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Research Article

PREDICTORS OF EARLY POST-OPERATIVE TRANSIENT URINARY INCONTINENCE AFTER HOLMIUM LASER ENUCLEATION OF PROSTATE

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ABSTRACT

Objective: Despite having various benefits, post-operative transient urine incontinence (TUI) is a significant consequence of holmium laser prostate enucleation (HoLEP) in a small percentage of patients. To manage benign prostatic hypertrophy, it is critical to establish predictive risk factors of early postoperative TUI after HoLEP.

Methods: One hundred participants participated in this hospital-based study over the course of 15 months in a tertiary care facility in Mohali and Punjab. All indoor benign prostatic hyperplasia patients who underwent HoLEP treatment from a single surgeon and were monitored for at least 3 months after the procedure made up the study population. Clinical information that was deemed pertinent was recorded.

Results: The study's participants had an average age of 68.54 +/− 7.72 years. Patients who had experienced acute urine retention made up 48% of the population. Mean prostate size and mean International Prostate Symptom Score (IPSS) were 64.19 ml and 28.35 ml, respectively, preoperatively. Diabetes mellitus, prostate volume (>58 cc), overall operation time (>131 min), enucleated prostate volume (42 g), total energy used (>154 kJ), and percentage decrease in prostate-specific antigen (60%) were all substantially linked to post-operative TUI. Total energy was found to be a predictor for post-operative TUI in multivariate analysis.

Conclusion: The following factors were discovered to be statistically linked with postoperative TUI: Diabetes mellitus, prostate volume (>58 cc), total operation time (>131 min), enucleated prostate volume (42 g), total energy used (>154 kJ), and reduction in Prostate Specific Antigen (60%) Multivariate research revealed that the only independent predictor for post-operative TUI was total energy consumed.

Keywords: Risk factors, Urinary incontinence, Benign prostatic hypertrophy, Complication.

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INTRODUCTION

In 1998, Gilling *et al*. became the first group of scientists to use the Holmium laser prostate enucleation (HoLEP) in a clinical setting [1]. Since then, the surgical community has adopted it as a benign prostatic hyperplasia (BPH) management technique since it is effective, safe, and independent of prostate size [2,3]. When compared to transurethral prostate excision, the HoLEP approach has benefits such a lower rate of complications and quicker catheterization times [4,5]. Transient urine incontinence (TUI), however, is a problem following HoLEP, according to the literature [6,7].

Few participants have reported postoperative TUI as a serious HoLEP complication, with incidence rates ranging from 1.3% to 10.7% in the literature-recorded data. TUI is one of the most disturbing side effects of this surgical technique because a substantial portion of patients recover on their own in 90 days on average, but occasionally it reduces the subject's quality of life. Despite the fact that HoLEP has some benefits, surgeons may strive to avoid it for the aforementioned reasons [2,8].

There is a paucity of research on the relationship between post-operative variables and TUI after HoLEP. To spread and continue using the HoLEP approach, it is crucial to identify the source of postoperative UI. Therefore, it is essential to identify predictive risk factors of early post-operative transient urinary incontinence (TUI) after holmium Laser enucleation of the prostate (HoLEP) for BPH.

METHODS

Design and study participants

One hundred participants participated in this hospital-based study over the course of 15 months in a tertiary care facility in Mohali and Punjab. The Department of Genitourinary Surgery at Fortis Hospital in Mohali and Punjab designed and implemented this hospital-based prospective study, which involved 100 patients over the course of 15 months. The study was conducted from December 2017 to March 2019. All indoor patients who underwent HoLEP for BPH were included in the study population. Study participants were monitored for 90 days following surgery.

Inclusion criteria

All patients having HoLEP for BPH-related lower urinary tract symptoms. Patients who did not benefit from alpha-blocker treatment were recruited for this study. We additionally enrolled individuals for this trial whose 90-day urine incontinence data were available.

Exclusion criteria

Patients who had already been given a diagnosis of neurogenic bladder, prostate cancer, or bladder and urethral stricture were not included in this study.

Study strategy

Age, body mass index (BMI), diabetes mellitus, blood prostate-specific antigen (PSA) levels, usage of medication, including antiplatelet drugs, history of acute urinary retention, and prostate volume assessed by transrectal ultrasonography were all considered relevant pre-operative factors in all patients (TRUS). Antiplatelet therapy was often stopped in patients who were receiving it 7–10 days before HoLEP and restarted 1–2 days following surgery. Operative time, enucleation time, morcellation time, and amount of blood loss were all highlighted as significant surgical variables in this study. The potential for bladder damage was also investigated. To calculate blood loss, the difference between hemoglobin levels on the day before surgery and the

1st postoperative day was employed. At the 3-month follow-up visit, the postoperative PSA levels were measured, and the percentage decrease in PSA levels was calculated using serum PSA levels obtained before and after surgery.

The study's participants chose to take part or not. There was no monetary payment to the study participants. The purpose of the study was described to the subjects, and they were asked to participate. Subjects were enrolled in the study after giving their informed consent, and participants' confidentiality and anonymity were upheld throughout. The accuracy of the completed surveys was then examined. After receiving ethical approval from the institute's ethical committee, the study was started.

Data analysis

The MS Excel spreadsheet was used to enter the collected data, code it appropriately, and then check it for any potential problems. Version 22.0 of IBM SPSS Statistics for Windows was used for the analysis (IBM Corp. Armonk, NY, USA). The Fisher's exact test and the Chi-square test were used to assess categorical data. To determine the risk factors for the occurrence of post-operative UI following HoLEP, logistic regression analysis was employed. We calculated the odds ratios (ORs) and 95% confidence intervals (CI). A multivariate logistic model incorporated univariate analysis p values 0.05.

RESULTS

The mean age of study subjects was 68.54±7.72 years. The mean BMI of patients was 27.08±2.30 kg/m^2. 54 (54%) patients had hypertension, while 35 (35%) and 22 (22%) patients had diabetes mellitus and coronary artery disease, respectively. 25 (25%) patients were on antiplatelet therapy. 48 (48%) patients had history of acute retention of urine.

The pre-operative characteristics of patients were as follows - mean prostate size and mean IPSS were 64.19±23.36 ml and 28.35±1.34, respectively. In comparison, mean maximum flow rate (Qmax) and mean post-void residual urine was 7.79±1.87 ml/s and 224.62±200.61 ml, respectively. The mean PSA and mean hemoglobin value were 2.49±2.02 ng/ml and 13.79±1.18 g/dl, respectively.

Comparison between patients with Transient Urinary Incontinence (TUI) and without TUI

The total operation time, morcellation time, and enucleated prostate volume were significantly higher in patients with transient Urinary Incontinence (TUI) compared to patients without TUI as per the Student t-test (p<0.05). The patients with TUI had a significantly higher incidence of diabetes mellitus when compared to patients without TUI as per the Chi-square test (p<0.05) (Table 1).

Univariate logistic regression analysis for predicting postoperative transient urinary incontinence (TUI)

We observed that diabetes mellitus, total operation time, morcellation time, enucleated prostate volume, and total energy used were significant risk factors for postoperative Transient Urinary Incontinence (TUI) (Table 2).

Table 1: Comparison between patients with TUI and without TUI

Parameters	TUI		Without TUI		Test of significance
	Mean	SD	Mean	SD	
Age	71.89	6.51	68.85	7.28	<0.05
BMI	26.87	1.98	27.19	2.41	>0.05
Prostate Size (cc)	89.93	23.38	62.06	12.48	<0.05
Pre-op IPSS	28.38	1.47	28.33	1.30	>0.05
Pre-op Qmax (ml/s)	7.39	1.59	7.94	1.96	>0.05
Pre-op PVR (mL)	314.49	292.9	189.13	138.17	<0.05
Pre-op PSA (ng/ml)	3.6	2.64	2.08	1.49	>0.05
Pre-op Hb (g/dl)	13.87	1.25	13.75	1.1	>0.05
Total Operation time (mins)	160.82	33.76	129.79	30.19	<0.05
Morcellation time (mins)	31.98	8.51	28.53	8.69	>0.05
Enucleated prostate vol (gms)	66.61	20.35	44.04	11.68	<0.05
Total energy used (KJ)	229.21	48.39	147.6	31.04	<0.05
%reduction in PSA	60.85	18.81	48.2	19.18	<0.05
Drop in Hb (g/dl)	1.29	1.11	1.09	0.63	>0.05
Hypertension	30	30%	24	24%	>0.05
Diabetes Mellitus	27	27%	8	8%	<0.05
Coronary Artery Disease	9	9%	13	9%	>0.05
Antiplatelet Therapy					
Yes	15	15%	10	10%	>0.05
No	32	32%	43	43%	
History of acute retention of urine					
Yes	26	26%	22	22%	>0.05

Table 2: Univariate logistic regression analysis for predicting postoperative TUI

Parameters	OR	95% CI	Test of significance
Age (<67 vs. >67)	1.5	0.61–6.9	p<0.05
BMI (<25 vs. >25)	0.53	0.80–6.71	p>0.05
Diabetes Mellitus (yes or no)	1.70	1.15–2.50	p<0.05
Antiplatelet drugs (yes or no)	0.97	0.82–1.16	p>0.05
History of AUR (Yes or No)	1.10	0.99–1.22	p>0.05
Prostate volume (<58 cc vs. >58 cc)	3.5	20.7–35.1	P<0.05
IPSS (<17 vs. >17)	0.30	0.53–0.65	p>0.05
Qmax (<10 vs. >10 ml/sec)	0.41	−1.31–0.27	p>0.05
PVR (<50 vs. >50 ml)	1.46	1.26–3.7	p>0.05
% reduction in PSA (<50 vs. >50)	0.54	0.50–2.76	P<0.05
Drop-in Hb	0.26	0.43–0.66	p>0.05
Total Operation time (<131 vs. >131 mins)	7.2	16.2–45.6	p<0.05
Enucleated prostate volume (<42 vs. >42gm)	4.08	14.3–30.85	p<0.05
Total energy used (<154 vs. >154 KJ)	1.055	1.031–1.081	p<0.05

DISCUSSION

One of the most annoying postoperative side effects of HoLEP, both for patients and physicians, is TUI. Patients' quality of life is greatly decreased by involuntary urine loss, and physicians may experience significant stress as a result of these concerns.

The total operation time was one of the primary predictors of TUI after HoLEP in the current investigation (OR 1.53, 95% CI, P0.05). However, Lerner *et al*. [9] (n=66) reported that even though operation time was not significantly related to postoperative TUI in their study, this factor was the most likely to affect TUI after HoLEP because the analysis of total operation time in their research was rife with confounding issues. Nam *et al*. [10] made a similar observation (OR 2.17, CI 1.26–3.27, p 0.05); however, Lerner *et al*. Post-operative TUI and delays in the recovery from this complication appeared to be caused by longer operation times.

Diabetes mellitus (n=35) is another finding from our study that is a strong predictor of TUI after HoLEP. In our study, 35 patients with diabetes mellitus in total, of which 27 (77%, n=0.05) had TUI. According to Elmansy *et al*. [11], having diabetes mellitus and having a big prostate volume are both statistically significant risk factors for developing stress urine incontinence (p=0.001 and p=0.02, respectively). However, tests carried out by Kobayashi *et al*. [12] found no discernible difference. Diabetes mellitus is a risk factor since it is a chronic condition that can

have a range of effects on the bladder, urethral sphincter, or the nerves responsible for micturition. As a result, diabetes mellitus may impair the nerve supply to the external sphincter.

In addition, we found that a large prostate volume higher than 58 cc was a highly significant predictor of the development of post-operative TUI following HoLEP (OR 3.5, CI 1.26–3.7, p 0.005). Elmansy *et al*. [11] likewise found this to be the case (p 0.02). We elucidate the relationship between a high prostate size and longer operation times as well as longer sheath manipulation times across external sphincters. In 190 BPH patients, Aus *et al*. [13] tested PSA before surgery and 3 months after TURP. The mean PSA dropped by 70% following TURP. 3 months after TURP, Fonseca *et al*. [14] likewise observed a 71% decrease in PSA.

Enucleated volume (>50 g, p0.05), as shown by Kobayashi *et al*. [12], was substantially linked with early post-operative TUI following HoLEP. A significant predictor of TUI in our analysis was a greater enucleated prostate volume (enucleated volume >42 g, OR 7.2, CI 16.2–45.6; p=0.05). A big prostatic fossa may result after the total removal of prostate tissue. This causes urine to temporarily get trapped and leak while under stress. Similar to how many authors have suggested that the removal of adenoma tissue close to the external sphincter may temporarily harm the continence mechanisms [15], in our study, we lower the laser energy setting (1.6J, 20 HZ) while working in proximity to the external sphincter to prevent injury to the external sphincter.

CONCLUSION

Based on the results of this study, we draw the conclusion that post-operative TUI was significantly correlated with diabetes mellitus, prostate volume (>58cc), total operation time (>131mins), enucleated prostate volume (42 g), total energy used (>154 kJ), and percentage decrease in PSA (60%) as shown in univariate analysis. Multivariate exploration revealed that the only independent predictor for post-operative TUI was total energy consumed.

SUGGESTION

Patients with known diabetes and large volume prostates should be advised to begin kegel exercises immediately postoperatively or even before surgery to decrease transient urinary incontinence (TUI). Based on the development of operative skills, we can also decrease the occurrence of post-operative TUI by shortening the total operation time and total energy expended.

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AUTHORS' CONTRIBUTION

All the authors have contributed equally.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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