



Original Research

Incidence and Determinants of Catheter-Related Bladder Spasms Following Transurethral Resection of the Prostate; A Prospective Review of 80 Cases.

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Abstract

Background: Bladder spasms due to involuntary contraction of the bladder occur frequently following Transurethral resection of the prostate (TURP). They may be aggravated by the presence of a catheter, blood clots, preoperative overactive bladder, or preoperative ingestion of bladder stimulants like caffeine. These bladder spasms are painful, associated with peri-catheter leakage of urine, increased post-operative bleeding, and often refractory to postoperative analgesia. The incidence and risk factors for the occurrence of bladder spasms following TURP need to be reviewed and validated to ensure adequate patient counseling and possible lifestyle modification before surgery. We conducted a prospective review of the determinants of bladder spasms in our patients following TURP.

Methodology: The study population was patients with benign prostatic obstruction scheduled for TURP between March 2022 and April 2023. Monopolar transurethral resection of the prostate was done using a continuous flow resectoscope. The primary endpoint of the study was occurrences of bladder spasms postoperatively before the trial without a catheter. Pain perception during the spasms was assessed using a visual analog scale. Clinical data were collected and analyzed to determine their association with the occurrence of bladder spasms postoperatively using regression analysis. Sub-group analysis was also done to correlate significant variables with the severity of pain in patients with spasms.

Results: The mean age of the 80 patients reviewed was 66.9 ± 8 years. Bladder spasms were seen in 41(51.2%) of the patients. The presence of overactive bladder (OAB) symptoms and the use of bladder stimulants were statistically significant determinants with a p-value of 0.003 and 0.026 respectively. The age of the patient, preoperative indwelling catheter, prostate volume, and resection time were not statistically determinant variables in the occurrence of bladder spasms post-operatively. 61% had severe pains and 39% had mild pains. There was no significant correlation between the presence of OAB or the use of bladder stimulants with the severity of pains in patients with bladder spasms after TURP.

Conclusions: Half of the patients are likely to have bladder spasms after TURP. The risk of having these spasms is higher in patients with preoperative OAB or patients who are exposed to bladder stimulants. The severity of spasms is however independent of these risk factors.

Keywords: Incidence, Determinants, Bladder Spasms, TURP.

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Introduction

Bladder outlet obstruction from benign prostate hyperplasia is a common disease of middle-aged and elderly men worldwide which may require surgical intervention when complicated or in the presence of bothersome symptoms.[1] Despite recent advances in the surgical treatment of benign prostatic obstruction and a change in paradigm from invasive options to minimally invasive techniques, transurethral resection of the prostate (TURP) remains the gold-standard surgical option.[2] Following TURP, a urethral catheter is typically left inset to ensure continuous bladder irrigation of blood for a variable period. Bladder spasms due to involuntary contraction of the bladder occur frequently during this post-operative period. These bladder spasms are painful, associated with peri catheter leakage of urine, increased post-operative bleeding, and often refractory to postoperative analgesia.[3, 4] It occasionally resolves with anticholinergics as they are mediated by the stimulation of bladder muscarinic receptors or following the removal of the catheter.[5]. The symptom may be aggravated by the presence of the catheter, blood clots, intraoperative bladder distension, or stimulation. It negatively affects a patient's quality of life following surgery. An interplay of bladder overactivity and bladder outlet obstruction has been noted in men with benign prostatic hyperplasia.[6, 7] Could this be a predisposing factor to the occurrence of bladder spasms after a successful TURP or cause an increase in the severity of these spasms after surgery? Behavioral factors such as caffeine use have been associated with worsening lower urinary tract symptoms and bladder overactivity due to either diuretic activity or centrally mediated bladder stimulation.[8, 9] These factors may increase the risk of bladder spasms after TURP. Hence, the incidence, risk factors for the occurrence of bladder spasms, and determinants of severity of symptoms following TURP need to be reviewed and validated to ensure adequate patient counseling and possible lifestyle modification before surgery. Recent reviews on catheter-related bladder spasms were largely on heterogeneous patient populations with various pathologies, surgical interventions, and indications for urethral catheterizations.[4, 10, 11] These observations limit the ability to make an inference on the incidence or risk factor based on the disease or surgical intervention. Hence, we conducted a prospective review of the determinants of bladder spasms in our patients with BPH following TURP.

Methodology

The study population was patients with benign prostatic obstruction with complications or bothersome symptoms scheduled for TURP between March 2022 and April 2023. Patients within the study population who consented to the study were recruited consecutively using convenience sampling methods within the study duration following approval from the Institution Health Ethics Research Committee. Minimum sample size was calculated using the formula $n = \frac{Z^2 (pq)}{d^2}$ —where $n=72$, $Z=1.96$, $p=0.95$, $q=0.05$ and $d=0.05$

Based on the unit protocol, these patients were evaluated and prepared for surgery following a negative urine culture for microorganisms. Monopolar transurethral resection of the prostate was done using a continuous flow resectoscope with sterile water as an irrigant. All the patients subsequently had a 24fr coude-tip three-way catheter inserted and the catheter balloon was inflated with 40mls of sterile water for bladder irrigation with normal saline. The patients had intravenous paracetamol and nefopam for 3 days postoperatively. The primary endpoint of the study was occurrences of bladder spasms postoperatively before the trial without a catheter. Bladder Spasms were defined as described by Agarwal et al as complaints of suprapubic pain associated with urgency with or without behavioral factors such as an attempt at pulling out the catheter, peri catheter leakage of urine, or strong vocal response.[12]The perception of pain during the spasms was assessed using a visual analog scale and classified as mild pain with pain scores of 1-5 and severe pain with 6-10 scores. Clinical data including the lower urinary tract symptoms (storage and voiding symptoms), presence of overactive bladder(defined as presence of urinary

urgency with or without urge incontinence associated with other lower urinary tract symptoms), prostate volume, preoperative indwelling catheter, use of Bladder stimulants (Caffeine, ginger drinks) duration of resection, were collected and analyzed to determine their association with the occurrence of bladder spasms postoperatively using linear regression with p-value of 0.05 at 95% confidence interval considered as significant. Sub-group analysis was also done to correlate variables that were statistically significant following regression analysis with the severity of pain in patients with spasms using Spearman’s correlation.

Ethical Approval and Consent to Participate:

Ethical approval from the Health Research Ethics Committee Ahmadu Bello University Zaria was obtained with the number D-U-N-S NUMBER 954524802

Consent for Publication: Written Informed consent was obtained from all the participants in the study.

Results

A total of 80 patients were studied and observed for the development of post-TURP bladder spam. The mean age of the patients was 66.9 ±8 years with a minimum age of 48 and maximum age of 88. Elderly patients (> 70 years) constituted 27.9% of the patients. Fifteen (13.5%) patients used bladder stimulants. The commonest lower urinary tract symptom was nocturia in 52(65%) patients. Sixteen (20%) of these patients had overactive bladder. The distribution of the indications for TURP is displayed in Figure 1 below

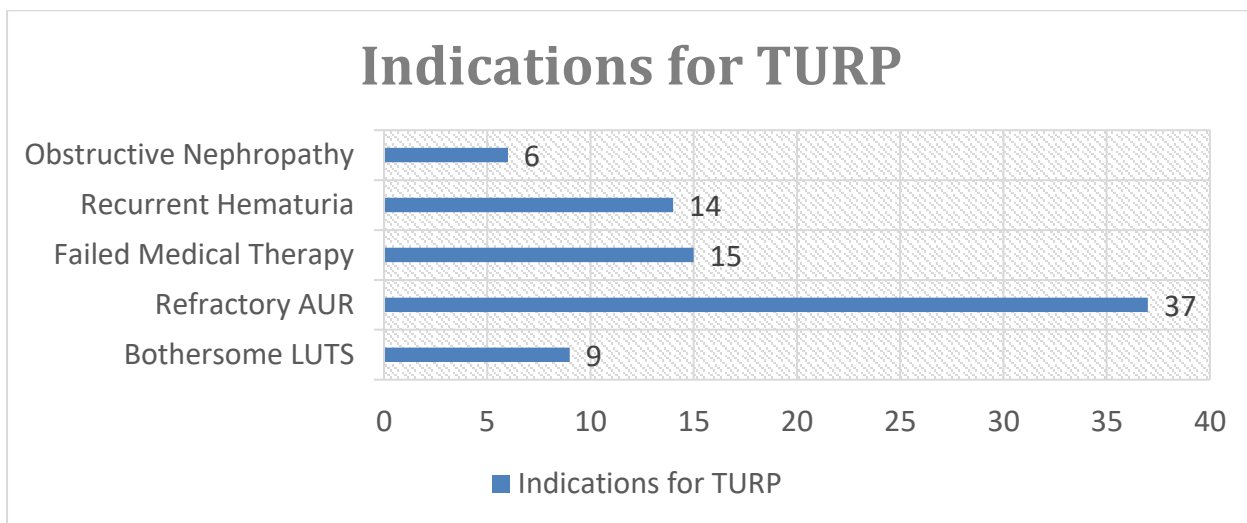


Figure1: Distribution of the Indications for Transurethral Resection of the Prostate
 AUR- Acute urinary retention, LUTS-lower urinary tract symptoms

The mean prostate volume was 63.6 ±10g with a minimum size of 40g and a maximum of 110g. Bladder spasms were seen in 41(51.2%) of the patients. The determinants of the occurrence of bladder spasms were evaluated using linear regression and displayed in Table 1 below. The presence of OAB symptoms and the use of bladder stimulants were statistically significant determinants with a p-value of 0.003 and 0.026 respectively. The age of the patient, preoperative indwelling catheter, prostate volume, and resection time were not statistically determinant variables in the occurrence of bladder spasms post-operatively.

Table 1: Binary Logistic Regression Analysis of the Determinants of Catheter-Related Bladder Spasms

Independent Variables		Catheter-Related Bladder Spasms		ODDS RATIO	95% Confidence Interval		P-VALUE
		NO	YES		Lower Bound	Upper Bound	
Age	<70 years	22 (27.5%)	27(33.75%)	0.544	0.193	1.538	0.251
	≥70 years	17(21.25%)	14(17.5%)				
Bladder Stimulants	No	35(43.75%)	30(37.5%)	5.935	1.244	28.314	0.026
	Yes	4(5.0%)	11(13.75%)				
Overactive Bladder	No	37(46.25%)	27(33.75%)	14.625	2.454	87.164	0.003
	Yes	2(2.5%)	14(17.5%)				
Preoperative Indwelling Catheter	No	23(28.75%)	20(25.0%)	1.538	0.553	4.275	0.409
	Yes	16(20.0%)	21(26,25%)				
Prostate Volume	≤40g	2(2.5%)	1(1.25%)	0.532	0.197	1.436	0.213
	41-80g	23(28.75%)	29(36.25%)				
	< 80g	14(17.5%)	11(13.75%)				
Resection Time	<1hr	8(10.0%)	8(10.0%)	2.149	1.041	4.436	0.147
	1hr	11(13.75%)	5(6.25%)				
	1-2hrs	19(23.75%)	28(35.0%)				
	>2hrs	1(1.25%)	0(0%)				

Twenty-five (61.0%) had severe pains (distressing pain, intense pain, or excruciating pain) and 16(39%) patients had mild pain (mild annoying pains, or nagging troublesome pains) following assessment of pain during spasms using the pain visual analog scale. The relationship between the use of bladder stimulants or preoperative OAB with the severity of pain during the bladder spasms is positive and strong though both were not statistically significant as depicted in the analysis shown in Table 2.

Table 2 Correlation of Severity of Catheter-Related Bladder Spasms and Significant Independent Variables.

		Overactive Bladder	Bladder Stimulants
Severity of Catheter-Related Bladder Spasms	Spearman's Rho	0.062	0.098
	Sig (2 Tailed)	0.701	0.541
	N	41	41

Discussion

In this study, the incidence of catheter-related bladder spasms following TURP was evaluated and found to be 51% which is likesome of the reported findings in literature. However, Zhang et al in 2023 found an incidence rate of 75% in a review of 48 patients who had spasms after TURP in China. The higher incidence rates may be due to the bigger size of the catheter balloon 50mls compared to the 40mls catheter size in our study because the size of the catheter balloon is a documented independent predictor of the occurrence of catheter-related bladder spasms.[13]

The association of possible risk factors such as behavioral factors, age, presence of overactive bladder coexisting with bladder outlet obstruction, prostate size, and resection time as independent factors that may affect the incidence of bladder spasms after TURP was reviewed. These factors may indicate the presence of a preoperatively hyperactive bladder or risk of stimulating the bladder during resection of the prostate. The use of bladder stimulants worsens bladder health and lifestyle modification has improved symptoms in patients with overactive bladder.[14–16]

The presence of an overactive bladder coexisting with bladder outlet obstruction and the use of bladder stimulants were the statistically significant factors found to be related to the occurrence of catheter-related bladder spasms after TURP which implies the preoperative functional status of the bladder may predispose to its increased sensitivity to the catheter mediated cholinergic stimulation following resection ultimately leading to spasms after resection. Spooler and colleagues in Canada who conducted a systematic review of the management of catheter-related bladder spasms concluded that avoiding bladder irritants had moderate evidence in the management of bladder spasms.[3] These factors were weakly associated with the severity of the spasms.

Although advanced age has been noted as a risk factor for hyperactive bladder and the development of catheter-related bladder spasms by Lim et al,[10] this was not found to predispose to the occurrence of bladder spasms in this study. Similarly, Li et al in another study found the presence of an indwelling urethral catheter as a risk factor for the development of bladder spasms after a urological procedure,[17] This was however not our findings in this series. Resection time, and prostate size which may be surrogates of variables that may indicate increased stimulation of the bladder during resection of the prostate were not related to the occurrence of bladder spasms. This is in contrast with the findings of Sipal et in a review of 120 patients who had TURP in 2020.[18]

The limitation of this study was the fact that the presence of an overactive bladder was not confirmed by urodynamic studies, though this is not a routinely recommended evaluation before TURP, this would have been more appropriate in demonstrating the hyperactivity of the bladder preoperatively. Furthermore, the presence of the median lobe or the characteristics of the growth of the prostate was not reported uniformly for all the patients at ultrasound evaluation and may be evaluated as a risk factor in addition to the size of the prostate.

Conclusion

Catheter-related bladder spasms after transurethral resection of the prostate occur frequently in about half of the patients. It results in severe intensive pains after surgery in more than half of the patients and the use of bladder stimulants or the presence of a coexisting overactive bladder with the bladder outlet obstruction are risk factors for the development of bladder spasms after surgery. Patients with these risk factors should be counseled adequately on lifestyle modifications and avoiding the use of bladder stimulants before surgery. These patients should be informed of the possibility of having spasms after TURP and the need for additional treatments with oral anticholinergics during the immediate post-operative period may be warranted to control the spasms.

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