0-4.4	1.6	0.3	0.9-2.1	-59	1.4	0.1	0.8-1.9	-64	1.1	0.2	0.8-1.5	-71.8
	TURPis	4.0	0.3	2.3-4.6	1.4	0.3	0.9-1.9	-65	1.3	0.2	0-1.9	-67.5	1.1	0.2	0-2.2	-72.5
Qmax (mL/s)	TURP	7.6	3.8	2.6-12.7	18.9	2.1	14.1-28.5	+148.7	19.2	2.4	12.3-28	+152.6	18.3	3.5	10.7-27.4	+140.8
	TURPis	6.9	4.4	1.6-13.3	17.5	2.2	15.4-29.1	+153.6	17.4	2.0	11.6-27.7	+152.1	17	2.9	9-28	+146.3
PVR (mL)	TURP	88	16	25-120	36	8	20-52	-59.1	18	4	10-32	-79.5	20	6	12-29	-77.2
	TURPis	65	12	25-98	27	5	18-57	-58.5	19	5	11-38	-70.8	17	6	9-30	-73.8
PSA (ng/mL)	TURP	2.2	0.9	1.1-3.8					1.3	0.4	0.6-2.4	-40.9				
	TURPis	2.6	1.0	0.3-4.2					1.4	0.5	0.2-2.7	-46.2				
PV (mL)	TURP	42.3	4.1	29-73					23.1	2.0	19-31	-45.4				
	TURPis	44.2	7.1	33-78					23.8	1.7	19-30	-46.2				

[a]Percent change from baseline; all changes from baseline were statistically significant ($P < .05$).
Abbreviations: IPSS, International Prostate Symptom Score; QoL, quality of life; Qmax, maximum urinary flow rate; PVR, postvoid residual urine; PSA, prostate-specific antigen; PV, prostate volume

over the past few years [5]. The biological basis behind bipolar electrosurgical technology has been described. In M-TURP, electrical energy is directed into the tissue, where its electrical resistance creates temperatures as high as 400°C (752°F). In B-TURP, the radiofrequency energy converts the conductive medium into a plasma field of highly ionized particles, which disrupts the organic molecular bonds between the tissues. This allows rapid vaporization and desiccation of prostate tissues as the high temperature loop passes through them. These drastic changes in tissue temperatures allow effortless loop passage and coagulation, which result in the *cut and seal* effect. The current flows from the active electrode to the adjacent return electrode directly, without passing through the tissue; this negates the need for a diathermy pad [8]. In the TURis system, the generator produces a high-frequency current that passes through the active electrode (resection loop) and returns via the return electrode (sheath of resectoscope) [5,9]. The absence of current flow through the patient also ensures that there is no unwanted stimulation of the obturator nerve or cardiac pacemaker. Glycine solution is not essential for irrigation in bipolar TURP; hence, 0.9% sodium chloride solution can be used. Therefore, B-TURP and TURPis incorporate the same concept as the traditional gold standard TURP in the immediate tissue removal in pieces. However, B-TURP and TURPis procedures have the advantages of low intraprostatic temperatures, better hemostasis, and the intraoperative use of saline irrigation. Therefore, B-TURP does not seem to represent an alternative to traditional TURP; rather, it is merely a technological modification to reduce the morbidity associated with M-TURP such as bleeding and TUR syndrome [3-5].

None of the patients in the present study demonstrated TUR syndrome. Although a significant decrease in TUR syndrome incidence has been reported during the past decades, it still represents a serious perioperative complication [2,10]. Functioning in a conductive medium instead of the conventional nonconductive irrigation fluid is a prerequisite of bipolar technology. This advantage is the most important because all issues relating to hypotonic/hypoosmolar fluid irrigation (eg, dilutional hyponatremia, TUR syndrome) are expected to be eliminated [11]. Therefore, bipolar technology should provide more time to perform larger resection, coagulation, and training without compromising safety [11,12]. Recently, Mamoulakis et al [4] reported on B-TURP versus M-TURP in a systematic review and meta-analysis of randomized controlled trials. An extensive literature search was performed to detect all published trials that compare the 2 techniques. The authors were able to include 16 randomized controlled trials with 1406 patients in their analysis. The systematic review described a total of 13 cases of TUR syndrome versus none after M-TURP and B-TURP, respectively. No significant difference in TUR syndrome occurrence was reported in individual trials. Pooled analysis detected an overall significant risk difference (RD) (RD: 2%; 95% CI, 0–3%; P = .01). This resulted in a number needed to harm (NNH) of 50 (95% CI, 33–111), meaning that treating 50 patients with B-TURP will result in 1 fewer case of TUR syndrome than when treating patients with M-TURP. Considering a reported incidence of up to 2.1% [2], these results provide strong evidence to support the notion expressed by Issa et al [13] that with B-TURP, dilutional hyponatremia of TUR syndrome is an historical event in the 21st century. However, bipolar technology does not prevent fluid absorption and will not be able to prevent severe cardiac and/or pulmonary failure in cases of large volume uptake; these facts should always be kept in mind [6,14].

One of the major complications of M-TURP is intraoperative or postoperative bleeding, which is clinically significant mainly if it causes clot retention or necessitates blood transfusion or reoperation. The patients receiving TURPis in the present study had significantly fewer clot retentions than the patients receiving TURP. None of the patients in either group required blood transfusion. Previous individual trials also reported a nonsignificant difference in blood transfusion rates between M-TURP and B-TURP arms. Pooled analysis verified this result [4]. Fewer cases required transfusion in the B-TURP arm, but the difference was not significant (RD: 2%; 95% CI, 0–4%; P = .10) [4]. Transfusion rates in M-TURP series have been significantly reduced over time; however, clot retention incidence ranges between 2% and 5% and bleeding still remains a concern [10]. The hemostatic capacity of bipolar current has been reported to be superior in a number of ex vivo studies, possibly attributed to deeper coagulation depths [15-17], as well as to the *cut and seal* effect of plasma created by bipolar energy [5,11]. The meta-analysis of data on postoperative change in Hb level reported a nonsignificant drop between arms [4]. Pooled analysis for clot retention showed a significantly higher frequency in the M-TURP arm (RD: 5%; 95% CI, 1–10%; P = .03). The NNH of 20 (95% CI, 10–100) means that treating 20 patients with B-TURP will result in 1 fewer case of clot retention than when treating patients with M-TURP. This seems to be clinically significant, considering the incidence of clot retention [10]. Additionally, meta-analysis for AUR showed no differences between arms (RD: 1%; 95% CI, –2% to 3%; P = .59), confirming all individual trial results [4]. The meta-analysis also verified the reduced duration of irrigation, decreased catheterization time, and shortened hospital stay in the B-TURP arm when compared with the M-TURP arm [4]. Similar results were found in the time variables measured in the present study.

The Mamoulakis et al [4] meta-analysis reported that mean operation times varied from 35 to 81 minutes in the M-TURP arm and from 39 to 79 minutes in the B-TURP arm. Michielsen et al [18] found mean (SD) operation times of 44 (20) and 56 (25) minutes in the TURP and TURis groups, respectively; the times were significantly longer in the B-TURP arm. The authors attributed this difference to the smaller size loop in TURis system and to operators' heterogeneous experience between arms. In contrast, other studies found that no difference was detected using the same system [9,19]. A shorter operation time was even reported with the PK system [20]. The results of the present study showed that the patients receiving TURPis had significantly shorter mean times for the procedure, with a mean operative time of 53 and 41 minutes for the TURP and TURis groups, respectively.

The major late complications of M-TURP include urethral strictures (2.2%-9.8%) and bladder neck contractures (0.3–9.2%). The incidence has not changed significantly over time, despite improvements in surgical techniques, lubricants, instruments, and electrical technology [10]. Both of these complications were found in patients in the present study (1 bladder neck contracture in the TURP arm; 1 urethral stricture in the TURPis arm). Theoretically, bipolar technology minimizes the risk of urethral strictures. However, alarming results regarding urethral strictures raised serious concerns about bipolar technology in the urological community [9, 21,22]. This holds true for the TURis system, because the bipolar circuit is completed with the current returning via the sheath of the resectoscope. As such, any current leakage along the sheath might traumatize the urethra by causing electric burns [5,9,18]. However, this concern has not been verified [9]. Pooled analysis showed that differences in cumulative incidence rates at 12 months were insignificant [4]. Accrual of more patients and/or longer follow-up may change these results.

B-TURP has been shown to be as effective as conventional TURP. Currently available best evidence (level 1a) derived from systematic review and meta-analysis showed no clinically relevant differences in short-term efficacy between B-TURP and M-TURP [4]. When compared with baseline, data on efficacy measured by the impact of each technique on Qmax, IPSS, and QoL score have been provided at follow-up periods ranging from 1 to 48 months, with the conclusion that the techniques were equally effective. Pooling trials reporting on Qmax at 12 months showed a small but significant difference (P = .03) favoring B-TURP (weighted mean difference [WMD]: 0.72 mL/s; 95% CI, 0.08–1.35). However, this difference is hardly clinically relevant [4]. Additionally, by pooling trials that reported IPSS and QoL score [4], no differences were detected at 12 months (IPSS, WMD: 0.05; 95% CI, -0.40 to 0.51; P = .82; QoL score, WMD: 0.04; 95% CI, -0.17 to 0.24; P = .72). Results of the present study also showed statistically significant changes from baseline in each group, but no significant between-group differences on these efficacy measures.

The physical configuration and design of the TURis system provides an additional potential advantage. In the TURis system, the active electrode is in the resection loop, and the return electrode is in the sheath of the resectoscope. The electric current flows through the loop, the prostate tissue, and the saline solution, and returns via the sheath. In contrast, in the PK Gyrus system the active and return electrodes are on the same axis, separated by a ceramic insulator. The important implication of this difference in design is in the cost. The PK Gyrus system with the coaxial electrode and ceramic insulator is more costly. The bipolar TURis loop is simple in design and, thus, less expensive. The cost of each PK Gyrus loop is approximately US $300; each TURIS loop is about US $60. The difference in cost will have an impact on health economics, especially for such a common surgical procedure [9].

Limitations of the Study

The single-center design of the present study and small number of patients limit the power of statistical analysis, particularly with infrequent complications such as urethral stricture and bladder neck contractures. Consequently, the statistically significant or nonsignificant findings may not reflect true clinical significance and should be addressed with caution. The follow-up time of 6 months is an additional limitation. A large-scale, multicenter, long-term randomized controlled trial comparing TURPis to TURP is justified and may help to provide better evidence.

CONCLUSIONS

TURPis has the potential to represent the new gold standard for BPH treatment. The present study demonstrated that TURPis has efficacy similar to TURP over a short-term period. TURPis has additional advantages of smaller declines in serum sodium and hemoglobin, reduced irrigation and catheterization times, shorter hospital stay, and elimination of TUR syndrome. However, a large-scale, long-term, randomized clinical trial comparing TURPis to TURP is needed.

Conflict of Interest: none declared

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