Comparative Effectiveness of Transurethral Prostate Procedures at Enabling Urologic Medication Discontinuation: A Retrospective Analysis

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OBJECTIVE To test the hypothesis that transurethral prostate procedures (TUPPs) eliminating tissue result in greater medication discontinuation and lower de novo initiation rates than procedures inducing tissue necrosis.

METHODS Retrospective review of all men undergoing first time TUPPs at a large tertiary center from 2001 to 2016 was completed. Procedure type and urologic medication use before, 3-12 months after, and greater than 12 months after TUPP were analyzed with simple open prostatectomy as a comparator. Tissue-eliminating TUPPs included transurethral resection of the prostate and laser prostatectomy. Tissue-necrosing procedures included microwave therapy (transurethral microwave therapy) and radiofrequency ablation (transurethral needle ablation), which were grouped in analyses. Medication types were 5-alpha reductase inhibitors (5ARI), alpha blockers, anticholinergics, and beta-3 agonists (B3A).

RESULTS A total 5150 TUPPs were analyzed. Preoperative medication use significantly varied across TUPPs for 5ARI (P <.01), alpha-blockers (P .01), and anticholinergics (P .047), but not B3A (P .476). Transurethral resection of the prostate and laser prostatectomy were associated with significantly higher medication discontinuation rates and lower resumption and initiation rates compared to tissue-necrosing procedures. Relative to TUPPs, simple prostatectomy had significantly higher medication discontinuation, as well as the lowest resumption and initiation rates.

CONCLUSION Tissue-eliminating benign prostatic hyperplasia procedures were associated with better medication discontinuation, resumption, and de novo initiation rates compared to tissue-necrosing benign prostatic hyperplasia procedures. UROLOGY 134: 192–198, 2019. © 2019 Elsevier Inc.

Benign prostatic hyperplasia (BPH) can produce bladder outlet obstruction (BOO) and result in lower urinary tract symptoms (LUTS) and other complications.[1,2] BPH is highly prevalent in the aging population; approximately 80% of men have BPH with LUTS by 70 years of age.[3] Surgical approaches to BPH are varied. Transurethral resection of the prostate (TURP) has withstood the test of time for surgical BPH treatment. Other modalities, such as photoselective vaporization of the prostate and/or laser prostatectomy (LP) provide additional options, while less invasive procedures, including transurethral microwave therapy (TUMT) and transurethral needle ablation (TUNA) have been utilized. In large glands, simple prostatectomy (SP) remains a useful approach.[4]

The goals of surgical therapy include improvement of symptoms and discontinuation of medications. Analyses of various interventions, focused upon changes in symptom scores and urodynamic parameters, have found various transurethral prostate procedures (TUPP) for BPH largely impart similar efficacy and morbidity.[5-8] However, few have examined incidence and durability of medication discontinuation following surgery. Knowledge of how each specific TUPP impacts urologic medication utilization may aid in optimizing procedure choice, and possibly help reduce the cost and morbidity of BPH treatment.

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The goal of this study was to determine changes in BPH medication utilization following TUPPs. Rates of post-TUPP urologic medication discontinuation, resumption, and de novo initiation (in men previously not on any urologic medications) were investigated. The hypothesis was tissue-eliminating TUPPs (TURP and LP) result in greater medication discontinuation rates as well as lower resumption and de novo initiation rates compared to procedures that induce tissue necrosis (TUMT and TUNA).

MATERIALS AND METHODS

All TUPPs performed within a large tertiary academic medical system between 2001 and 2016 were retrospectively identified. Only initial TUPPs (the first documented in the medical record, excluding subsequent procedures) were reviewed and included in analyses. Demographic variables collected included age, history of type II diabetes mellitus, history of coronary artery disease, smoking status, and history of alcohol abuse. All data were electronically extracted from the medical record upon institutional review board approval.

Urologic medications prior to the procedure, 3-6 months postoperatively, 6-12 months postoperatively, and greater than 12 months post-TUPP were collected. Urologic medications 0-3 months after TUPP were not analyzed, as local practice patterns often maintain postoperative patients on their urologic medications until the remaining doses of their last prescription (re)fill have been completed. Medication utilization collected by automated data extraction was reviewed manually to exclude non-urologic medications uses (eg, 5ARI for hair loss or AB for hypertension). The date of last-recorded follow-up within the health system was also collected.

Medications were considered "discontinued" if listed as an active prescription prior to the procedure and no longer an active prescription from 3 months, 6 months, or 12 months post-operatively onward (cumulatively for later time periods). Medications were defined as "initiated" if not active preoperatively and for which a prescription was newly listed as active from 3 months, 6 months, or 12 postoperatively onward (cumulatively for later time periods). Medications were deemed "resumed" if a prescription was subsequently listed as active after the medication had been previously classified as "discontinued" based upon the above criteria.

Men with at least 1 urologic medication prior to TUPP who had no active 5ARI, AB, AC, or B3A from 3 months, 6 months, or 12 months postoperatively onward were considered to have "discontinued all medications" after their procedure (cumulatively for later time periods). Tissue-eliminating TUPPs were LP and TURP. Tissue-necrosing TUPPs were TUMT and TUNA, which were grouped together in analyses. Additionally, SP was included as a comparator.

Data were analyzed using JMP Pro 13 (SAS Institute, Cary, NC) or GraphPad Prism 5.0 (GraphPad Software Inc., San Diego, CA) software. Descriptive statistics, based upon data distribution, are presented as mean ± standard deviation or as percentages. Comparative analyses included analysis of variance for continuous variables and Pearson's chi-squared tests for categorical variables. Urologic prescription-free status was analyzed for all men via Kaplan-Meier survival curves for the period 12 beyond the procedure with log rank used to compare the survival distributions. Men with no active urologic prescription(s) were censored to the date of last follow-up. All $P < .05$ were considered statistically significant.

RESULTS

Patient Demographics and Preoperative Medication Utilization

A total of 5150 TUPPs were performed on men with BPH and included 2549 LP, 2304 TURP, 165 TUMT or TUNA, and 132 SP. Mean age ranged from 69.1 ± 10.2 to 72.1 ± 9.49 across procedure type (Table 1). A significantly greater percentage of men undergoing TUMT or TUNA had a history of smoking compared to other TUPPs (9.09% vs 4.25-5.3%, P .028, respectively). History of coronary artery disease differed significantly (P .015) across TUPPs with higher percentages in patients undergoing LP (25.9%) and TURP (25.7%) compared to TUMT and TUNA (18.8%) or SP (15.9%). Rates of alcohol abuse and type II diabetes mellitus did not differ significantly across procedure groups. Preoperative urologic medication utilization varied significantly across TUPPs (Table 1). Overall, alpha blockers (AB) were the most commonly utilized urologic medication, and B3A were the least. Time between date of procedure and date of last follow-up, defined as any type of encounter found in the medical record, varied significantly by TUPP, with TUMT and TUNA having the longest time to follow-up and TURP the least (Table 1).

Medication Changes 3-6 Months Post-TUPP

Urologic medication discontinuation rates (Table 2) varied significantly by TUPP type for 5ARIs ($P < .01$) and AB ($P < .01$) but not anticholinergics (AC) ($P = .128$) or B3A ($P = .358$). Tissue-eliminating TUPPs had the highest discontinuation rates

Table 1. Patient demographics and preoperative medication prescription rates

Variable	LP ($n = 2549$)	TURP ($n = 2304$)	TUMT + TUNA ($n = 165$)	SP ($n = 132$)	P Value
Age (y)	72.1 ± 9.49	71.0 ± 9.72	69.1 ± 10.2	71.8±7.77	.046*
History of smoking	5.3%	4.25%	9.09%	4.55%	.028*
History of alcohol abuse	18.7%	16.2%	20.0%	19.7%	.110
Type II DM	17.4%	19.7%	16.4%	17.4%	.178
CAD	25.9%	25.7%	18.8%	15.9%	.015*
5ARI pre-TUPP	44.4%	51.8%	37.0%	53.8%	<.01*
Alpha blocker pre-TUPP	79.7%	79.6%	83.6%	68.2%	.01*
Anti-cholinergic pre-TUPP	18.4%	21.3%	23.6%	18.2%	.047*
Beta-3 agonist pre-TUPP	0.86%	0.91%	0.61%	0.00%	.476
Time between procedure and last follow-up (mo)	55.0 ± 43.0	39.0 ± 34.5	89.6 ± 38.9	39.0 ± 41.4	<.01*

* significant at $\alpha = 0.05$.

Table 2. Short and intermediate term medication changes after TUPP

Medication	Medication Utilization	LP ($n = 2549$)	TURP ($n = 2304$)	TUMT + TUNA ($n = 165$)	SP ($n = 132$)	*P* Value
Medication changes 3-6 months after TUPP						
5ARI	Discontinued	91.6%	89.4%	80.3%	98.6%	<.01*
	Initiated	1.91%	2.34%	3.85%	0.00%	.335
Alpha blocker	Discontinued	90.2%	89.1%	78.3%	95.6%	<.01*
	Initiated	3.87%	4.26%	7.41%	0.00%	.443
Anticholinergic	Discontinued	80.2%	84.1%	84.6%	95.8%	.128
	Initiated	7.89%	5.74%	4.76%	8.33%	.041*
Beta-3 agonist	Discontinued	81.8%	95.2%	100%	–	.358
	Initiated	0.71%	0.44%	0.00%	0.76%	.451
Medication changes 6-12 months after TUPP						
5ARI	Discontinued	85.0%	86.2%	67.2%	98.6%	<.01*
	Resumed	12.5%	12.0%	26.53%	0.00%	<.01*
	Initiated	2.68%	3.15%	7.69%	0.00%	.016*
Alpha blocker	Discontinued	85.8%	86.0%	73.2%	96.7%	<.01*
	Resumed	11.0%	11.1%	23.2%	2.33%	<.01*
	Initiated	5.61%	4.90%	7.41%	0.00%	.414
Anti-cholinergic	Discontinued	81.1%	81.9%	84.6%	95.8%	.313
	Resumed	11.7%	12.8%	6.06%	4.35%	.441
	Initiated	5.96%	4.52%	9.52%	4.63%	.040*
Beta-3 agonist	Discontinued	81.8%	100%	100%	–	.111
	Resumed	11.1%	0.00%	0.00%	–	.292
	Initiated	0.63%	0.39%	0.00%	0.00%	.399

* significant at = 0.05.

for these drugs with over 90% of 5ARI and AB discontinued following LP, while nearly 90% were discontinued after TURP. Tissue-necrosing procedures had the lowest discontinuation rates with around 80% of 5ARI and AB discontinued after TUMT or TUNA.

Medication initiation rates (Table 2) differed significantly by TUPP for AC ($P = .041$) only, with TUMT or TUNA associated with the lowest initiation rate of 4.76% and LP at 7.89% being the highest. Relative to all TUPPs, SP had the highest mediation discontinuation rates. However, at 8.33% SP also had the highest AC initiation rate.

Medication Changes 6-12 Months Post-TUPP

Medication discontinuation rates (Table 2) varied significantly by TUPP for only 5ARI ($P <.01$) and AB ($P <.01$), with LP and TURP being higher than TUMT and TUNA. Following LP, around 85% of 5ARI and AB were discontinued, where around 86% of ARI and AB were discontinued after TURP. Only 67.2% of 5ARI and 73.2% of AB were discontinued after TUMT or TUNA. The highest discontinuation rates followed SP, with 98.6% of 5ARI and 96.7% of AB stopped.

Medication initiation rates (Table 2) differed significantly for 5ARI (P 0.016) and AC (P 0.040) across procedures. The highest initiation rates were after TUMT or TUNA, with 7.69% starting a 5ARI and 9.52% an AC. Initiation rates were approximately half these magnitudes following LP and TURP. No patients after SP started a 5ARI and only 4.63% started an AC.

Trends in rates of medication resumption (Table 2), after being discontinued 3-6 months postoperatively, mirrored those of medication discontinuation. Both LP and TURP were associated with lower resumption rates than TUMT and TUNA for 5ARI and AB. Men undergoing SP had the lowest resumption rates.

Medication Changes Greater Than 12 Months Post-TUPP

Medication discontinuation rates (Table 3) varied significantly by TUPP for 5ARI ($P <.01$), AB ($P <.01$), and AC ($P <.030$) over the long term. Discontinuations rates for these medications were higher for LP and TURP compared to TUMT or TUNA with SP demonstrating the highest rates (Table 3). Rates of men who discontinued and remained off all urologic medications differed significantly ($P <.01$) by procedure, with rates for LP (52.9%) and TURP (62.0%) higher than TUMT or TUNA (27.7%) but lower than SP (87.3%).

Medication initiation rates differed significantly by TUPP for all medication types. LP and TURP had lower initiation rates than TUMT and TUNA (Table 3). The lowest rates of medication initiation were noted after SP.

Medication resumption rates (Table 3) differed significantly by TUPP for 5ARI ($P <.01$), AB ($P <.01$), and AC ($P .02$). Both LP and TURP were associated with lower resumption rates than TUMT or TUNA (Table 3). Resumptions rates were lowest after SP.

Time to last follow-up varied significantly by TUPP (Table 1) and Kaplan-Meier survival analysis demonstrated rates of remaining urologic prescription-free beyond 12 months differed by procedure despite this (Fig. 1). Rates of remaining medication-free varied significantly for AB ($P <.0001$), 5ARI ($P <.0001$), and AC ($P = .0018$). The highest rates were noted after SP and lowest after TUMT and TUNA. No significant differences were observed for B3A ($P = .4287$).

COMMENT

Given that lifelong medication use imparts ongoing costs[9] and the potential for side effects and medication interactions,[10,11] understanding how surgical BPH management influences medication utilization is needed. The results of this study supported the hypothesis that compared to tissue-necrosing procedures (TUMT and TUNA), tissue-eliminating procedures (TURP and LP) were associated with greater rates of urologic medication discontinuation, as well as lower rates of medication resumption and de novo initiation.

Table 3. Medication changes greater than 12 months after TUPP

Medication Type	Medication Utilization	LP ($n = 2549$)	TURP ($n = 2304$)	TUMT + TUNA ($n = 165$)	SP ($n = 132$)	*P* Value
5ARI	Discontinued	71.1%	76.1%	45.9%	97.2%	<.01*
	Resumed	20.8%	15.1%	38.9	2.86	<.01*
	Initiated	13.4%	7.47%	34.6%	1.64%	<.01*
Alpha blocker	Discontinued	65.6%	74.4%	35.5%	90.0%	<.01*
	Resumed	28.4%	17.7%	53.0%	8.33%	<.01*
	Initiated	22.1%	12.8%	51.6%	0.00%	<.01*
Anticholinergic	Discontinued	74.5%	77.0%	64.1%	95.8%	.030*
	Resumed	15.9%	13.1%	32.3%	4.55%	.02*
	Initiated	14.9%	10.2%	31.0%	4.63%	<.01*
Beta-3 agonist	Discontinued	72.7%	95.2%	100%	–	.119
	Resumed	12.5%	5.00%	0.00%	–	.61
	Initiated	3.40%	1.71%	5.49%	0.76%	<.01*
Discontinued all medications		52.9%	62.0%	27.7%	87.3%	<.01*

* significant at $\alpha = 0.05$.

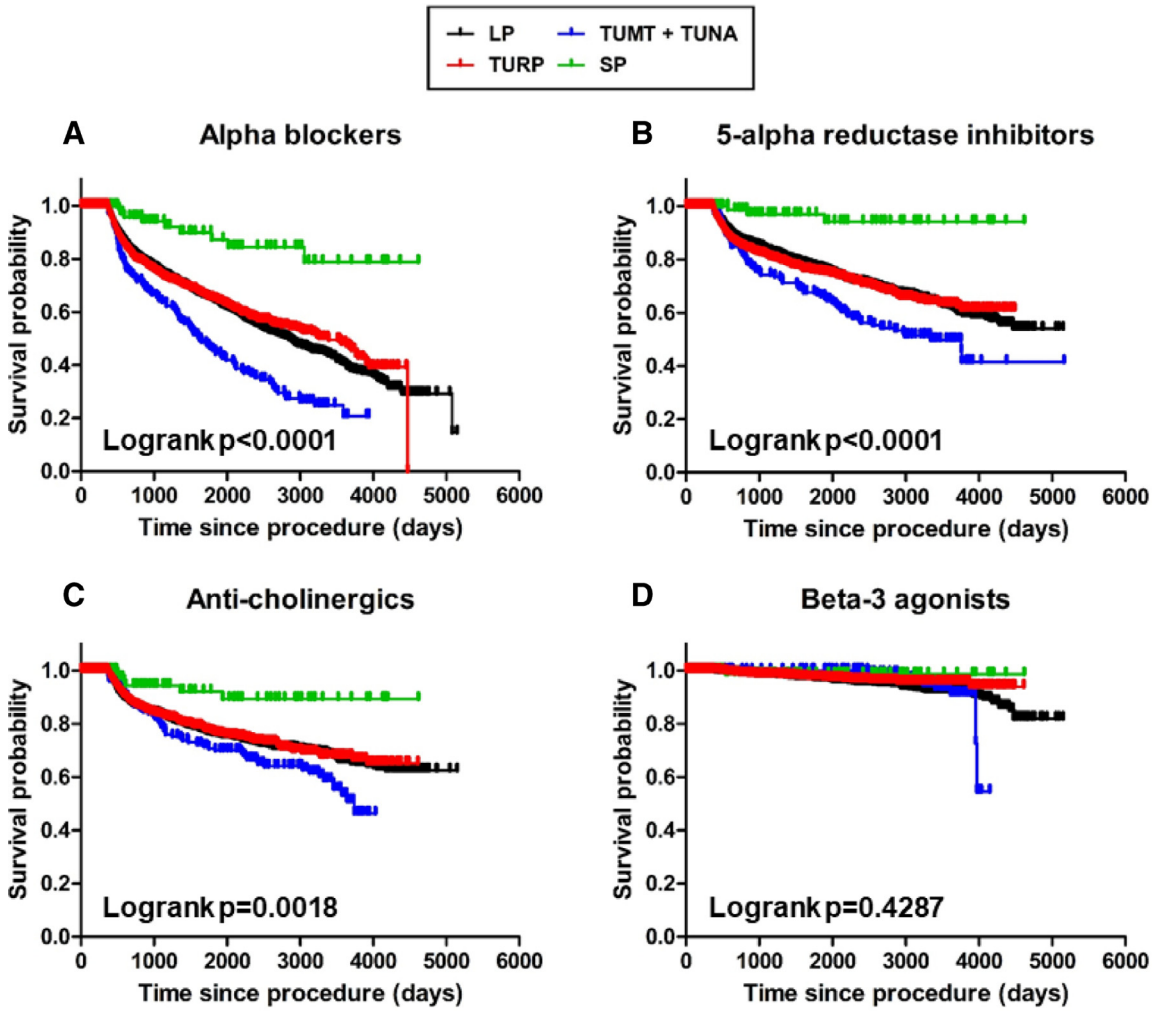

Figure 1. Prescription-free survival curves across TUPP for (**A**) AB, (**B**) 5ARI, (**C**) AC, and (**D**) B3A. (Color version available online.)

Unsurprisingly, SP outperformed all TUPPs in these regards over the long term (greater than 12 months post-TUPP).

The superiority of tissue-eliminating TUPP at enabling medication discontinuation and reducing de novo medication initiation were particularly evident greater than 12 months postoperatively, as was the outperformance of TUPP by SP. The majority of patients with at least 1 active urologic medication prior to TUPP had discontinued all urologic medications after LP, TURP, and SP, but not following TUMT or TUNA.

The rates of pre-TUPP urologic medication utilization found in this study are consistent with published trends in BPH and LUTS investigations.[12] They also align with the AUA guidelines, which suggest AB and/or 5 ARI in the treatment of LUTS secondary BPH.[13] The baseline findings of relatively sparse B3A use reflect the time period over which the patients were treated, as B3A are a relatively newer class of pharmacologic agents. Nonetheless, the use of B3A for OAB-type symptoms was appreciated in some men, in line with the recent AUA/SUFU guidelines indicating that they may be as an alternative to AC as second-line overactive bladder treatment after first-line management via dietary and lifestyle modifications.[14]

The unfavorable medication discontinuation and initiation rates with TUMT or TUNA support previous work demonstrating high failure rates and frequent retreatment after such tissue-necrosing procedures. Rosario et al found that 83% of men undergoing TUNA after medical therapy with alpha blockers experienced symptom recurrence at a median 20 months postprocedure, with 48.5% ultimately undergoing retreatment with conventional therapy (TURP or bladder neck incision) in a prospective cohort study of 71 men.[15] Thalmann et al found that 22% of men treated with TUMT required retreatment with repeat TUMT, TURP, or cystostomy after a median of 42 months in a prospective study of 200 patients with BPH and LUTS.[16] Thus, the higher rates of urologic medication utilization postoperatively in the TUMT and TUNA patients studied herein are not surprising. However, it is important to appreciate the mean time between procedure and last follow-up was significantly longer for TUMT and TUNA compared to other procedures, possibly allowing more time for prostate regrowth and biasing the rates of medication resumption higher in conjunction with lower rates of discontinuation. Similar could be argued for de novo medication initiation.

In contrast to tissue-necrosing procedures, elsewhere LP has been shown to have a retreatment rate of roughly 9% while TURP achieved a 3%-15% retreatment rate at 5 years.[17,18] Relative to TUMT or TUNA, these lower rates of retreatment support the lower rates of postoperative medication utilization in the current study. Furthermore, the superiority of SP in reducing postoperative medication utilization relative to TUPPs is consistent with a demonstrated lower risk of reoperation following SP compared to TURP.[19,20] However, as is well known, SP is associated with significant perioperative morbidity, particularly bleeding, and is being utilized progressively less frequently as endoscopic technologies and techniques advance.[21,22]

Together, the choice of TUPP for BPH treatment is based upon numerous factors including patient preference, comorbidity, surgeon experience, and prostate anatomy. The current study provides data on their comparative effectiveness of avoiding urologic medications postoperatively. In general, the findings of the current study suggest the more invasive a BPH procedure was, the lower the rates of postoperative medication utilization it achieved. This new information may help further inform patient and surgeon treatment decisions.

While TURP has withstood the test of time as a reliable endoscopic approach to BPH, LP is an effective option that may be considered less invasive than and confer a lower bleeding risk than TURP.[7] Regarding long-term postoperative medication utilization, TURP appeared to perform slightly better than LP, achieving roughly 5%-10% less medication utilization across the pharmacologic classes. However, over the time period analyzed, LP was an evolving technology (ie, 120 W vs 180 W laser). Similar arguments can be made for TUMT or TUNA, which while least intensive and potentially less morbid from a urinary and sexual function standpoint, confer higher retreatment rates[23] and the highest postoperative medication utilization rates noted in this study.

Overall, the findings in this work provide new information to urologic surgeons and patients regarding the expected rates of medication utilization following BPH procedures. This information can prove useful in counseling patients regarding management, especially those who are medication averse, would prefer not to pay for treatment indefinitely, or who cannot tolerate pharmacotherapy. As expected, procedures that eliminated BPH tissue were associated with superior rates of medication discontinuation, resumption, and de novo initiation in comparison to tissue-necrosing interventions. While this finding is in line with urologists' intuition, the current study provides evidence to support this notion and factual information to put into practice.

This investigation, while large scale, has limitations inherent to health-services type research. Selection bias is present due to the retrospective nature of the analysis. Specifically, it cannot be excluded that the findings in the data stem from preoperative differences among men that led to them to a specific procedure, including severity of their condition, as assessed by symptom or quality of life scores, a desire to undergo treatment and avoid medications, or even medication intolerance. Further, generalizability of the results may be limited given the outcomes presented are from a single health system, although multiple surgeons performed the procedures across multiple hospitals. The large discrepancy in sample size between tissue-resecting procedures and tissue-necrosing interventions may also hamper statistical analyses. Likewise, the small sample size utilizing B3A introduces the possibility of false negative results and underpowered comparisons.

While changes in urologic medication prescriptions were analyzed, prescription fulfillment and medication compliance are unknown—an important consideration given that pharmacologic BPH therapy is often challenged by poor compliance.[24,25] Lastly, limitations associated with the automated data collection process used exist, including the risk of incomplete or missing data (ie, a patient was on a medication from an outside provider that was not reconciled), as well as limited detail regarding procedure types that can impart variability in outcomes (ie, laser wattage during photovaporization or ablation, power of microwave or needle ablation devices, etc.). Otherwise, the study is also limited in the outcomes presented, which do not include other

clinically-relevant endpoints such as medication intolerance, falls, sexual dysfunction, and quality of life. Lastly, the effects of post-TUPP medication changes on overall treatment cost were not analyzed, which can have notable implications in clinical decision making.[26,27] However, the strengths of this study include a large sample size, inclusion of novel B3A data, a direct comparison of varying TUPPs within a diverse multisurgeon, multisite practice, and the evaluation of medication changes across multiple postoperative time intervals.

Overall, this study found that compared to tissue-necrosing procedures, tissue-eliminating BPH interventions led to lower rates of postoperative urologic medication utilization. Together, these findings suggest that the choice of TUPP may have implications in long-term urologic medication utilization, providing data that can be useful in practice. Future studies should not only include newer technologies (eg, HOLEP, Prostatic Urethral Lift, Convective Water Vapor Ablation, etc.) but examine the impact of postprocedural BPH medication changes on other aspects of health, patient-reported outcomes, and overall treatment cost.

CONCLUSION

Superior rates of urologic medication discontinuation, resumption, and de novo initiation were found with tissue-eliminating BPH procedures compared to tissue-necrosing procedures. These results can help inform the choice of BPH procedure with regard to the clinical or personal need for urologic medication discontinuation. Future studies examining the effects of these medication changes on clinical outcomes and treatment costs are warranted in light of newly emerging therapies.

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EDITORIAL COMMENT

The fundamental principle of surgery always remains the correct indication. This, regardless of costs, is particularly valid in case

of benign prostatic hyperplasia) and bladder outlet obstruction (BOO). The symptoms associated to BOO, as all urologists well know, should be evaluated in a multifactorial context. Therefore, when an indication to treat benign prostatic hyperplasia is given, if there are no imperative indications, it must always be assumed that the treatment will improve the symptoms more effectively than the medications. Or that surgery can solve a problem that drugs can no longer treat. Nowadays several surgical treatments are available to treat BOO so the choice of the best one for the patient may become more challenging but give to the patient better results compared to the past, considering not only technical urological factor but also age, comorbidities and expectations of the patient. The type of technique to use has to consider also surgeon's expertise and technologies available in every single center. In this scenario, a meticulous analysis of cost benefit, even in view of what may happen after BOO treatment, should always be carefully taken into consideration.

The results of this study supported the hypothesis that compared to tissue-necrosing procedures (transurethral microwave therapy and transurethral needle ablation), tissue-eliminating procedures (transurethral resection of the prostate and laser prostatectomy) were associated with greater rates of urologic medication discontinuation, as well as lower rates of medication resumption and de novo initiation.

Even if with some bias characterized by an older population, in the tissue-necrosing procedures sample (with consequent higher incidence of underactive bladder) and the lack of information on the precise degree of disobstruction obtained with the different techniques that may justify the higher use of medication for BOO, from a speculative point of view, this study may support the concept that tissue necrosis in the prostate could generate a sort of "local remodeling" undermining disobstruction which is the primary goal of BOO treatment. Therefore, despite several limitations, the overall findings of this study are to provide helpful information from an administrative standpoint that can have some real-world applicability.

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AUTHOR REPLY

As noted in the editorial comment by Scarpa and Papalia, achieving better outcomes is largely optimized when interventions are utilized for appropriate indications. This study retrospectively analyzed benign prostatic hyperplasia procedures within a large health system from an administrative and/or health-services perspective. The hypothesis that procedures eliminating tissue outperform those relying upon tissue necrosis was supported with regard to urologic medication prescription.

However, it must be assumed that patients (prostate size, anatomy, comorbidities, etc.) were optimally matched to their procedures. Also, the extent to which procedures were carried out remains another important variable—obviously the authors' hope this is assumed to be to a thorough degree! Considering these factors, rates of medication use (continuation, resumption, de novo initiation) were better after tissue removing procedures, and arguably with a greater extent of tissue removed (SP vs transurethral procedures).

The findings in this study echo those recently published by Campbell, et al in the August 2019 issue of this journal.[1] While they found lower rates of preoperative urologic medication use before transurethral resection of the prostate (TURP) in Canada, postoperative rates of alpha blocker and 5-alpha reductase use were nearly twice as high 3 months after surgery, whereas rates of anticholinergic use were similar. Long-term rates of medication utilization after TURP were comparable, aside from lower rates of anticholinergic use in Canadian men.

Insights into factors underlying medication discontinuation after BPH treatment remains an area of active research. Analysis of a subset of patients in the current study suggests comorbidity burden is negatively associated with the likelihood of discontinuing BPH medications.[2] Moving forward, this overall body of evidence can serve as useful information for better counseling patients and informing treatment recommendations. How newer BPH treatments compare is a relevant question moving forward.

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