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Research Article

BEHAVIOR OF BLADDER AFTER TURP IN UNDERACTIVE DETRUSOR PATIENTS

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ABSTRACT

Objective: The gold standard therapy for benign prostatic obstruction is transurethral resection of the prostate (TURP). Because it improves outlet resistance, it may also be useful for individuals who have detrusor underactivity (DU) with lower urinary tract dysfunction that is refractory to medicinal therapy or in situations with a substantial residual urine volume. The objective of the current study was to assess the urodynamic behavior of the bladder following TURP in DU patients.

Methods: This research examined and analyzed 41 individuals with DU (mean age 68.7 years). All these patients had a TURP for a suspected outlet blockage. All these patients had extensive pre-operative evaluations and urodynamics assessments before and after TURP. We compared maximum flow rate (Qmax), international prostate symptom score (IPSS), post-void residuals (PVR), quality of life (QoL) along with other urodynamic parameters assessing detrusor function like bladder contractility index (BCI), and detrusor pressure at Qmax (pdetQmax) pre- and post-TURP.

Results: The average duration of follow-up of patients was 9.2 months. Following TURP, the mean IPSS and QoL improvement was statistically significant. Following TURP, there was also a substantial decrease in PVR while we observed an improvement in Qmax value. Even after TURP, there was no substantial change in total cystometric capacity, BCI, or pdetQmax index.

Conclusion: DU may not be an absolute contraindication to TURP. Despite the presence of DU, the prognosis of TURP may be optimistic if the patients have evident bladder outlet obstruction. However, medically removing the blockage does not increase contractility, which is essential when evaluating and advising on TURP surgery.

Keywords: Detrusor underactivity, Transurethral resection of the prostate, Bladder contractility index.

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INTRODUCTION

Detrusor underactivity (DU) is a frequent lower urinary tract dysfunction (LUTS) that is understudied and unclear. According to the international continence society (ICS), DU is a condition where contractions are with decreased strength and/or occur for lesser time that results in protracted bladder emptying and/or inability to attain full bladder emptying within a usual time range [1]. It is possible that bladder outlet obstruction (BOO) is a contributing factor to DU in males, with the contractile strength of the detrusor reduced due to the anatomical and neurophysiologic effects of persistent BOO. Nevertheless, the link between BOO and DU is yet unknown. Both BOO and DU reduce urinary flow rate while increasing post-void residual urine volume (post-void residuals [PVR]). The sole tool for determining the degree of BOO and the condition of the detrusor function during voiding is the pressure-flow study (PFS). According to PFS, DU is defined as a poorly maintained/wave like detrusor contraction having low pressure and low flow rate.

The gold standard therapy for benign prostatic blockage is transurethral resection of the prostate (TURP). Because it lowers outlet obstruction, it could be useful for individuals with DU who have LUTS are refractory to medicinal therapy with a substantial amount of residual urine. However, there is scarce data on the efficacy of TURP among these individuals. More critically, there are limited studies examining bladder behavior in DU patients after TURP for BOO. The objective of this current study was to assess the urodynamic behavior of the bladder following TURP among DU patients.

METHODS

It is a retrospective observational study done in the department of Urology, Institute of Medical Sciences, and SUM Hospital. We assessed health records of 44 subjects from MRD department of IMS and SUM hospital after obtaining approval from the Institutional Ethical Committee vide no. DMR/IMS.SUM/2018/190372, who underwent TURP for LUTS indicative of benign prostatic hyperplasia (BPH). Among all these individuals, TURP was recommended as perroutine practice. All the subjects had a PFS preoperatively confirming the diagnose of DU. The pdetQmax value of 40 cm of H_2O and Qmax level of 15 mL/s was utilized as the criterion of DU in this study, which is similar to the "poor contractility zone" of the previously reported bladder contractility index (BCI) nomogram [2]. Three participants were observed to have urethral stricture disorders during the follow-up visit so, they were removed from the final analysis. None of the participants in this research had any obvious underlying neurologic or biological diseases, such as prostate cancer, urinary calculi, or stricture.

A comprehensive history, clinical examination, and rectal examination were performed before surgery. Laboratory investigations such as serum prostate-specific antigen, urinalysis, pressure flow study (according to ICS recommendation following calibration of the machine, trace interpretation, quality control based on reference levels), and uroflowmetry were also performed [3]. Radiological investigations such as ultrasonography for post-void residual urine, prostate volume, and cystourethroscopy were all performed before surgery. The patients' symptoms were graded using the international prostate symptom score (IPSS) and a questionnaire was used to determine quality of life (QoL) of subjects. Qmax and pdetQmax were derived as urodynamic parameters.

The BCI was computed using Qmax and pdetQmax values using the following formula [2]:

BCI=pdetQmax+5Qmax

Computed BCI values were interpreted as strong (BCI value more than 150), normal (BCI value between 100 and 150), and weak (BCI value <100).

Qmax and pdetQmax values were also used to calculate BOO index (BOOI) using the following formulae

BOOI=pdetQmax-2Qmax

The obtained BOOI values were further classified as obstructed when BOOI is <40 and unobstructed when BOOI value more than 40.

All the above parameters were also measured post-intervention and compared with the pre-operative values. Data collected were analyzed using the Statistical Package for the Social Sciences version 25. Normality of data was established using Shapiro–Wilk's test. Comparison of pre- and post-surgery parameters was performed using paired t-test or Wilcoxson signed-rank test depending on the distribution. Statistical significance was established when $p<0.05$.

RESULTS

In this study, 41 people were included for final analysis. The patients' average age was 68.7 years (ranged from 54 years to 80 years). Repeated episodes of acute retention of urine and repeated unsuccessful trials of void were the most prevalent reason of TURP indication. The average weight of prostrate removed after surgery was 40.2 g. No untoward events were observed in subjects during and post-surgery. The average duration of follow-up was 9.2 months (ranged from 6 months to 23 months). The pre-operative and post-operative comparisons of patient characteristics following TURP are summarized in Table 1.

A significant improvement in IPSS score (24.3±2.8 vs. 9.4±3.4) and QoL (5.2±0.9 vs. 2.4±0.7) were observed in our study. Before surgery, the most troublesome symptoms were a weak stream, incomplete emptying, and increased frequency. However, nocturia was the most prevalent symptom among patients following TURP increasing frequency. Following TURP, there was also a substantial drop in mean PVR (145.0 vs. 81.4) and an increase in mean Qmax value (7.6 vs. 9.8). Even after TURP, there was no significant increase ($p>0.05$) in BCI, and total cystometric capacity.

DISCUSSION

LUTS can be induced by DU in addition to BOO [4,5]. Te and Kaplan [6] found reduced detrusor contractility in almost one 5th of individuals with LUTS, while Amenda *et al*. [7] found poor contractility in one-third of symptomatic men without BOO.

Table 1: Comparison of different parameters before and after transurethral resection of the prostate in men with LUTS and with a diagnosis of detrusor underactivity

Variables	Pre-operative (mean [SD])	Post-operative (mean [SD])	p-value
Qmax (mL/s)	7.6 (3.6)	9.8 (2.3)	0.0015
International prostate symptom score	24.3 (2.8)	9.4 (3.4)	<0.0001
Quality of life	5.2 (0.9)	2.4 (0.7)	<0.0001
Post-void residuals (mL)	145.0 (113.8)	81.4 (37.1)	0.001
Cystometric capacity (mL)	722.4 (411.7)	691.1 (388.4)	0.724
pdetQmax (cm of H_2O)	23.8 (10.5)	24.4 (11.1)	0.8021
Bladder contractility index	62.1 (30.2)	72.6 (26.9)	0.1003

LUTS: Lower urinary tract dysfunction, SD: Standard deviation

The DU definition according to ICS is only confined to the voiding phase, which results in a low urine flow rate with or without PVR. PFS is the only way to diagnose DU as DU cannot be distinguished from BOO with confidence, either by symptoms or by flow trace. The concurrent rise of pdetQmax value obtained through PFS confirms the diagnosis of BOO. However, when detrusor contractility is diminished, detrusor pressure does not increase significantly, and the BOO can be misdiagnosed. In this scenario, TURP may be beneficial due to the removal of a blockage that PFS did not recognize.

However, the effectiveness of the TURP surgery in males with DU has been called into question. According to Rollema and Van Mastrigt, two-thirds of LUTS patients were unobstructed, and among them more than two-third were remained symptomatic following the TURP [8]. According to a study by Abrams, the failure rate of 30% for TURP when it was carried out considering patients' symptoms and uroflowmetry, while the failure rate dropped to <15% after choosing blocked subjects considering the pre-operative PFS results [9,10]. According to Javleé *et al*. [11], all the subjects (100%) remained symptomatic in the unobstructed group while the percentage dropped by 20% among subjects with ambiguous blockage or having detrusor contractility issues. They also calculated the predictive values of Schäfer nomogram in combination with detrusor contractility and concluded that they were more accurate in predicting the prognosis with specificity, sensitivity, and positive predictive value to be 93%, 87%, and 95%, respectively.

Thomas *et al*. [12] in their study on the long-term benefits of TURP (over 11 years of follow-up) reported increased chronic retention in males with DU and no long-term clinical or urological advantages compared to DU patients without treatment. Similarly, Bruskewitz *et al*. [13] found non-significant results for TURP while comparing obstructed versus unobstructed groups.

According to Van Venrooij *et al*. [14], one-tenth of the subjects were unobstructed and one-fourth were ambiguous findings before surgery, and both groups benefitted after TURP. Another research published by the same authors (Van Venrooij *et al.* [15]) comparing advantages of TURP in obstructed patients with unobstructed/ambiguous patients found that the differences in both groups were quite comparable while they found significant differences in urethral resistance (UR) and Qmax. They proposed that TURP could be an effective surgical therapy for men having high-grade LUTS with BPH/hypertrophy opting for resection, non-response to medication, and have adverse reaction that warrants discontinuation of medication. They also reported that TURP can give better result in a significant reduction of UR, even in unobstructed men.

In our study, almost all of our patients had some degree of borderline obstruction (mean BOOI-44.4) and in spite of DU most of our patients show significant improvements in the average values of IPSS, QoL, and PVR urine after TURP. Most of the subjects were satisfied with the QoL following TURP. More importantly, we found a significant decrease in mean PVR (from 145.0 mL to 81.4 mL). A few patients (five) were advised self-catheterization based on their high PVR (>100 mL) on USG during follow-up visit at one month. However, none of the patients continued self-catheterization and at 6 months of follow-up, they were found to have a significant decrease in PVR (<40 mL). A decrease in bladder outlet resistance could be the sole reason for such improvement after TURP. However, surgical intervention for the obstruction does not increase the bladder contractility and there was no significant change in pdetQmax.

CONCLUSION

DU may not be an absolute contraindication to TURP. Despite the presence of DU, the prognosis of TURP may be optimistic if the patients have evident BOO. However, medically removing the blockage does not increase contractility, which is essential when evaluating and advising on TURP surgery.

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AUTHORS' CONTRIBUTIONS

Authors' contribution-Dr. Pranab Patnaik- writing manuscript, collecting data, Interpretation of data.
Dr. Vikalap Gupta- Data collection.
Dr. Suren Das- Interpretation of Data, final approval.

CONFLICTS OF INTERESTS

None

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