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The Relevance of Urodynamic Study in Genitourinary Prolapse with Special Reference to Genuine Stress Incontinence

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Abstract: *Pelvic Organ Prolapse (POP) Is A Complex Condition Often Associated With Both Urinary Incontinence And Urinary Retention. The Urodynamic Study Can Detect The Presence Or Absence Of Incontinence In Prolapse Patient & Type Of Surgery Appropriate For Particular Patient For Best Postoperative Outcome.*

Aims & Objectives: *The aim of this study was to find out the voiding abnormalities among the prolapsed patient and to select the optimal surgical procedure in the individual patient based on the urodynamic findings.*

Methods: *Fifty (50) patients attending gynaecology outdoor with any degree of pelvic organ prolapse fulfilling both inclusion and exclusion criteria are included in this study after taking proper written consent. Pessary test to detect occult stress urinary incontinence is performed. Routine investigation & USG were done. Then at urology department URODYNAMIC STUDY was performed. Transobturator tape surgery is used as an incontinence surgery.*

Results: *Age distribution in our study population shows that maximum number (18, 36%) of patients were in the age group 61-70 years while minimum number (04, 08%) was noted in the age group above age group was found as above 70 years.Out of 50 patients only 40% of patient expressing symptom of SUI where as 60% patient had no symptom of SUI. 14% of patients in the study population attending in G&O OPD are in POP-Q stage II, stage III patient accounts for 54% while remaining 32% patients were in stage IV.Majority of patient (74%) of POP were suffering from stress urinary incontinence. Urge incontinence accounted for about 10% while 16% of patients had mixed form of incontinence.Our study showed 40% of patient of POP were suffering from overt stress urinary incontinence. And SUI could be detected in another 14% of prolapse patient after prolapse reduction by Pessary test.After doing Urodynamic study with prolapse reduction all prolapse patient with stress urinary incontinence could be detected. In the present study, incontinence surgery along with vaginal hysterectomy was done in 37 patients diagnosed stress urinary incontinence urodynamically. Only vaginal hysterectomy done in 13 patients diagnosed urge or mixed incontinence urodynamically.*

Keywords: *Pelvic organ prolapse, Urodynamic study, Stress Urinary incontinence, Urge incontenance.*

Abbreviations: POP - Pelvic organ prolapse. UDS – Urodynamic study. UI - Urinary incontinence. LUTS – Lower urinary tract symptoms. QOL – Quality of life. MUCP – Maximal urethral close pressure. SUI – Stress urinary incontinence. OSUI – Occult stress urinary incontinence.UDSI – Urodynamic stress incontinence.UUI – Urge urinary incontinence.MUI – Mixed urinary incontinence.Pves –bladder pressure. Pabd –Intra abdominal pressure. Pdet – Detrusor pressor.DO – Detrusor overactivity. OAB – Over active bladder.BOO – Bladder outlet obstruction.LPP – Leak point pressure. VLPP – Valsalva leak point pressure.ALPP – Abdominal leak point pressure. CLPP – Cough leak point pressure.ISD – Intrinsic sphincter deficiency.PVR – Post void residual urine.Qmax – Maximum urinary flow rate. PFS – Pressure flow study.OPD – Out patient department.VH – Vaginal hysterectomy.TOT – Trans obturator tape.TVT – Trans vaginal tape.

I. Introduction

The term Urodynamic study (UDS) was first coined by DM Davis to denote the study of storage and emptying phase of the lower urinary tract. Urodynamic investigation aims to confirm the presence of self – reported stress incontinence. Occult stress incontinence is defined as urogenital prolapse that prevents urinary leakage , urethral kinking or external urethral compression may be the underlying cause. The life expectancy for women has almost doubled through the 20th century. So quality of life is a major concern. Worldwide, over 200 million people are living with urinary incontinence (UI)[1]. As per International Incontinence society urinary incontinence is "the complaint of any involuntary loss of urine which is a social or hygienic problem and

objectively demonstrable". Women's urinary incontinence should be categorised as stress urinary incontinence (SUI), mixed urinary incontinence and urge (UI) /over active bladder (OAB).

With an aging population pelvic organ prolapse (POP) is a major health problem. In the united states alone, millions of women are affected by POP, the prevalence of which is expected to increase nearly 50% by 2050. Stress urinary incontinence is reported by 40% of patient of genital prolapse. Occult urodynamic stress incontinence is diagnosed in about 50% of the patients with genital prolapse not reporting SUI before surgery[2].Almost 20% of incontinent women abstain from social activities because of urinary incontinence.SUI has been shown to cause deterioration in quality of life, poor care seeking, life style restriction, limitation in social relationships and higher prevalence of psychological morbidity. The need for preoperative urodynamics is often justified by the consideration that pre-existing detrussor overactivity may be either a contraindication for surgery or at least carries a worse prognosis However if there is a firm indication to surgically correction of a prolapse, current literature does not support the decision to cancel surgery if detrussor overactivity is assessed at preoperative urodynamics. In patients with cystocele and urodynamic stress incontinence, one out of three patient remains stress incontinent if only prolapse is corrected whereas if a sling surgery is simultaneously performed stress incontinence is cured in almost all. But combination carries an increased risk of OAB symptoms, should be weighed against each other to determine which treatment strategy is to be preferred.

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II. Material And Methods

From January 2012 to July 2013,fifty (50) patient of different degree of prolapse were taken as study population in our study performed at department of Gynae & Obst. and Dept. of Urology-- of Calcutta National Medical College & Hospital, Kolkata. Detailed demographic data obtained from the patients were noted. Obstetrical history, menopausal history, history of incontinence type, duration were also noted. Psychosocial impact was assessed by 'Pelvic floor distress inventory and other appropriate clinical examinations were thoroughly done. According to age, parity, the study population was sub grouped and their obstetric history (mode of delivery, duration of labour), precipitating causes (chronic cough, constipation etc.) were also taken. According to POP-Q staging, the patient are grouped into stage ll,lll,lV.

Using questionnaires, Pelvic Distress Inventory of following parameters before surgery and at 6 week after surgery were assessed by the symptoms improvement --urinary frequency (nocturnal/diurnal/both),urgency, urine leakage related to coughing ,sneezing, laughing, dysuria, difficulty in voiding, feeling of incomplete evacuation ,pain & discomfort in lower abdomen genital region, prolongation of urinary stream requiring manual repositioning of prolapse, duration of symptoms.

Pessary test was done to the prolapse patient without stress urinary incontinence (SUI) to detect occult SUI clinically before surgery.

At last, Urodynamic study(UDS) was done at Urology dept. of CNMCH to all patients under study population.Three parameters are taken from all patients—1)Filling and voiding cystometry, 2)Pressure flow study & 3)Leak point pressure. The tests are performed both before and after operation. Before doing UDS, urinary tract infection is excluded by urine RE, ME. Three 8 french catheter are used in this study. Among them, two have pressure transducer at their tip. One normal catheter for filling the bladder and another catheter with pressure transducer are introduced in the bladder. Through filling catheter, normal saline is introduced by pump at the rate of 100 ml/min. The pressure catheter will measure the intravesical pressure (Pves). And another catheter with pressure tip is introduced in the rectum. It can measure intra-abdominal (Pabd) pressure. From this two pressure recording, detrussor pressure (Pdet)can be measured. Pdet = Pves – Pabd

Recording of pressure changes are noted. Now the patient is asked for standing, coughing, wheel bouncing for provocation. When the bladder is filled upto 200 ml of normal saline, the abdominal leak point pressure is recorded. It is the minimum pressure at which leakage is observed.

During voiding cystometry, the maximum urine flow rate is measured, when the pt will void on the specially designed container that has pressure sensor. During this detrussor pressure changes can be recorded, by which we can detect any urge component.Residual urine volume is detected by introducing a transurethral catheter after voiding and measurement of the urine amount after catheterization. After six weeks of surgery, again urodynamic study was performed whether any improvement regarding stress incontinence symptom occur or not. Collected data from all these parameters were analysed accordingly.

III. Results & Analysis

Table 1: Age Distribution Of Patients (N = 50)

AGE(in yrs)	NUMBER(n=50)	PERCENTAGE(%)
≤50	16	32
51-60	12	24
61-70	18	36
>70	4	08

Age distribution in our study population shows that maximum number (18, 36%) of patients were in the age group 61-70 years while minimum number(04, 08%) was noted in the age group abo age group was found as above 70 years

Table 2: Distribution Of Patients According To Number Of Vaginal Delivery

PARITY	NUMBER(n=50)	PERCENTAGE
≤2	22	44
3-5	24	48
>5	4	8

The above table reveals that majority of the patients experiencing were third to fifth parity women (48%). 44% were 2nd para or primi-para and 8% were more than fifth parity.

Table3: Distribution Of Patients According To Presence Of Stress Incontinence Symptom

TYPE OF PATIENT	NUMBER(n=50)	PERCENTAGE(%)
POP WITH OUT SUI	30	60
POP WITH SUI	20	40

The above table reveals that 40% of patients with experiencing stress urinary incontinence. And 60% of patient with prolapse have no stress incontinence symptoms.

Table4: Distribution Of Patients According To Pop-Q Staging

POP-Q STAGES	NUMBER(n=50)	PERCENTAGE(%)
STAGE II	**7**	14
STAGE III	27	54
STAGE IV	16	**32**

The above table reveals that 14% of patients attending in G&O OPD are in POP-Q stage II, stage III patient accounts for 54% while remaining 32% patients are in stage IV.

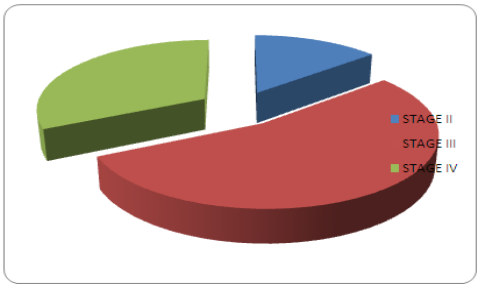

Fig 1: Pie chart shows distribution of patients according to their POP-Q staging.

Table5: Distribution Of Patients According To Type Of Incontinence

TYPE	NUMBER(n=50)	PERCENTAGE(%)
STRESS	**37**	74
URGE	5	10
MIXED	8	**16**

The above table reveals that 74% of patient of POP are suffering from stress urinary incontinence. Urge incontinence accounts for about 10% and16% have mixed form of incontinence.

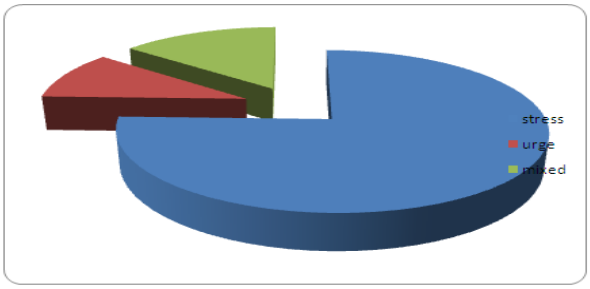

Fig 2: Pie chart shows distribution of patients according to type of incontinence

Table 6: Distribution Of Patients According To Detection Of Sui Before And After Pessary Test

TYPE OF PATIENT	NUMBER(n=50)	PERCENTAGE(%)
Without pessary test	20	40
With pessary test	27	54
With UDS	37	74

The above table reveals that 40% of patient of POP are suffering from overt stress urinary incontinence. And SUI can be detected in another 14% of prolapse patient after prolapse reduction by Pessary test.
After doing Urodynamic study with prolapse reduction all prolapse patient with stress urinary incontinence can be detected.

Table7: Distribution Of Patients According To Pre & Post-Operative Filling Cystrometry.

SENSATION TO VOID	PRE-OPERATIVE MEAN VALUE(ml)	POST-OPERATIVE MEAN VALUE(ml)	Paired t test & p value
FIRST DESIRE	**241±73.6**	**251.8±69.4**	**p=0.019**
NORMAL DESIRE	**395±97.4**	**410±97.5**	**P<0.0001**
CYSTOMETRIC CAPACITY	**504.5±77.1**	**534±56.4**	**p=0.001**

The above table reveals that first & normal sensation of desire are improved significantly on post-operative urodynamic study. The cystometric capacity is also improved in **significant** amount post-operatively.

Table8: Distribution Of Patients According To Pre & Post-Operative Voiding Cystrometry.

VARIABLE	PRE-OPERATIVE MEAN VALUE(ml)	POST-OPERATIVE MEAN VALUE(ml)	Paired t test & p value
Qmax	**14.5±2.9**	**20±4**	**p<0.0001**
Residual vol.	155.8±43	122.4±22.4	P<0.0001

The above table reveals that maximum urine flow rate are improved significantly on post-operative urodynamic study. The residual volume diminished in **significant** amount post-operatively (p,0.0001).

Table 9: Distribution Of Patients According To Pre & Post-Operative Pressure Flow Study

VARIABLE	PRE-OPERATIVE	POST-OPERATIVE	Paired t test & p value
Pdet AT Qmax	36.5±12.7	**32.4±12**	**p<0.0001**

The above table reveals that detrussor pressure (Pdet=Pves-Pabd) at maximum urine flow rate was diminished in **significant** amount post-operatively(P,0.0001)

Table10: Distribution Of Patients According To Pre & Post-Operative Leak Point Pressure(Abdominal Lpp On Cough).

VARIABLE	PRE-OPERATIVE (cm of H_2O)	POST-OPERATIVE (cm of H_2O)	Paired t test & p value
MEAN LEAK-POINT PRESSURE	**77.4±18.3**	**120.4±20.9**	**P<0.0001**

The above table reveals that mean leak point pressure increased in **significant** amount post-operatively(p,0.0001).

Table11: Distribution Of Patients According To Treatment Modality.

T/t TYPE	NUMBER(n)	PERCENTAGE(%)
VH	**13**	**26**
VH+TOT	**37**	**74**

The above table reveals that incontinence surgery along with vaginal hysterectomy is done in 37 patients diagnosed stress urinary incontinence urodynamically. Only vaginal hysterectomy done in 13 patients diagnosed urge or mixed incontinence urodynamically.

IV. Discussion

Worldwide over 200 million of people are living with urinary incontinence (UI).[1]Urodynamic investigations have been advocated to be incorporated in the standard diagnostic workup of patients undergoing surgical correction of genital prolapse. The life time risk of a woman to have surgery for prolapse or urinary incontinence is about 11%, with upto one third of procedures representing recurrent operations[3].Taking into account vaginal deliveries (including forceps delivery), there was a significant relationship of increasing prevalence of incontinence with a higher number of deliveries.

This association was seen in other study. In their study they analyzed the relationship between the increasing numbers of live births and UI incidence. There was a positive correlation between the numbers of live births and increased prevalence of incontinence in each patients. The mean number of deliveries in women with each type of UI was found to be more than four (range 1–13), It was found that more than 50% of the women who had four or more deliveries were incontinent. In another, they also concluded that women who had more than two deliveries had a higher risk of UI.

In addition to exploring the association between conventional risk factors and UI, we also evaluated the role of pelvic organ prolapse in the development of UI. Because of the close proximity of the anatomical structures within the pelvis, UI and pelvic organ prolapse commonly coexist. It was reported that SUI and pelvic prolapse may occur simultaneously as a result of weakness of the supporting tissues at the urethrovesical junction.[5] A study by Swift et al[6] of 1004 women aged 18-83 years presenting for routine gynecological examination revealed the distribution of Pelvic Organ Prolapse by POP quantification staging to be as follows: Stage 0 =24%, Stage I = 38%, Stage II = 35% and Stage III- 3%.

One study shows that the most common type is stress urinary incontinence, with one study reporting 78% of women presenting with the symptom of stress urinary incontinence (49% with pure stress urinary incontinence and 29% with both stress and urge urinary incontinence).[7] According to a study using the National Hospital Discharge Survey and National Census data, approximately 129,778 women underwent surgery for stress urinary incontinence in the United States in 2003 (a rate of 12 per 10,000 women).[8] Approximately 30% of women with stress urinary incontinence in the United States opt for surgical treatment.[9]

In others studies the coexistence of SUI and pelvic organ prolapse in women was reported as high as 62.6% and the presence of UUI was reported to be affected by increased anterior vaginal wall defects.[10-12] Fianu et al.,[13] reported that 15–80% of patients with pelvic organ prolapse had SUI.

In a prospective study in 60 patients with genital prolapse, detrusor overactivity was present in seven women (20%)with grade 1 or 2 cystocele versus 13 (52%) with grade 3 or 4 cystocele.[10]
Yuan et al.[14] reported that POP and SUI shared common patho-physiological etiologies and often coexisted with one another.

V. Conclusion

- 74% of pelvic organ prolapse are suffering from stress urinary incontinence.
- 10% of pelvic organ prolapse patient are suffering from urge incontinence and 16% are suffering from mixed urinary incontinence.
- After prolapse reduction, Urodynamic study can detect stress urinary incontinence in all prolapse patient.
- Urodynamic study in prolapse patient can detect occult stress incontinence.
- Depending upon urodynamic finding , we can plan surgical procedures.
- Quantitative improvement after surgery can be evaluated after surgery.

So, we can conclude that Urodynamic study is valuable in surgical correction of pelvic organ prolapse.

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