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Contemporary Practice Patterns of Endoscopic Surgical Management for Benign Prostatic Hyperplasia Among Urologists in the United States

William T. Lowrance^{*†}, Andrew Southwick, Alexandra C. Maschino, and Jaspreet S. Sandhu[‡]

Department of Surgery, Urology Division, Huntsman Cancer Institute, University of Utah (WTL, AS), Salt Lake City, Utah, Department of Epidemiology and Biostatistics (ACM) and Urology Service, Department of Surgery (JSS), Memorial Sloan-Kettering Cancer Center and Department of Urology, Weill Medical College of Cornell University (JSS), New York, New York

Abstract

Purpose—We describe contemporary trends in endoscopic surgical management for benign prostatic hyperplasia. We examined case logs submitted by urologists for American Board of Urology certification or recertification. We compared electrosurgical transurethral resection of the prostate vs laser vaporization or laser enucleation and determined the impact of surgeon age on practice patterns.

Materials and Methods—We analyzed case logs from 2004 to 2010 for trends and used logistic regression models to assess the impact of surgeon age on endoscopic surgery use.

Results—A total of 3,955 urologists included at least 1 endoscopic surgical management in the case logs, while 2,334 (59%) exclusively performed electrosurgical transurethral resection of the prostate and 309 (8%) exclusively performed laser vaporization or laser enucleation. We observed a large increase in the number and proportion of laser procedures from 11% in 2004 to 44% in 2010. Although there was no difference in median age between urologists who performed exclusively electrosurgical transurethral resection and those who performed laser procedures, the latter had a substantially higher case volume. Older urologists were significantly less likely to perform laser vaporization or enucleation when undergoing the second recertification (OR 0.56/10 years of age, 95% CI 0.36–0.87, $p = 0.009$), but not the initial certification.

Conclusions—There was a substantial increase in laser vaporization or laser enucleation procedures performed by urologists who underwent board certification or recertification in 2004 to 2010. However, of those undergoing the second recertification older age was significantly associated with a lower likelihood of performing laser procedures. These data provide estimates of current practice patterns and further our understanding of evolving surgical treatment for benign prostatic hyperplasia.

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^{*}Correspondence: Division of Urology, Department of Surgery, Huntsman Cancer Institute, University of Utah, 1950 Circle of Hope, Suite 6405, Salt Lake City, Utah 84112 (telephone: 801-587-4282, FAX: 801-585-3749, will.lowrance@hci.utah.edu).

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[‡]Financial interest and/or other relationship with American Medical Systems and Endo.

Keywords

prostate; prostatic hyperplasia; laser therapy; transurethral resection of prostate; physician's practice patterns

Electrosurgical TURP has been the standard surgical treatment for BPH and associated LUTS for the last 4 decades. However, since the introduction of medical therapy for BPH and LUTS in the 1980s, there has been a well documented decrease in TURP. According to Medicare data available through 2008, the TURP rate has been decreasing since 1987.¹⁻⁴ LP procedures have emerged as popular treatment options with efficacy and morbidity rates similar to those of traditional electrosurgical TURP. It also appears that with the decrease in TURP during training there has been an increase in adverse events associated with TURP. Furthermore, resident case logs suggest that the increase in laser procedures has led to the stabilization of adverse events.⁵ However, the impact of laser technology on contemporary practice patterns for the endoscopic surgical treatment of BPH/LUTS is uncertain.

Using data provided by the ABU, we determined current practice patterns of ESM for BPH in the United States. Specifically, we compared electrosurgical TURP with LP, including vaporization and enucleation. We also examined the impact of surgeon age on the practice patterns of ESM for BPH. We hypothesized that, because of the adoption of laser technology, the annual volume of ESM for BPH had stabilized and was no longer decreasing at the same rate as in the previous 20 years. We also hypothesized that older urologists would be less likely to report experience with the newer laser technology.

Materials and Methods

Data

As we previously described,⁶ we used self-reported operative logs from the ABU, the agency responsible for board certification of urologists in the United States. The ABU evaluates candidates licensed to practice medicine and performs examinations for urological certification, recertification and ongoing certification maintenance. Candidates for board certification or recertification must submit an operative case log including 6 consecutive months during the 17-month period before the due date for case log submission. A notarized Practice Log Verification Statement must be submitted with the final case log. The first and second board recertifications occur 10 and 20 years, respectively, after the original certification. They also rely on 6-month practice logs. Urologists who were certified before 1985 are not required to submit case logs for recertification. The ABU provided de-identified case log data on ESM for BPH, which we used in accordance with ABU regulations.

Cohort

We identified urologists who applied for original ABU certification and those who applied for the first and second board recertifications from 2004 through 2010. Procedures recorded in individual case logs were performed between 2003 and 2009. Surgical procedures were identified in physician case logs by HCPCS (Healthcare Common Procedural Coding

System) codes, including electrosurgical TURP (52601, 52612 and 52614), laser vaporization (52648) and laser enucleation (52649). Code 52649 was available for reporting beginning in January 2008.

Statistical Methods

We present descriptive statistics to characterize urologists who performed endoscopic surgical procedures for BPH and trends in use. Urologists were characterized as performing electrosurgical TURP only, LP only or TURP and LP. Because urologists who submitted case logs for the initial certification were generally younger (median age 35 years) than those seeking a first or second recertification (mean age 43 and 52, respectively), we analyzed each certification type separately. Since urologists could report experience as exclusively LP, exclusively electrosurgical TURP or a combination of LP and electrosurgical TURP, we used 2 separate outcomes, including 1) only LP and 2) some LP use. We created 2 logistic regression models for each outcome (any LP and only LP, respectively). To illustrate the association with surgeon age, we plotted the predicted probability of each outcome as a function of age. For clarity we plotted predicted values over restricted age ranges. All statistical analysis was done using STATA® 11.0.

Results

A total of 4,709 urologists submitted case logs to the ABU for nonpediatric board certification between 2004 and 2010. Of these urologists 3,955 reported at least 1 endoscopic surgical procedure for BPH (TURP or LP), including 1,621 who performed at least 1 LP and 309 who exclusively performed LP. In contrast, 2,334 surgeons exclusively performed electrosurgical TURP. Table 1 shows the characteristics of urologists who reported any laser use and those who reported exclusively electrosurgical techniques. Those who performed any LP had a substantially higher case volume than those who performed only electrosurgical procedures (median annual case volume 18, IQR 10, 30 vs 10, IQR 4, 18, Wilcoxon rank sum test $p < 0.0005$). Figure 1 shows the temporal change in the distribution of procedures performed by surgeons when varying the yearly case volume.

We examined the number of ESMs done during the study period. The number of urologists who applied for certification or recertification increased from 493 in 2004 to 646 in 2010 and the number of ESMs that they reported increased from 8,022 to 12,196 during the same period (table 2). This represents a small increase per urologist from a mean of 16.3 annual ESMs in 2004 to 18.9 in 2010. LP use increased through 2008, while electrosurgical TURP use decreased, and the utilization rates of each procedure appeared to plateau after 2008 (table 2 and fig 2). We observed an increase in the number and proportion of urologists who performed LP, while there was a corresponding but smaller decrease in the number and proportion performing electrosurgical TURP (table 3). Median annual TURP volume remained relatively stable during the study period for urologists who performed any ESM. For urologists who performed at least 1 LP the median annual volume was 16 cases (IQR 12, 36) in 2004 and 18 (IQR 10, 32) in 2010.

Figure 3 shows the predicted probability of performing at least 1 LP as a function of age, estimated separately by certification type. Although the effect of age appeared stronger

among recertifying urologists than among those receiving the initial certification, the interaction term between age and certification type was not statistically significant ($p = 0.4$). Table 4 shows the association between age and performing any or all LP cases, stratified by certification type. For urologists who received the original board certification we found no evidence that age was significantly associated with the probability of performing at least 1 LP after adjusting for recertification year (OR 0.81/10 years of age, 95% CI 0.54–1.19, $p = 0.3$). Among those undergoing the second recertification physician age was significantly associated inversely with performing at least 1 LP (OR 0.56/10 years of age, 95% CI 0.36–0.87, $p = 0.009$).

Discussion

Our study provides estimates of contemporary practice patterns of ESM for BPH in the United States according to ABU data. Approximately 56% of reported procedures were performed electrosurgically by those certifying in 2010, down from 89% in 2004. Correspondingly, LP use increased from 11% of procedures in 2004 to 44% in 2010. These data suggest that despite almost 2 decades of persistently decreasing ESM volume there appears to be stabilization or even a slight increase in case volume. In 2004 there were 16.3 ESMs per certifying or recertifying urologist vs 18.9 in 2010. Also, urologists who performed LP had a higher case volume than those who performed any ESM. The median annual case volume for urologists who performed at least 1 LP was 18 vs 12 for those who performed at least 1 of any type of ESM. Furthermore, as we hypothesized, age appeared to influence whether recertifying urologists performed LP with older urologists less likely to use laser technology.

TURP Practice Patterns

Electrosurgical TURP has been the gold standard surgical treatment for BPH and LUTS for decades and at 1 point it was the most commonly performed surgical procedure in American men.⁷ Since the introduction of medical therapy for BPH and LUTS in the 1980s, there has been a well documented decrease in TURP.^{1–3,7} According to Medicare data, the TURP rate has been decreasing since 1987.^{1–3} LP emerged as a popular treatment option in the last decade with efficacy and morbidity rates similar to those of traditional electrosurgical TURP, as demonstrated in randomized trials.^{8–13} LP techniques may provide advantages in postoperative hospital stay or perioperative morbidity in older patients at higher risk, such as those on anticoagulants. However, the long-term efficacy of BPH/LUTS treatment appears to be similar for traditional electrosurgical and LP procedures.

Even before some of the mentioned randomized, controlled trials were reported, we saw substantial uptake of LP in ABU data. Similar to robotic prostatectomy practice patterns, this appears to be a situation in which innovative technology drives endoscopic surgical practice patterns for BPH.⁶ Further research is needed to better understand why and how physicians use and patients desire new surgical technologies. More study is needed to clarify the economic impact of these shifting practice patterns of surgical treatment for BPH.

ESM Volume

Although the number of certifying or recertifying urologists increased from 493 in 2004 to 646 in 2010, there was an even greater increase in the total number of endoscopic surgical procedures for BPH (TURP and LP) performed by these urologists (16.3 vs 18.9 per urologist). Our analysis of ABU data suggest that the total volume of endoscopic surgical procedures for BPH has stabilized and even increased slightly, and it is not continuing to decrease, as previously reported for the last 2 decades.^{1–3,7} These findings appear to be similar to those reported by Malaeb et al⁴ but they must be validated in other, population based data sets before definitive conclusions are reached.

For complex surgical procedures there is a strong positive correlation between individual surgeon volume and clinical outcome. This has been shown for open and robotic radical prostatectomy,^{14,15} and it may well be the case for endoscopic procedures for BPH. Individual annual surgeon volume was substantially higher for urologists who performed at least 1 LP (median volume 18) vs those who performed at least 1 electrosurgical TURP (median volume 12). Again, as seen with the uptake of robotic radical prostatectomy, the newer LP technology may contribute to concentrating the endoscopic surgical case volume for BPH and result in high volume surgeons who produce better outcomes with time.

Impact of Surgeon Age on LP

Age impacted the likelihood that a recertifying urologist would perform LP. For each increasing year of age urologists undergoing the second recertification had an average of 6% lower odds of taking up the procedure. There was no evidence that age impacted whether urologists undergoing the original or first recertification performed LP. These findings seem logical, since urologists further out from residency training are less likely to have been exposed to laser procedures and, therefore, potentially they may be not as comfortable with incorporating this new technique into practice.

Our study has limitations. We only analyzed endoscopic surgical procedures for BPH according to self-reported logs submitted by urologists applying to the ABU for initial certification or recertification. These operative logs come from 6 consecutive months during the 17 months before certification. The ABU then doubles each log to provide an annual volume estimate. Based on this methodology, there is no reason to suspect systematic overestimation or underestimation in case loads. We could not independently verify case logs but the ABU reserves the right to audit any questionable logs. We did not have data on other minimally invasive surgical treatments for BPH, eg transurethral microwave therapy or transurethral needle ablation, and we could not estimate their influence on current endoscopic surgical patterns. Furthermore, we could not distinguish between bipolar and monopolar electrocautery TURP or identify button vaporization procedures. Our study only gives a cross-sectional view of the practice patterns of ESM for BPH in the United States. This study provides estimates of ESM use calculated from certifying urologists who only represent a percent of all urologists in the United States. By design, we included laser ablation and enucleation procedures in the same category because the code for laser enucleation of the prostate (52649) was not available until 2008. Inaccurate coding of BPH endoscopic surgical procedures may have biased our results. Because urologists who

received ABU board certification before 1985 are not required to recertify, we focused on a relatively younger group of urologists. As such, our estimate of LP cases may be an overestimate.

Conclusions

Our study provides estimates of contemporary practice patterns of ESM for BPH in the United States according to ABU data. Of the BPH endoscopic surgical procedures performed by urologists who certified in 2010 approximately 44% were LP and 56% were electrosurgical TURP. Urologists who performed LP had a higher volume than those who performed any endoscopic surgical procedure for BPH. Also, in those recertifying for the second time older age was significantly associated with a lower likelihood of performing LP. These data provide estimates of the current practice patterns of ESM for BPH and further our understanding of how technological advances impact surgical treatment for BPH.

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Abbreviations and Acronyms

ABU	American Board of Urology
BPH	benign prostatic hyperplasia
ESM	endoscopic surgical management
LP	laser vaporization or laser enucleation of prostate
LUTS	lower urinary tract symptoms
TURP	transurethral resection of prostate

Figure 1.

TURP (dark gray bars) and LP (light gray bars) surgeon volume during study period. In 2004, 427 surgeons performed no laser procedure.

Figure 2.

Percent of endoscopic BPH procedures performed as electrocautery TURP (CPT 52601, 52612 or 52614) (solid curve) and LP (CPT 52648 or CPT 52649) (dashed line) by urologist certification and recertification year.

Figure 3.

Probability of performing at least 1 LP as function of surgeon age, estimated by original certification (black curve), and first (dark gray curve) and second (light gray curve) recertification. Dashed curves represent 95% CI.

Table 1
Characteristics of 3,955 urologists who performed TURP or LP

	Electrosurgical TURP Only	Any LP
CPT code	52601, 52612, 52614	52648, 52649 (52649 in 1/2008)
No. urologists	2,334	1,621
Median age (IQR)	43 (37, 51)	43 (38, 51)
Median case vol/yr (IQR)	10 (4, 18)	18 (10, 30)
No. male (%):	2,186 (94)	1,537 (95)
No. yr (%):		
2004	427 (18)	66 (4)
2005	395 (17)	99 (6)
2006	387 (17)	201 (12)
2007	308 (13)	266 (16)
2008	258 (11)	307 (19)
2009	280 (12)	315 (19)
2010	279 (12)	367 (23)
No. specialty (%):		
Andrology	32 (1)	14 (1)
Endourology	110 (5)	70 (4)
Female	62 (3)	26 (2)
General	1909 (82)	1406 (87)
Oncology	178 (8)	64 (4)
Pediatrics	18 (1)	12 (1)
Urolithiasis	25 (1)	29 (2)
No. certification type (%):		
Original	784 (34)	507 (31)
First	797 (34)	639 (39)
Second	753 (32)	475 (29)

Table 2
Endoscopic procedures for BPH by year of urologist certification or recertification

Yr	No. Urologists Performing BPH Endoscopic Procedures	No. Electrosurgical TURP (%)	No. LP (%)	Total No.
2004	493	7,116 (89)	906 (11)	8,022
2005	494	6,612 (85)	1,152 (15)	7,764
2006	588	6,816 (72)	2,660 (28)	9,476
2007	574	5,810 (60)	3,836 (40)	9,646
2008	565	5,296 (56)	4,114 (44)	9,410
2009	595	5,716 (54)	4,812 (46)	10,528
2010	646	6,858 (56)	5,338 (44)	12,196
Totals	3,955	44,224 (66)	22,818 (34)	67,042

Table 3
Procedures for BPH done by 3,814 urologists by procedure and certification or recertification year

Yr	Total No. Certifying	At Least 1 BPH Endoscopic Procedure*			At Least 1 LP*		
		No. Recertifying (%)	Median Case Vol (IQR)	No. Recertifying (%)	No. Recertifying (%)	Median Case Vol (IQR)	
2004	607	493 (81)	12 (8, 20)	66 (13)		16 (12, 36)	
2005	603	494 (82)	12 (6, 22)	99 (20)		20 (10, 30)	
2006	685	588 (86)	12 (6, 22)	201 (34)		18 (10, 28)	
2007	721	574 (80)	12 (6, 22)	266 (46)		20 (12, 32)	
2008	680	565 (83)	12 (6, 22)	307 (54)		16 (10, 26)	
2009	687	595 (87)	12 (6, 24)	315 (53)		18 (10, 30)	
2010	726	646 (89)	14 (8, 26)	367 (57)		18 (10, 32)	
Totals	4,709	3,955 (84)	12 (6, 22)	1,621 (23)		18 (10, 30)	

* Urologists may be counted in multiple categories if they performed LP and electrosurgical TURP.

Table 4
Urologist age and certification year, and any LP by certification type

Model	No. Urologists	Any LP		Only LP	
		OR (95% CI)	p Value	OR (95% CI)	p Value
Original certification:					
Age/10 yrs	1,291	0.81 (0.54–1.19)	0.3	0.85 (0.43–1.68)	0.7
Current certification yr		1.42 (1.34–1.52)	<0.0005	1.37 (1.22–1.53)	<0.0005
Recertification 1:					
Age/10 yrs	1,436	0.76 (0.53–1.09)	0.13	0.93 (0.51–1.70)	0.8
Current certification yr		1.38 (1.31–1.47)	<0.0005	1.19 (1.08–1.31)	0.0006
Recertification 2:					
Age/10 yrs	1,228	0.56 (0.36–0.87)	0.009	1.03 (0.45–2.33)	0.9
Current certification yr		1.39 (1.31–1.48)	<0.0005	1.24 (1.09–1.40)	0.0008