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Original Article

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Outcome of Transurethral Resection of Prostate in Patient of Chronic Retention of Urine due to Benign Enlargement of Prostate

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Abstract

Background: *Chronic urinary retention (CUR) due to benign enlargement of prostate (BEP) causes impaired detrusor function secondary to obstruction related changes in urinary bladder. The gold standard surgical treatment option for relieve of obstruction is Transurethral resection of prostate (TURP). However, in chronic retention of urine, there is chance of detrusor underactivity.*

Objective: *The present study evaluated the outcome of TURP in patients of chronic retention of urine due to benign enlargement of prostate irrespective of detrusor activity.*

Methods: *This observational study involves 26 patients of BEP with chronic retention of urine underwent TURP after 6 Weeks long initial perurethral catheterization in the Department of Urology, Bangladesh Medical University (BMU), Shahbagh, Dhaka. The postoperative outcomes were evaluated on the basis of international prostate symptoms score (IPSS), Quality of life (QoL) maximum flow rate (Qmax), post void residual urine (PVR), grading of upper tract dilatation, serum creatinine, urodynamic parameters such as detrusor pressure at maximum flow (PDdetQmax), bladder contractility index (BCI), bladder outflow obstruction index (BOOI) three months after TURP.*

Results: *The mean age of the patients was 65.2 ± 6.5 years which ranged from 53-80 years. Three months after TURP, the median PVR significantly reduced to 75.0 [40.0, 145.0] ml from 394.0 [333.0, 516.0] ml. Before TURP, 38% of patient had upper tract dilatation (UTD) among them, UTD decreases in 60% patient and 40% became normal. The median Qmax significantly increased to 18.2 [12.1, 22.1] ml/sec from 7.9 [5.6, 10.2] ml/sec. The median serum creatinine significantly reduced to 1.21 [0.91, 2.24] from preoperative 1.27 [0.95, 2.25]mg/dl. Median PdetQmax was significantly reduced to 49.3 [45.9, 53.7] from 88.1 [59.3, 106.2] after TURP. The median BCI increased to 151.6 [139.0, 167.2] from 136.1 [91.9, 154.5]. The median BOOI significantly reduced to 15.9 [8.0, 22.0] from 72.1 [44.1, 88.1].*

Keywords: Chronic retention of urine, Benign enlargement of prostate, Transurethral resection of prostate, Outcome

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The median IPSS significantly reduced to 8.0 [6.7, 10.0] from 20.0 [15.0, 25.0] while median QoL was also significantly reduced to 2.0 [2.0, 2.0] from 4.0 [4.0, 4.2]. Among the 8 patients, having hypocontractile bladder, 2 patients still remained in hypocontractile state other 6 improved to normocontractile state. Two patients required timed voiding, double voiding and Clean Intermittent Self-Catheterization (CISC) up to this follow up period.

Conclusions: *After TURP, there were significant improvement of international prostate symptom score (IPSS), QoL, Urinary flow rate, serum creatinine, hydronephrosis and urodynamic parameters (PdetQmax, BCI, BOOI) and PVR among the patients of benign enlargement of prostate with chronic retention of urine. Though 25% patients of weak detrusor contractility failed to achieve normal contractility and needed timed voiding, double voiding and Clean Intermittent Self-Catheterization (CISC).*

Introduction

Patients of chronic urinary retention (CUR) are clinically important and they are about 25% in number among the patients undergoing transurethral resection of prostate[1]. Chronic urinary retention is defined by the International Continence Society as "A non painful bladder, which remains palpable or percussable after the patient has passed urine." >300 ml residual urine is diagnostic for CUR[1].

Chronic retention can be classified as high pressure chronic urinary retention (HPCR) and low pressure chronic urinary retention (LPCR), based on bladder end filling pressure[1]. In HPCR there is chance of development of bladder wall thickening with trabeculation, hypertension, bilateral hydroureteronephrosis resulting in progressive renal failure, uremia and death if left untreated[3]. Detrusor underactivity (DUA) sometimes co-exists with benign prostatic obstruction (BPO) and can be a result of longstanding obstruction. Smooth muscle hypertrophy and significant extracellular and intracellular abnormalities results from obstruction[4]. In LPCR there is detrusor underactivity where the urinary bladder become soft and flabby[5].Active management with surgical intervention or intermittent catheterization is appropriate[2].

The detrusor underactivity can only be diagnosed by detrusor pressure uroflow urodynamic study[6]. There is much controversy in the surgical management of cases with DU and BPO as many urologists do not consider prostate surgery in men with DU for fear that the improvement is suboptimal and unnecessarily subjecting these cases to the risk of the surgical procedure[7]. Some studies reported no significant benefit from prostatic surgery in patients with detrusor underactivity as in Thomas et al. (2004) study who reported their study on patients with detrusor underactivity (DU) had undergone TURP with a mean follow-up of 11 years[8]. Detrusor underactivity carry the risk of postoperative urinary retention in approximately 43% of cases and needed CIC[6].

Patients of chronic retention need careful pre and post operative follow up. Gradual recovery of upper tract occurs after relief of chronic retention. Patient with preoperative impaired renal function need prolong per urethral catheter drainage up to improvement of renal function, because it causes more post TURP complication and poor outcome and six fold increase of mortality rate[9]. Decision of Surgery in detrusor underactivity patients remains controversial[10]. The natural history of chronic urinary retention is not well-understood. Several studies suggest that men with high PVRs and "high-pressure" chronic urinary retention or severe lower urinary tract symptoms (LUTS) may be more likely to be benefited from a TURP[1]. Authors have argued that conservative management of large PVRs is appropriate; however, almost a quarter of men progress and need intervention[11]. It is unclear what proportion of men with benign prostatic hyperplasia (BPH) go on to develop an acontractile detrusor muscle and require clean intermittent catheterization (CIC), and if the natural history of their bladder dysfunction could have been altered with earlier intervention[12]. High post voidal residual volume (>1000 ml) preoperatively shows slow resolution of upper tract dilatation[13]. Men having worst symptoms before TURP shows more improvement of symptoms after surgery and patient having least severe symptoms shows poor improvement of symptoms in post TURP State[14].

The prevalence of DUA in men with LUTS ranges between 9% and 48%[15]. The presence of DUA was associated with long-term symptomatic failure and decreased flow rates after BPH surgery[16]. As intermittent catheterization and TURP both are associated with different complications, and there is possibility of reducing future complication of chronic retention by outlet obstruction reduction[12]. The aim was to observe outcomes after TURP in patient of BEP with chronic retention of urine. It was determined if preoperative parameter improves after relief of obstruction by TURP.

Patient and Methods

After taking approval from the Institutional Review Board (IRB) of BMU, this before and after study was conducted in Department of Urology, BMU from April 2022 to March 2023. The study population was selected on the basis of selection criteria from the patients attended in the outdoor of department of Urology, BMU, Dhaka. Among them a total of 26 patients were included in this study.

Inclusion criteria:

Patients fulfilling the following criteria –

- BEP with chronic retention of urine having Post void residual volume of urine > 300 ml.

Exclusion criteria:

- Patient having past history of prostatic surgery.
- Patient having prostate or bladder cancer.
- Urethral stricture
- Known neuropathic bladder
- Patient having any other causes of lower urinary tract symptoms

Methods:

All the patients were informed about the study procedure and invited to participate in the study. Patients who agreed to participate in the study, provided their written informed consent form. Study variables were Age, IPSS & QoL, Post voidal residue of urine (PVR) by ultrasonography, Grading of upper tract dilatation by ultrasonography, Maximum urine flow rate (Qmax) by uroflowmetry, Serum creatinine by automatic blood analyzer, Detrusor pressure at maximum flow (PdetQmax) by urodynamic study, Bladder contractility index (BCI), Bladder outlet obstruction index (BOOI)

Initial assessment at first visit of patient included - history taking, IPSS scoring by IPSS bangla questionnaire, general, physical and genital examination, DRE, ultrasonography of KUB with prostate with maximum cystometric capacity (MCC) with post void residual (PVR), Uroflowmetry, Serum creatinine, S. electrolyte, S. PSA and Urodynamic study (after adequate preparation including prior 3 days voiding diary, and ensuring urinary culture having no growth of organism). We calculated BOOI = Pdet @ Qmax – 2 Qmax. Using this equation, we divided the patients into obstructed, equivocal, and unobstructed According to their BOOI. BOOI > 40 = obstructed; BOOI 20-40 = equivocal; and BOOI < 20 = unobstructed. The bladder contractility index (BCI) is represented by the following formula: BCI = PdetQmax + 5 Qmax. Using this formula, we divided the patients into normal detrusor contractility = >100, and weak detrusor contractility = < 100 . Then perurethral catheterization was done after admission of the patient in the indoor of the department of urology, BMU. After catheterization close monitoring was done and observed for any post obstructive diuresis, decompression hematuria and any electrolyte imbalance. All were managed accordingly. Urethral catheter was kept in situ for 6 weeks. During this period catheter was changed in every 3 weeks. After 6 weeks investigations for anesthetic fitness was done. The decision regarding operative treatment was taken by consultant surgeon based on chronic retention of urine due to BEP, The patients was placed in lithotomy position and standard monopolar TURP was done by specialized surgical team. Careful monitoring of the operative duration and intraoperative complication was done and was managed successfully. Proper post operative follow up and management was ensured.

In the follow up visit after 3 months, history taking, general, physical and genital examination, ultrasonography of KUB with prostate with MCC with PVR, Uroflowmetry, Serum creatinine and Urodynamic study of the patients was assessed again. Then effect of the intervention was evaluated. Contact number of each patient was taken and weekly reminder message /call was given to prevent loss to follow up and to prevent cross over during the study period.

The statistical analysis was conducted using SPSS (Statistical Package for the Social Science) version 26 statistical software. The findings of the study were presented by frequency, percentage in tables. Mean with standard deviation for continuous variables and frequency distributions for categorical variables was used to describe the characteristics of the total sample. In case of skewed data, median with interquartile range

was used to describe the data. Association of continuous data were reviled by Wilcoxon signed-rank test. A p-value less than 0.05 was considered statistically significant in two tailed tests.

Results

Among the The present study evaluated the outcome of TURP in patients with benign enlargement of prostate with chronic retention of urine. A total of 28 patients who fulfilled the selection criteria were included in this study. Patients were followed up for three months. However, within this follow up period, two patients were dropped out. Hence, the following result section represented the data of 26 patients.

Table I : *Distribution of patients by age (n=26)*

Age group (in years)	Frequency (n)	Percentage (%)
Up to 55	2	7.7
56-65	13	50.0
66-75	8	30.8
>75	3	11.5
Mean ± SD	65.2 ± 6.5	
Range(min-max)	53.0-80.0	

Table I shows that 13 (50.0%) patients were in 56-65 years age group, 8 (30.8%) patients were in 66-75 years age group and 3 (11.5%) patients were in >75 years age group. The mean age of the patients were 65.2 (± 6.5) years.

Table II: *Comparison of Post Void Residual (PVR), peak flow rate (Qmax) (ml/sec), serum creatinine (mg/dl), parameters of urodynamic study, International Prostate Symptom score (IPSS) with quality-of-life before and after Transurethral resection of the prostate (TURP) (n=26)*

	Before TRUP Median [IQR]	After TRUP Median [IQR]	p value
PVR	394.0 [333.0, 516.0]	75.0 [40.0, 145.0]	<0.001[a]
Qmax	7.9 [5.6, 10.2]	18.2 [12.1, 22.1]	<0.001[a]
Serum creatinine	1.27 [0.95, 2.25]	1.21 [0.91, 2.24]	0.001[a]
The detrusor pressure at maximum urinary flow (PdetQmax)	88.1 [59.3, 106.2]	49.3 [45.9, 53.7]	<0.001[a]
Bladdercontractility index (BCI)	136.1 [91.9, 154.5]	151.6 [139.0, 167.2]	0.050a
Bladder outlet obstruction index (BOOI)	72.1 [44.1, 88.1]	15.9 [8.0, 22.0]	<0.001a
International Prostate Symptom score (IPSS)	20.0 [15.0, 25.0]	8.0 [6.7, 10.0]	<0.001a
Quality-of-life (QoL)	4.0 [4.0, 4.2]	2.0 [2.0, 2.0]	<0.001a

a=Wilcoxon signed-rank test

Table II shows that before TURP, the median PVR was 394.0 [333.0, 516.0] ml. After TURP, the median PVR significantly reduced to 75.0 [40.0, 145.0] ml (p<0.001). Before TURP, the median Qmax was 7.9 [5.6, 10.2] ml/sec. After TURP, the median Qmax significantly increased to 18.2 [12.1, 22.1] ml/sec (p<0.001). Before TURP, the median serum creatinine was 1.27 [0.95, 2.25] mg/dl. After TURP, the median serum creatinine significantly reduced to 1.21 [0.91, 2.24] mg/dl(p=0.001). Before TURP, the median PdetQmax was 88.1 [59.3, 106.2]. After TURP, the median PdetQmax became 49.3 [45.9, 53.7] <0.001[a], the median BCI was 136.1 [91.9, 154.5]. After TURP, the median BCI increased to 151.6 [139.0, 167.2] (p=0.050). Before TURP, the median BOOI was 72.1 [44.1, 88.1] which significantly reduced to 15.9 [8.0, 22.0] after TURP (p<0.001). Before TURP, the median IPSS was 20.0 [15.0, 25.0] which significantly reduced to 8.0 [6.7, 10.0] after TURP (p<0.001). Again, median QoL was also significantly reduced to 2.0 [2.0, 2.0] from 4.0 [4.0, 4.2] after TURP (p<0.001).

Table III: Comparison of upper tract dilatation before and after transurethral resection of the prostate

Table III shows Before TURP, 38% of patient (10 out of 26 patients) had upper tract dilatation (UTD) among them, UTD decreases in 60% patient (6 out of 10 patients) and 40% (4 out of 10 patients) became normal.

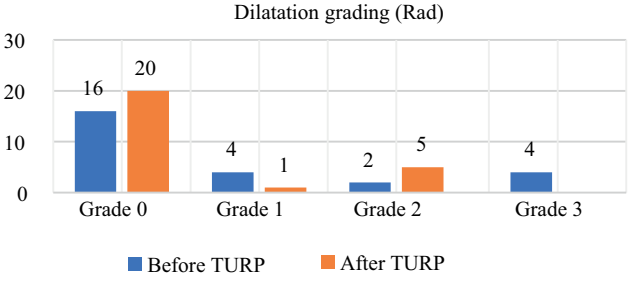

Table VIII: *Distribution of patients by Bladder contractility index (BCI) before and after Transurethral resection of the prostate (TURP) (n=26)*

Criteria	After TURP Hypocontractile	Before TURP Normocontractile	Total
Hypocontractile	2 (25.0%)	6 (75.0%)	8 (100.0%)
Normocontractile	0 (0.0%)	18 (100.0%)	18 (100.0%)

Table IX

Comparison of PVR and Qmax among hypocontractile patients before and after Transurethral resection of the prostate (TURP) (n=8)

Criteria	Before TURPMedian [IQR]	After TURPMedian [IQR]	p value
PVR	453.0 [345.0, 597.0]	140.0 [115.0, 191.2]	0.012[a]
Qmax	4.4 [3.2, 5.6]	11.1 [9.0, 12.0]	0.012[a]

a=Wilcoxon signed-rank test

Table IX shows that before TURP, 8 patients were hypocontractile. After TURP, 2 patients remained hypocontractile and 6 patients improved to normal. On the other hand, among the 18 patients who were in normocontractile group, all remained in the same group.

Table IX shows that before TURP, the median PVR significantly reduced after TURP (p=0.012). Again, median Qmax was significantly increased after TURP (p=0.012).

DISCUSSION

The prevalence of Benign enlargement of prostate (BEP) increases with age and affects approximately three-quarters of men by the seventh decade of life[17]. Transurethral resection of the prostate (TURP) is considered as the standard surgical treatment for lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia. However, in chronic retention of urine, there is chance of detrusor underactivity which might influence the outcome. The present study evaluated the outcome of TURP in patients with benign enlargement of prostate with chronic retention of urine irrespective of detrusor activity. After TURP, the PVR, BOOI and PdetQmax significantly reduced and the Qmax significantly increased. Moreover, the IPSS and QoL were also significantly reduced after TURP. Before TURP, 38% of patient had upper tract dilatation (UTD) among them, UTD decreases in 60% patient and 40% became normal.

The mean age of the patients of this study was 65.2 (± 6.5) years which was in accordance with previous studies (Ghalayini et al., Abdelhakim et al., 2021; Dekalo and Welk, 2022). The study of Ghalayini et al. (2005) included men with chronic urinary retention with LUTS and an IPSS of >7 where the mean age of the patients was near about 68.0 years. The prospective study of Abdelhakim et al. (2021) found men with benign enlargement of prostate with chronic retention of urine had mean age of 64.0 years. The retrospective case series of Dekalo and Welk (2022) included patients with median age of 65.0 years.

The present study confirmed the findings of others, that most patients with CUR have a good outcome after bladder outlet surgery (George et al., 1983; Ghalayini et al., 2005).

In the current study, after TURP, the PVR, Qmax, BOOI, PdetQmax improved significantly. In contrast, Islam et al. (2016) found overall favorable outcome in all patients after TURP though few patients had unfavorable outcome. This might be due to the inclusion of both chronic and refractory retention in the study Islam et al. (2016) while the present study included only patients with chronic urinary retention.

The mean goal of TUPR is to improve lower urinary tract symptoms (LUTS) in men by relieving prostatic obstruction[6]. The median IPSS was 20.0 which significantly reduced to 8.0 after TURP (p<0.001). Additionally, median QoL was also significantly reduced to 2.0 from 4.0 after TURP (p<0.001). Masumori et al. (2010) reported a long-term benefit in IPSS and QOL scores following TURP. Han et al. (2008) reported a 60% satisfaction rate among patients with

preoperative poor bladder contractility and significant improvements in IPSS and QOL. Thomas et al. (2019) found that after 12 months follow up, all men had improved international prostate symptom score and QoL scores compared to baseline.

In this study, patients were categorized according to preoperative BCI into hypocontractile (<100 BCI), normal and strong contractile (>100 BCI). All of the groups improved significantly. Variation of observation exits between study to study regarding this issue. Thomas et al. (2004) reported no significant benefit from prostatic surgery in patients with detrusor underactivity. In contrast, the study of Thomas et al. (2019) observed that patients had long-term symptomatic or urodynamic gains from TURP in men with DU. This might be due to the definition used in studies differs among study patients.

In the current study two patients in hypocontractile group did not improve (had BCI <100). Tanabe et al. (2011) reported that patients with weak detrusor contractility usually were older patients with significantly poorer flow and a high rate of residual urine which might affect the final outcome these patients.

After TURP, the PVR, BOOI and PdetQmax significantly reduced and the Qmax significantly increased in most of the patients. Moreover, the IPSS and QoL were also significantly reduced after TURP. Previous study demonstrated that patients with urinary retention, aged e" 80 years, with a retention volume of > 1500 m, and maximal detrusor pressure of < 28 cmH_2O, are at high risk of treatment failure[1].

This study found that males with BEP who had chronic urine retention improved significantly after TURP, and that this advantage seemed to be sustained over a three-month period. This study supports the notion that, first, TURP is safe in these individuals, and that, second, it may prevent future worsening in bladder function.

Conclusion

In this study patient of benign enlargement of prostate with chronic retention of urine treated with TURP showed significant improvement in all LUTS, QoL, Urinary flow rate, urodynamic parameters (PdetQmax, BCI, BOOI) and PVR. Though following surgery, bladder contractility power increased in most of the patients, few patients failed to achieve normal contractility. They were managed by timed voiding, double voiding and Clean Intermittent Self-Catheterization (CISC). Detrusor functional status may be used to predict the postoperative clinical prognosis of TURP among these patients' group.

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