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ASSOCIATION OF DETRUSOR MUSCULAR ACTIVITY WITH THE OUTCOME OF TRANSURETHRAL RESECTION OF PROSTATE IN PATIENTS WITH SEVERITY OF BLADDER OUTFLOW OBSTRUCTION

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Abstract:

Objective: *To evaluate the association of detrusor muscular activity with outcome of TURP in patients with severity of bladder outflow obstruction.*

Methods: *This is a hospital based cross sectional study conducted in the Department of Urology of Dhaka Medical College Hospital, Dhaka.Elderly male patients having lower urinary tract symptoms (IPSS=20-35) with no retention (non-catheterized patient), who attended in Dhaka Medical College Hospital, were included in the study. A total of 73 patients meeting the enrollment criteria were included in the study. They were evaluated by history, physical examination including DRE and necessary investigations to identify the potential candidates for TURP. Then the potential participants were counseled for Urodynamic study. All patients underwent TURP by expert surgeon. Three months after TURP, repeat Urodynamic study was done and the results were compared to see the outcome. Afterward the data were plotted for the clarification of detrusor contractility at three levels: normal detrusor contractility (voiding pressure 40-60cm of water), detrusor over activity (voiding pressure >60cm of water) and detrusor under activity (voiding pressure <40 cm of water). According to the provisional ICS nomogram for the analysis of voiding, patients were divided into three classes. In BOO Index($Pdet_{Qmax}$-2_{Qmax}),obstructed(BOOI > 40); equivocal(BOOI=20-40);Unobstructed(BOOId" 20) are taken into consideration. The test statistic used to analyze the data was descriptive statistics and ANOVA test. The level of significance was set at 0.05 and P<O.05 was considered significant.*

Results: *Out of 73 patients 8 didn't attend follow up session and hence excluded keeping 65 for final analysis. The mean age was 66.3 ± 9.7 years (50- 87 years) .Detrusor over activity was present in 13(20%), normal detrusor contractility was observed in 46(70.8%) and weak contractility in 6(9.2%). Peak urinary flow rate was almost similar among patients of different groups. However, voided volume and residual volume were lowest in overactive group and highest in underactive group, while normal group was in between two (p = 0.007 and p = 0.046 respectively). Maximum urinary flow rate and voided urine between patients of moderate and severe bladder outlet obstruction were almost comparable (p =0.120 and p = 0.270 respectively). However, residual urine volume was much higher in the patients of moderate BOO than that in severe BOO (p = 0.001).The patients of OAB experienced a significant improvement in percentage of reduction of residual urine volume compared to normal and underactive bladder (p = 0.002), However, there were no significant difference among the patients with overactive, normal and underactive bladder with respect to peak urinary flow rate and voided urine volume (p = 0.499 and p = 0.847 respectively).*

Conclusion: *TURP is an effective surgical procedure for treatment of BPH, especially for patients with severe degree of BOO with normal or overactive detrusor contraction.*

Key words: *BOO, TURP, BEP*

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Introduction:

Bladder outflow obstruction (BOO) is a term which means infravesical obstruction with poor flow of urine, which is measured by ultrasonocystodynamogram (USCD) and International Prostate Symptom Score (IPSS)[1]. Poor flow of urine (Qmax<15ml/s) may be due to infravesical obstruction or may be due to detrusor underactivity[1]. In 60% of patients with BEP, the detrusor may become overactive due to idiopathic reason. Few patients following prolonged obstruction may develop detrusor underactivity due to decompensationof urinary bladder muscle or cause may be atonic neurogenic bladder. IfIPSS is 20-35 it is called severe bladder outlet obstruction[2]. Normal voiding pressure is 40-60 cm of water. Detrusor overactivity can be diagnosed by observing the high voiding pressure (e"60 cm of water) with low mean cystometric capacity (MCC). If the voiding pressure is low (d"40 cm of water), MCC is very high and urine flow is also low then it is called detrusor underactivity[3].

The normal flow rate from a full bladder is about 20-25 ml/s in men. Obstruction should be suspected in any adult voiding with a full bladder at a rate of less than 15 ml/s. A flow rate less than 10 ml/s is considered definite evidence of obstruction [4].

TURP is the gold standard surgical procedure for BEP[5]. But some patients have poor flow of urine even after good TURP. For normal flow of urine there should not be any infravesical obstruction as well as the evacuation of urine[6]. So if a patient after properly done TURP still has poor flow of urine, his detrusor function should be evaluated[7]. Development of detrusor underactivity is a long continued process, following chronic obstruction the detrusor become decompensated and fails to contract due to deposition of collagen in between muscle fibres.[8] So after TURP, detrusor under and overactivity are determinants of characteristics of disease as well as surgical outcome[9] .

The aim of the present study is to evaluate the association of detrusor muscular activity with outcome of transurethral resection of prostate in patients with severe bladder outlet obstruction (BOO).

Materials and Methods:

This Cross sectional study was conducted in the Department of Urology, Dhaka Medical College Hospital from July 2008 to June 2010.Elderly male patients having lower urinary tract symptoms (IPSS=20-35) with no retention (non-catheterized patient), who attended in Department of Urology, Dhaka Medical College Hospital, were included in the study. All patients were enrolled after considering selection criteria.A total of 73 patients meeting the enrollment criteria were consecutively included in the study.They were evaluated by history, physical examination including DRE and necessary investigations to identify the potential candidates for TURP. Then the potential participants were counseled for Urodynamic study. All patients underwent TURP by expert surgeon and there was no operation related complication that can affect the outcome as is evidenced by follow-up investigations. Three months after TURP, repeat Urodynamic study was done and the results were compared to see the outcome. Theintravesical pressure, the detrusor pressure, and the abdominal pressure were simultaneously monitored during the filling of bladder with saline at the rate of 50 – 60 ml/min. Detrusor pressure was calculated by electronically substracting the abdominal pressure from the intravesical pressure. Filling water cystometry was performed to evaluate detrusor activity. The detrusor pressure during voiding and the maximum flow rate were measured simultaneously. The maximal flow rate, the detrusor pressure at maximal flow rate (PdetQmax), and at bladder neck opening, and the abdominal pressure at maximal flow rate (PabdQmax) were manually read from the tracing of the P-FS. Afterward the data were plotted for the clarification of detrusor contractility at three levels: normal detrusor contractility (voiding pressure 40-60cm of water), detrusor overactivity (>60cm of water) and detrusor underactivity (<40 cm of water). According to the provisional ICS nomogram for the analysis of voiding, patients were divided into three classes .In BOO Index($Pdet_{Qmax}$-2_{Qmax}),obstructed (BOOI > 40); equivocal (BOOI=20-40);

Unobstructed (BOOI < 20) are taken into consideration. All examinations were performed and data interpreted by one investigator.

In addition to P-FS free uroflowmetry was performed both pre and postoperatively more than two times. The best result of uroflowmetry with a voided volume of greater than 150 ml was adopted for the data. Urodynamics tests were preformed using an ANDROMEDA urodynamics system. Statistical analyses were performed using ANOVA test. Data were analyzed using SPSS (Statistical Package for Social Science, version 12). The test statistic used to analyze the data was descriptive statistics and ANOVA test. The level of significance was set at 0.05 and P<O.05 was considered significant.

Results:

A total of 73 male patients having lower urinary tract symptoms with severe bladder outlet obstruction due to benign prostatic hyperplasia were selected. Of them 8 patients did not attend at follow up session 3 months after operation and hence were excluded keeping 65 for final analysis.

Age distribution:

Table-I

Distribution of patient by age (n = 65)

Age (years)	Frequency	Percentage
<60	18	27.7
60 – 70	21	32.3
70 – 80	20	30.8
>80	06	9.2

Table I demonstrates that over one quarter (27.7%) of patients was below 60 years of age, 32.3% between 60 – 70 years, 30.8% between 70 – 80 years and rest 9.2% 80 or > 80 years. The mean age was 66.3 ± 9.7 years (50-87 years).

Table-II

Distribution of patients by detrusor contractility:

Detrusor contractility	Frequency	Percentage
Overactive	13	20.0
Normal	46	70.8
Underactive	06	9.2

According to detrusor contractility the patients were divided into three categories as shown in table II. Detrusor over activity was present in 13(20%) of cases, normal detrusor contractility was observed in 46(70.8)% cases and weak contractility in 6(9.2%) cases.

Table III

Pre-treatment functional assessment based on contractility

Pre treatment functional assessment[#]	Detrusor contractility			P-value
	Overactive (n = 13)	Normal(n = 46)	Underactive(n = 6)	
Peak urinary flow rate (ml/sec)	9.4 ± 4.5	9.5 ± 3.1	8.3 ± 6.5	0.774
Voided urine volume (ml)	348.8 ± 126.8	361.2 ± 140.6	376.5 ± 149.3	0.007
Residual urine volume (ml)	115.1 ± 33.9	124.1 ± 37.9	166.5 ± 81.7	0.046

Peak urinary flow rate was almost similar among patients of overactive, normal and underactive bladder (p = 0.774). However, voided urine volume and residual urine volume were lowest in overactive group and highest in underactive group, while normal group was in between two (p = 0.007 and p = 0.046 respectively (Table III).

Table IV

Pre-treatment functional assessment based on severity of bladder outlet obstruction

Pre treatment functional assessment	Severity of BOO		p-value
	Moderate (n = 11)	Severe(n = 54)	
Peak urinary flow rate (ml/sec)	10.8 ± 4.7	9.1 ± 3.5	0.178
Voided urine volume (ml)	390.2 ± 123.5	373.8 ± 154.9	0.270
Residual urine volume (ml)	165.8 ± 69.9	118.1 ± 31.5	0.001

Maximum urinary flow rate and voided urine between patients of moderate and severe bladder outlet obstruction were almost comparable (p = 0.120 and

p = 0.270 respectively). However, residual urine volume was much higher in the patients of moderate bladder outlet obstruction than that in severe bladder outlet obstruction (p = 0.001) (Table IV).

Table V

Post-treatment functional assessment severity of bladder outlet obstruction

Post treatment functional assessment	Severity of BOO		p-value
	Moderate (n = 11)	Severe(n = 54)	
Peak urinary flow rate (ml/sec)	15.3 ± 5.6	17.5 ± 4.1	0.132
Voided urine volume (ml)	460.3 ± 92.4	429.6 ± 101.5	0.218
Residual urine volume (ml)	51.6 ± 20.2	33.9± 18.3	0.003

Maximum urinary flow rate and voided urine between patients of moderate and severe bladder outlet obstruction were almost comparable (p=0.132 and p = 0.218 respectively). However, residual urine volume was higher in the patients of moderate bladder outlet obstruction than that in severe bladder outlet obstruction (p = 0.003) (Table V).

Table VI. Post treatment functional status based on detrusor contractility.

Percentage of improvement[#]	Contractility			p-value
	Overactive(n = 13)	Normal(n = 46)	Underactive(n = 6)	
Peak urinary flow rate (%)	21.1 ± 4.8	24.4 ± 3.1	20.9 ± 3.4	0.847
Voided urine volume (%)	186.5 ± 64.7	147.8 ± 27.2	247.6 ± 125.6	0.499
Residual urine volume (%)	92.2 ± 7.7	82.4 ± 25.1	51.6 ± 24.1	0.002

Table VI illustrates that patients of overactive bladder experienced a significant improvement in percentage of reduction of residual urine volume compared to normal and underactive bladder (p = 0.002), However, there were no significant difference among the patients with overactive, normal and underactive bladder with respect to peak urinary flow rate and voided urine volume (p = 0.499 and p = 0.847 respectively).

Discussion

The present study has been designed to evaluate the association of detrusor muscular activity with outcome of TURP in patients with severity of bladder outflow obstruction.

In this study the mean age was 66.3 ± 9.7 years and minimum and maximum ages were 50 and 87 years respectively. Most of the cases were between 60 and 70 years (32.3%).

In Royal Liverpool University Hospital and Aintree Hospitals,Javle et al.performed a prospective analysis on 55 patients undergoing TURP with mean age of patients 68.5 ± 3.1 years (55 to 85 years). The mean age of the present study is nearly similar to other studies[10].

In this study preoperative urodynamics revealed detrusor overactivity in 20% cases, normal detrusor contractility in 70.8%, and detrusor underactivity in 9.2% cases.

In the department of Urology, Sapporo Medical University School of Medicine, Sapporo, and Urology service, Furuya Hospital, Kitami, Japan, Tanaka et al performed a prospective study on 92 patients where they observed detrusor overactivity in 48%, normal detrusor contractility in 60% and detrusor underactivity in 40% on preoperative urodynamics[11].

The present study differs from the above study because they found detrusor underactivity in more number of patients (40%) where as normal detrusor contractility in less no of patients in comparison to present study because we have included only non-catheterized patients.

In a study by Homma et al. (1996) on 692 BPH undergone TURP showed similar results[12].

In the present study the peak urinary flow rate was observed to be significantly higher Q max in patients having normal detrusor contractility (p = 0.058), while voided urine volume and residual urine volume(PVR) were significantly less in patients with normal detrusor contractility than that in patients with detrusor underactivity. (P = 0.002 and p < 0.001 respectively).

Thomas et al. demonstrated that there were no long-term symptomatic or urodynamic gains from TURP in men shown to have DUA [13].

In a study by Tanaka et al.showed no significant difference in the success rates between patients with normal detrusor contractility and detrusor underactivity. The present study differs from above study because there is no significant improvement of Qmax in patients with detrusor underactivity[12].

In the present study, voided urine volume and residual urine volume were significantly less in the patients with pretreatment detrusor overactivity than those in patients without it. However, no difference in outcome was observed between the groups in terms of maximum urinary flow rate (p = 0.560).

According to the study by Tanaka et al, if the patients had obvious BOO, the outcome was promising in spite of the existence of DO because approximately 80% of the patients with BOO showed excellent or good efficacy[11]. The present study correlates with the above study.

In another study by Tanaka et al. on 92 men undergone TURP showed the preoperative degree of BOO did not affect the postoperative results $Q_{max}$and PVR and voided urine volume when each of them was analyzed separately, but the overall efficacy rate of TURP, which included simultaneous evaluation of symptoms, QOL and function was increased as the preoperative degree of BOO worsened (P=0.025).

Maximum urinary flow rate and voided urine between patients of moderate and severe bladder outlet obstruction were almost comparable (p=0.132andp = 0.218 respectively). However, residual urine volume was higher in the patients of moderate bladder outlet obstruction than that in severe bladder outlet obstruction (p = 0.003)

The results of the present study is similar with the above-mentioned study.

The goal of BPH treatment is improvement of QOL through the relief of symptoms. In this study, most patients having LUTS showed improvement of IPSS and the QOL index after TURP in spite of urodynamic findings on pressure-flow study except those with DUA and some cases of DO[14].

Conclusion:

Transurethral resection of prostate is an effective surgical procedure for the treatment of benign prostatic hyperplasia, especially for patients with severe degree of BOO with normal or overactive detrusor contraction. However detrusor under activity may not be a contraindication for TURP.

Conflict of Interest : None declare

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Abbreviations:
BOO : Bladder outlet Obstruction
IPSS: International Prostate symptoms score
USCD : Ultrasonocystodynamogram