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Original Research Article

Comparative evaluation of urodynamic profile in cases of cystocele alone or associated with uterovaginal prolapse before and after surgery

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ABSTRACT

Background: Pelvic organ prolapse is a bulge or protrusion of pelvic organs and their associated vaginal segments into or through the vagina. There may be structural and functional changes in the bladder and urethra post-operatively.

Methods: It was a prospective type of cohort study. The study was conducted on 30 patients with cystocele with or without uterovaginal prolapse undergoing surgery for same under Department of Obstetrics and Gynecology of Dr. Ram Manohar Lohia Hospital. Comparison of various pre-operative and post-operative urodynamic parameters were done using appropriate statistical tests.

Results: Post-operatively, statistically significant increase was observed in the bladder volumes at which patients had first and strong desire to void as well as in the maximum cystometric capacity, increase in mean compliance, increase in mean average flow rate, decrease in post-void residual volume. Though, no significant improvement was seen on peak flow rates on uroflowmetry, maximum filling detrusor pressure, mean peak flow rates, maximum voiding detrusor pressure, mean detrusor pressure at peak flow rate.

Conclusions: A pre-operative urodynamic study may be helpful in planning the site-specific repair surgery. It will also help in predicting the post-operative outcome. Urge related symptoms may not be corrected by cystocele repair alone and may require additional treatment.

Keywords: Urodynamic study, Cystocele, Uterovaginal prolapse, Pelvic organ prolapse

INTRODUCTION

Pelvic organ prolapse is a bulge or protrusion of pelvic organs and their associated vaginal segments into or through the vagina. Pelvic organ prolapse may result from weakening of the supportive structures, which may occur by actual tears or break in the supportive ligaments or by neuromuscular dysfunction or both.¹ Cystocele occurs as a result of herniation of urinary bladder along the anterior wall and may be associated with voiding dysfunction such as urinary incontinence, obstruction to outflow, urgency, hesitancy and increased frequency.² Pelvic organ prolapse leading to symptoms such as urinary incontinence, faecal

incontinence, difficulty in voiding and defecation is collectively known as the “disorders of pelvic floor”.³ The normal anatomical configuration of uterus and bladder is distorted affecting the parameters like storing capacity, flow rate, peak flow rate, etc. So, urodynamic study (UDS) helps to assess the functions of the bladder in cases of pelvic organ prolapse with the help of urodynamic study. The standard urodynamic tests conducted are uroflowmetry and multichannel cystometry during filling and voiding phase. Uroflowmetry is the measurement of urine flow rate, measured in ml/sec.⁴ It is a non-invasive procedure. The modern uroflowmeter was invented by Willard M. Drake Jr., in 1946.⁵ Multichannel cystometry

requires placement of catheters into the bladder and rectum and measures pressure in the rectum and bladder during bladder filling or during provocative manoeuvres.⁶ It also assesses the pressure changes during voiding phase, urine flow rates and the residual volume. Post-operatively, structural and functional changes may occur in the bladder and urethra such as improvements in the symptoms of incontinence, increase in flow rates, increased bladder capacity, etc.

METHODS

The study design was prospective “before and after” type of cohort study conducted from October 2011 to December 2012 conducted on 30 patients with cystocele with or without uterovaginal prolapse undergoing surgery for same under the Department of Obstetrics and Gynecology of Dr. Ram Manohar Lohia Hospital.

Inclusion criteria

The inclusion criteria for the study were as follows: all cases of cystocele alone or associated with uterovaginal prolapse, all age groups and any parity.

Exclusion criteria

The exclusion criteria for the study were as follows: urinary tract infections, urinary tract anomaly such as diverticula, bladder stones, gross hydronephrosis, urethral stenosis/stricture, associated medical disorders example: diabetes mellitus, neurological diseases, etc and previous vaginal surgery.

All patients were subjected to a preoperative uroflowmetry and cystometry (CMG) using Laborie machine version 11. Patients were asked to void in uroflowmeter and flow rate was obtained. Pressure changes and other urodynamic parameters were recorded during filling and voiding phase. All the recruited cases underwent surgery and were subjected to post-operative CMG after 3 months. During UDS, following parameters were analysed: uroflowmetry- rate of peak flow of urine; filling or storage detrusor pressure (Pdet(s)); compliance- it is the intrinsic ability of the bladder to change in volume without significant change in detrusor pressure; leakage of urine; leak point pressure: Valsalva leak point pressure (VLPP) and detrusor leak point pressure (DLPP); sensations- first urge to void; strong urge to void; maximum cystometric capacity (MCC)- volume at which one can no longer delay micturition; unstable detrusor contractions; peak detrusor pressure (maximum Pdet(v)); Pdet at max flow rate (Qmax); peak flow rate (Qmax); average flow rate (Qav); and post void residual volume (PVR).

Comparison of pre-operative and post-operative urodynamic parameters have been done using appropriate statistical tests. Statistical analysis was conducted with the Statistical package for the social science system (SPSS)

version SPSS 17.0. Nominal scale variables were described using relative and absolute frequencies, and the chi square test was used to assess differences between the groups. Fisher’s exact test was used if expected frequencies < 5. P < 0.05 was considered statistically significant.

RESULTS

The study was conducted on a set of 30 patients, out of which 19 (63.3%) were below the age of 50 years and 11 (36.6%) were above the age of 50. Only 3 (10%) patients had parity of two or less and 27 (90%) of the patients had parity of three or more. Therefore, high parity can be a factor predisposing to pelvic organ prolapse (Table 1).

Table 1: Demographic characteristics.

Variable	Value	Percentage
Age (in years)		
<40	7	23.3
41- 50	12	40.0
51- 60	4	13.3
>60	7	23.3
Parity		
<3	3	10.0
=3	10	33.3
>3	17	56.6

Table 2: Urinary symptoms.

Symptoms	Pre-operative n (%)	Post-operative n (%)
Stress urinary incontinence	3 (10)	0 (0)
Urge incontinence	5 (16.7)	3 (10)
Hesitancy	13 (43.3)	3 (10)
Feeling of incomplete evacuation	8 (26.7)	1 (3.3)

Table 3: Uroflowmetry.

Variable	Pre-operative mean value (in ml/sec) n=30	Post-operative mean value (in ml/sec) n=30	P value
Peak flow rate	18.40	20.97	0.125

The most common urinary symptom seen in patients with POP was hesitancy, seen in 13 (43.4%) patients. Less frequently seen were feeling of incomplete evacuation (26.7%), urge incontinence (16.7%), stress incontinence (10%). Mixed incontinence was seen in 2 patients pre-operatively. Post-operatively, the component of stress incontinence was relieved, but urge incontinence persisted.

The persistence of hesitancy in 3 patients post-operatively could be due to co-existent neuropathy (Table 2).

The difference in mean peak flow rates on uroflowmetry among the two groups was not found to be statistically significant being 18.4 ml/s pre-operatively and 20.97 post-operatively (Table 3).

Table 4: Bladder sensations during filling phase.

Sensation	Pre-operative mean value (in ml) n=30	Post-operative mean value (in ml) n=30	p value
First desire to void	238	329	0.002
Strong desire to void	346.33	498.17	<0.001
Maximum cystometric capacity	405.33	573	<0.001

Table 5: Detrusor activity during filling phase.

	Pre operative (n=30)	Post operative (n=30)	
Unstable contractions	01	00	
Leakage of urine on CMG	03	00	
	Pre-operative mean value	Post-operative mean value	p value
Maximum filling detrusor pressure (in cm H ₂ O)	8.6	9.1	0.624
Compliance (in ml/cm H ₂ O)	30.35	43.53	0.001

Table 6: Voiding phase results.

	Pre-operative mean value	Post-operative mean value	p value
Average flow rate (Q _{av}) (ml/s)	10.13	12.23	0.011
Peak flow rate (Q _{max}) (ml/s)	20.93	19.43	0.351
Maximum voiding detrusor pressure (in cm H ₂ O)	41.73	44.66	0.247
P _{det} at max flow rate (Q _{max}) (cm H ₂ O)	32.57	33.03	0.860
Post void residual volume(ml)	93.87	41.17	0.001

Post-operatively, significant increase was observed in the bladder volumes at which patients had first and strong desire to void as well as in the MCC. In the pre-operative group, 8 patients had first urge to void at a bladder volume of <150 ml, while none in the post-operative group. Similarly, there was a significant decline in the number of patients who had strong urge to void at bladder volumes <300 ml; being 10 pre-operatively as compared to 2 post-operatively (Table 4).

Out of the 6 patients who had symptomatic incontinence, 3 patients also had demonstrable leakage on pre-operative urodynamic study and none post-operatively. There was leakage associated with cough/valsalva in two patients. Leakage of 22 ml at bladder volume of 90 ml and VLPP 84 cm H₂O in one patient and leakage of 18 ml at bladder volume of 540 ml and VLPP 120 cm H₂O. One another patient leaked 22 ml associated with overactive bladder (OAB) contraction at volume of 112 ml and DLPP 18 cm H₂O. Unstable detrusor contraction prior to surgery was seen in 1 patient and none post-operatively. Maximum filling/storage detrusor pressure <6 cm H₂O was seen in 12 patients pre-operatively and 11 patients post-

operatively. There was no statistically significant change in the maximum filling detrusor pressure; max P_{det}(s) being 8.6 cm H₂O in the pre-operative group and 9.1 cm H₂O in the post-operative group. Compliance >20 ml/cm H₂O was seen in 22 patients pre-operatively as compared to 27 patients post-operatively. A statistically significant increase in the mean compliance was seen post-operatively (Table 5).

During voiding studies, a statistically significant increase in mean average flow rate was seen from 10.13 ml/s in the pre-operative group to 12.23 ml/s in the post-operatively. Though, no statistically significant change was seen in mean peak flow rates; being 20.93 ml/s pre-operatively and 19.43 post-operatively. There was no statistically significant change in the maximum voiding detrusor pressure; maximum P_{det(v)} being 41.73 cm H₂O in the pre-operative group and 44.66 cm H₂O in the post-operative group. Detrusor pressure at peak flow rate was in the range of 20-40 cm H₂O in 18 patients pre-operatively as compared to 23 patients post-operatively. The mean values for detrusor pressure at peak flow rate were more than 25 cm H₂O. However, there was no significant change in the

mean detrusor pressure at peak flow rate in the two groups.

There was a statistically significant decrease in post-void residual volume from 93.87 ml in pre-operative group as compared to 41.17 ml in the post-operative group (Table 6).

DISCUSSION

Pelvic organ prolapse is a health concern affecting millions of women worldwide. It is more common in females of high parity, which was also observed by Panicker et al and Wolter et al.^{7,8} The significant improvement observed in stress incontinence post-operatively can be because of cystocele repair and Kelly's stitch applied during surgery. The persistence of urge incontinence and hesitancy post-operatively could be due to anatomic distortion of lower urinary tract. The somatic and autonomic innervations of the pelvis could be disturbed by reconstructive pelvic surgery, which could lead to persistence of the voiding symptoms.⁷ The results were similar to Wall et al and Chaikin et al.^{8,10}

On uroflowmetry, insignificant increase in the peak flow rate could be because patients had a pre-operative Q_{max} within normal range.

On CMG during filling phase, there was a significant increase in the bladder volumes at which patients had first urge and strong urge to micturate as well as the maximum cystometric capacity post-operatively. The findings are similar to the study of Panicker et al.⁷ This could be related to improved bladder compliance allowing more bladder filling.

Apparent poorer sensory functions in post-operative group as suggested by significant increase in first urge, strong urge and MCC in the post-operative group may be related to improved bladder compliance allowing more bladder filling before reaching a bladder pressure enough to stimulate stretch or pressure receptors in the bladder.

Maximum filling detrusor pressure was found to be within normal range pre-operatively with no significant change post-surgery, this could be because of no gross impairment of functioning of detrusor muscle due to presence of cystocele. The reduced compliance in pre-operative group could be because prolapsed bladder is not able to stretch easily, with significant improvement post-operatively.

During voiding CMG, an improved average flow rate while no change in peak flow rates could be due to improvement in overall micturition time consequent to surgical correction of cystocele. So, the patient has to strain less to evacuate urine collected in the prolapsed portion of the bladder.

No significant change in peak detrusor pressure and detrusor pressure at peak flow rates is in accordance with the study of Panicker et al.⁷ This could be because advanced prolapse gives rise to mild degrees of urethral obstruction. The significant decrease in post-void residual urine volume suggests an improved bladder evacuation post-operatively. The results were similar to Panicker et al.⁷

CONCLUSION

To conclude, the present study shows improvement in urodynamic parameters after surgery. Hence, patients can be counselled regarding the improvement or worsening of symptom pre-operatively and appearance of any de-novo symptom after surgery. If stress incontinence is present before surgery on urodynamic study, an additional urethropexy procedure can be undertaken. The study also shows that urge related symptoms may not be corrected by cystocele repair alone and may require additional treatment such as anti-cholinergic drugs. Thus, a pre-operative urodynamic study may be helpful in planning the site-specific repair surgery. It will also help in predicting the post-operative outcome. Hence, for better post-operative outcome, patients with uterovaginal prolapse should undergo urodynamic study.

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