



## Elderly Men with Luts: The Role of Urodynamics

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### ABSTRACT

**Aim:** to emphasize the role of urodynamic studies in the objective evaluation of elderly men with LUTS. Thirty elderly male patients with LUTS whose ages ranged between 50 – 90 years were studied in Al-Yarmouk Teaching Hospital/Baghdad/Iraq during the period from March 7th 2015 to September 15th 2015. All patients were analyzed by complete medical history & a thorough physical examination as well as a complete urologic examination. All patients underwent urodynamic studies. It was found that IPSS scores were independent to the age of patient but they were increased significantly as the degree of obstruction increased. There was significant difference of Q max which was inversely related to the degree of obstruction while post voiding residual volume was directly related to the age and degree of obstruction. Bladder contractile function also significantly dropped as the patients age increased while the BOOI increased. Involuntary detrusor contractions were directly related to the degree of obstruction significantly, but the bladder capacities showed no significant difference among different groups. It was concluded that urodynamic studies are most useful for translating LUTS into objective basement for better management of patients with these symptoms

### KEYWORDS

LUTS, BOO, urodynamic studies.

### Introduction:

Lower urinary tract symptoms (LUTS) are common in men and women, especially in aged populations. They negatively affect health-related quality of life of afflicted individuals and are associated with high health care costs<sup>[1]</sup>.

The etiology of male LUTS is multifactorial including benign prostatic enlargement (BPE), infective, inflammatory and neoplastic conditions of the bladder, prostate and urethra. One of the most common causes of these in older men is benign prostatic hyperplasia (BPH) which induces bladder outlet obstruction (BOO). The latter interferes with urinary flow and may lead to acute urinary retention, urinary infection, bladder stones, hydronephrosis, or renal failure. BOO is also associated with bladder dysfunction, including detrusor overactivity, detrusor underactivity, and bladder hypersensitivity<sup>[2]</sup>.

Bladder dysfunction may occur independently from the prostate, as women develop similar changes in bladder function. Thus, male LUTS may be prostate associated and non-prostate associated. In practice, it is often difficult to distinguish these two phenotypes<sup>[3]</sup>.

LUTS increase with age and associated with an increased risk of falls<sup>[4]</sup>. Other important changes observed with age include an increased prevalence of involuntary detrusor contractions and increased post void residual (PVR) volume<sup>[5, 6]</sup>.

Clinical evaluation is an important aspect in the assessment of older patients with LUTS. The evaluation has to characterize the voiding symptoms as well as the patient's general medical condition and mental status<sup>[6]</sup>.

The international prostate symptom score (IPSS) is the most commonly used tool to evaluate LUTS suggestive of BPH<sup>[7]</sup>. However urodynamics (UDS) are the gold standard objective investigation in evaluating LUTS in general. They involve the assessment of the function and dysfunction of the lower urinary tract by appropriate methods<sup>[8]</sup>.

The aim of study was to evaluate elderly male patients with LUTS and determine the potential underlying abnormality that cause LUTS by using urodynamic studies.

### Patients and methods:

This prospective descriptive study was conducted at urologic outpatient clinic in Al-Yarmouk Teaching Hospital/Baghdad/Iraq during the period from January 7<sup>th</sup> 2015 to September 15<sup>th</sup> 2015, the targets of this study were elderly male patients with age range 50 – 90 years who were complaining of LUTS, 30 patients were sequentially included in this study, those patients were evaluated clinically via medical history and physical examination including DRE, neurological examination, quantification of LUTS and quality of life of patients via direct interview by using IPSS scoring system. Laboratory evaluation was carried out by doing urinalysis, urine culture, blood urea, serum creatinine, blood sugar, CBC and serum PSA level. Imaging study by doing abdominal ultrasound were performed on all patients. Trans rectal ultrasound (TRUS), intravenous urography (IVU) and CT scan of abdomen and pelvis were done as indicated. All patients underwent UDS by doing uroflowmetry, estimation of PVR, filling cystometry and pressure flow study. Exclusion criteria included patients with UTI and patients with LUTS due to neurological diseases.

All patients had received a prophylactic dose of antibiotic before and after the testing. In all patients the UDS were conducted in the same manner with the same equipments which was Mediwatch urodynamic device (UK).

Uroflowmetry was done by asking the patient to come with a comfortably filled bladder and void in urinal of flowmetry device (spinning disk systems) prior to cystometry and we recorded the parameters of flow rate, voided volume, Q max, voiding time and graph.

Filling cystometry studies were performed with the patients lying supine, bladder pressure was recorded with a 9F double lumen catheter and rectal pressure was measured with a 14F catheter connected to external pressure transducers. The bladder was filled with normal saline at room temperature, at a constant infusion rate of 50 ml/min. the intraabdominal pressure, intravesical pressure and detrusor pressure were recorded throughout the voiding cycle. During test each patient was asked to cough or strain to evaluate detrusor instability. The first desire to void was recorded as soon as it perceived by the patient. The test then continued until the patient reached

full bladder capacity when he had strong desire to void, at that time the infusion stopped and the patient was asked to void and the voiding pressures were recorded. Pressure flow study was done while the patient in erect position. Then the bladder was emptied to determine the PVR volume. The patients were analyzed for first desire volume, maximum detrusor pressure, maximum cystometric capacity, bladder complianc, voided volume, voiding time, voiding pressure, Q max and PVR.

In all patients the diagnosis of BOO was made and the degree of obstruction was identified by using their bladder outlet obstruction index (BOOI) as indicated by international continence society (ICS) equation (BOOI = P det, Q max - 2 Q max). According to ICS nomogram men were classified into 3 groups, unobstructed (BOOI < 20), equivocal (BOOI = 20 - 40) and obstructed (BOOI > 40).

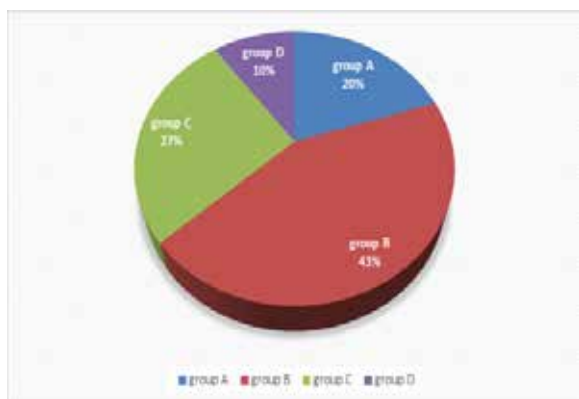
Also our patients were classified into 4 groups depending on their bladder contractile function by using bladder contractile index (BCI).

BCI = P det Q max + 5 Q max. These 4 groups included very weak (BCI < 50), weak (BCI =50-100), normal (BCI = 100-150) and strong group (BCI > 150).

Statistical analysis of this prospective study had been done with the aid of using statistical package of social science program (SPSS version 22) to get the means and standard deviations of different variables. ANOVA test was used for evaluation of significance of differences among the variables, P. value ≤0.05 was considered significant, P. value > 0.05 was considered non-significant.

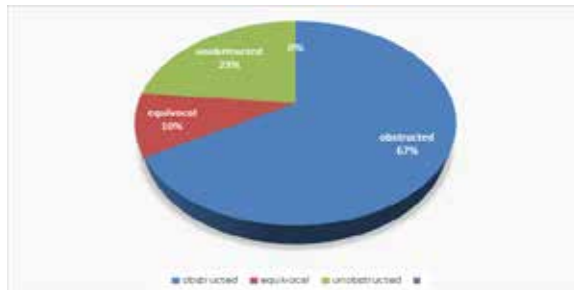
**Results:**

Thirty older male patients with LUTS were included in this study and distributed into 4 groups, A, B, C and D according to their ages. Group A included 6 patients (20%) whom ages ranged 50 - 59 years, group B included 13 patients (43%) their ages ranged 60 - 69 years, group C composed of 8 patients (27%) with ages ranged 70 - 79 years and group D included only 3 patients (10%), their ages ranged 80 - 89 years as shown in(Fig. 1).

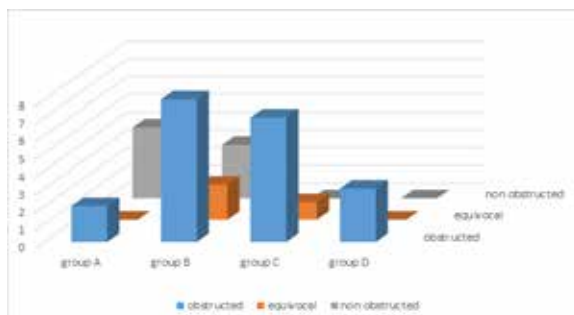


**Fig.1: The distribution of male patients with LUTS according to their ages.**

In this study the patients were distributed also according to the degree of BOO into 3 groups, the obstructed group which constituted 20 patients (66.66%), the equivocal group which composed of 3 patients only (10%) and unobstructed group included 7 patients (23.33%) as shown in (fig.2) P. value ≤0.05. while (fig. 3) showed classification of patients according to degree of BOO into obstructed, equivocal and unobstructed patients within each age group, P. value ≤ 0.01.

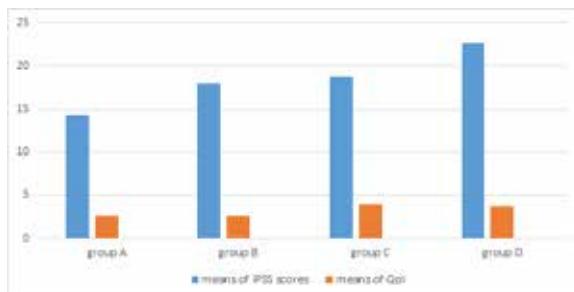


**Fig. 2: the distribution of patients according to the degree of BOO P. value ≤ 0.05.**

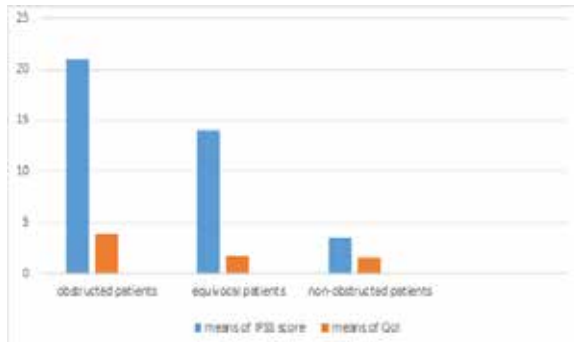


**Fig. 3: the distribution of patients according to the degree of BOO among age groups P. value ≤0.01**

The present study revealed the tendency of getting higher means of IPSS and quality of life in group D than group C which in turn had higher mean than group B and the least mean was in group A. (fig. 4) P. value 0.087, but the means of IPSS and QOL were higher in the obstructed group then in the equivocal group and the least was in the unobstructed group of patients as shown in (fig 5) P. value ≤0.01.

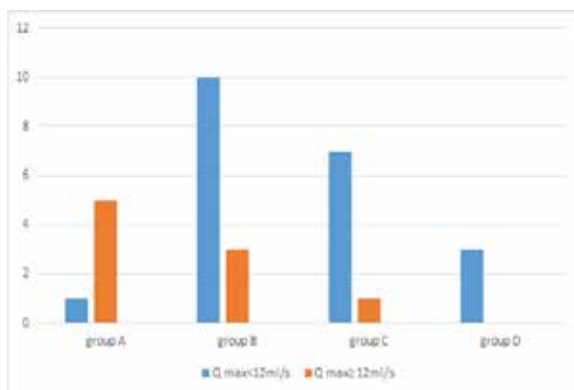


**Fig. 4: distribution of means of IPSS and Qol among age groups patients with LUTS P. value 0.087.**



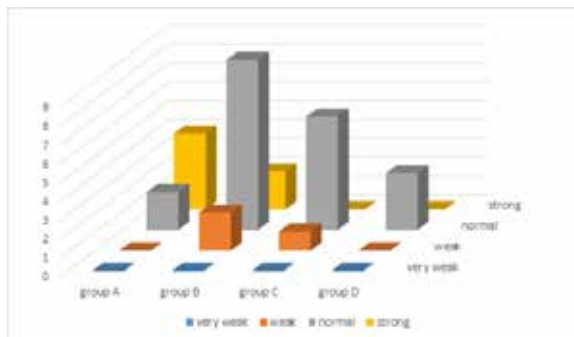
**Fig. 5: distribution of means of IPSS and Qol among obstructed, equivocal and non-obstructed patients with LUTS P. value ≤0.01.**

Via the uroflowmetry study Q max values of patients in this study was classified into ( Q max < 12 ml/s). which comprised all patients in group D and most patients in groups B and C, while patients with Q max ≥ 12ml/s. formed most of group A and few of groups B and C (fig. 6) P. value ≤0.05



**Fig. 6: classification of patients according to value of Q max among age groups P. value ≤0.05**

The present study had analyzed detrusor contractile function as shown in (fig. 7), revealing statistically significant difference (P.values≤0.05) of bladder contractile function among age groups, no patient in this study had very weak bladder but few of them in groups B and C had weak bladder, most of patients in all age groups had normal contractile function, strong contractile function was seen mostly in patients of group A and few in group B.



**Fig. 7: The distribution of patients according to BCI among age groups P. value ≤0.05**

The current study showed significant difference (Pvalue ≤0.05) in means of Q max and voiding time and high significant difference (P. value ≤0.01) in means of flow rate among age groups and poor association between severity of LUTS and parameters of flowmetry especially Q max as shown in table 1.

**Table 1; the distribution of the means of IPSS, Q max, flow rate and voiding time among age groups of male patients with LUTS.**

Age groups	IPSS score	Q max ml/ sec.	Flow rate ml/sec.	Voiding time in sec.
Group A	17.16±8.68	17.31±5.33	9.13±3.29	44.54±20.34
Group B	17.92±5.43	11.85±4.31	6.4±2.81	58.48±26.53
Group C	18.75±5.23	8.28±3.19	4.08±2.1	87.8±58.93
Group D	22.66±4.16	9.33±2.4	5.1±1.51	86.7±35.48
P. value	0.087	≤0.05	≤0.01	≤0.05

This study also showed highly significant difference (P. value ≤ 0.01) in means of PVR of the different age groups with poor association between the severity of LUTS and PVR as shown in table 2.

**Table 2; the distribution of the means of IPSS and PVR among age groups of male patients with LUTS**

Age groups	IPSS scores	PVR
Group A	17.16±8.68	52.5±72.37
Group B	17.92±5.43	69.92±55.83
Group C	18.75±5.23	117.25±60.23
Group D	22.66±4.16	126±31.43
P. value	0.087	≤0.01

Many parameters were compared in this study among patients with variable degree of BOO, the obstructed, equivocal and unobstructed groups, there was highly significant difference in the PVR, Qmax, BOOI, and detrusor instability P. value ≤ 0.01 but no significant difference was found in BCI and bladder capacities as shown in table 3.

**Table 3; the distribution of the means of PVR, Q max, BCI, bladder capacity and detrusor instability among obstructed, equivocal and non-obstructed groups of patients with LUTS**

Parameters	Obstructed patients	Equivocal patients	Non-obstructed patients	P. value
PVR in ml	109.5±55.2	45 ±19.51	16.42 ±19.3	≤0.01
Q max ml/sec	8.92±2.79	13.33±2.9	19.11±2.42	≤0.01
BOOI	57.5±10.23	27±1.73	13.85±4.09	≤0.01
BCI	119.38±21.22	120.33±21.08	146.22±18.01	0.086
Bladder capacity ml	430.05±95.1	363.33±40.41	387.14±21.38	0.213
Detrusor instability	60%	33.33%	42.85%	≤0.01

**Discussion:**

Our study revealed that elderly male patients with LUTS who sustained bladder outlet obstruction (obstructed group) formed about two thirds 66.66% of the studied patients compared with the equivocal group 10% and unobstructed group 23.33%. Higher percentage of obstructed patients was in the older age groups D and C compared to groups A and B. This result agreed with that of Eckhardt et al<sup>[9]</sup>, Gomes C.M. et al<sup>[6]</sup> and Aganovic et al<sup>[10]</sup> had found age to be significantly associated with incidence of obstruction however Diokno and colleagues<sup>[11]</sup> had found only 47% of patients 65±10 years with LUTS had obstruction,

The current study showed a tendency of the higher age groups to get higher means of IPSS scores and QOL than the lower age groups, i.e. group D had the highest means while group A had the lowest this result was consistent with Aganovic D<sup>[10]</sup> and Barry MJ<sup>[12]</sup>. This study also revealed significantly higher IPSS scores and QOL means in the obstructed group of patients in comparison to equivocal and unobstructed groups this result might be due to higher prevalence of DO and overactive bladder in obstructed patients, a finding which agreed with Netto NRet al<sup>[13]</sup> and Robertson et al<sup>[14]</sup> who found that a greater reduction in IPSS score in obstructed patients after surgical release of obstruction than unobstructed patients but it disagreed with other studies (Sirls LT<sup>[15]</sup> and Barry MJ<sup>[12]</sup>) which showed that the IPSS is not correlated with urodynamic obstruction

Our study revealed that Q max means of patients among different age groups tend to be lower (< 12 ml/s) in the group D patients and most patients in groups C and B, while in group A most of patients had Q max ≥12 ml/s ,these results might be due to aging process, BOO, detrusor underactivity or combination of these factors, the older the patients had the lower Q max. The degree of BOO and detrusor underactivity were higher in older age groups, this result agreed with that obtained by studies reported by Rodrigues et al<sup>[16]</sup>, Oelke

et al<sup>[17]</sup> and Zhang et al<sup>[18]</sup>. They found that Q max decreased with age and concluded that the findings indicated a progressive decrease in detrusor contractility rather than BOO.

The present study revealed that most of the patients in groups B, C and D had normal bladder contractile function while most of patients in group A had strong bladder contractile function i.e. bladder contractile function as estimated by BCI was inversely related with age which might be as part of aging process and a squally of BOO which is more prevalent in aged patients. These findings were consistent with Zhang et al<sup>[18]</sup> who had suggested that in older men with suspected BPO, residual urine volume is more closely related to a weak detrusor contraction than to urethral obstruction, and Thomas et al<sup>[19]</sup> who found that among a large series of 2,066 neurologically intact older men with LUTS, 224 showed detrusor underactivity (defined as a Pdet at Qmax <40 cm H<sub>2</sub>O, with Qmax <15 mL/s). In a series of 196 patients with and without prostatic obstruction, treated or otherwise, they found no evidence to suggest that detrusor contractility declined in long-term obstruction, or that relieving the obstruction surgically improves contractility (Thomas AW<sup>[20]</sup> and Al-Hayek S<sup>[21]</sup>).

Our study revealed a significant decline of Q max and flow rate with advancement in age but the voiding time had related directly with the age of patients, and the IPSS scores had poor relation to the parameters of uroflowmetry. These could be due to aging process and the BOO which was more prevalent in older age group, and detrusor underactivity in older patients. These results are in accordance with previous studies which have shown lack of association of symptom scores with urodynamic findings (Fusco F<sup>[22]</sup>, De la Rosette JJ<sup>[23]</sup>) and IPSS also correlates poorly with free urinary flow rate (Barry MJ<sup>[13]</sup>). Rodrigues et al<sup>[16]</sup>, Oelke et al<sup>[17]</sup> & Zhang et al<sup>[18]</sup> found that Q max and flow rate was decreased with age in reverse to voiding time which increased.

This study showed significant increment in PVR urine volume in direct relation to the ages of patients and this result might be due to BOO and detrusor underactivity which were prevalent in aged patients, and it had weak association with the severity of LUTS as assessed by IPSS score. This finding agreed with Schmidbauer J<sup>[5]</sup>, Gomes, C.M<sup>[6]</sup> and Light JK<sup>[24]</sup> who had found that elevated PVR is not generally well understood, and its interaction with BOO and detrusor underactivity is complex. Post-void residual may be elevated due to detrusor underactivity, BOO, or a combination. For example, while men with LUTS and BPO may have an elevated PVR, an elevated PVR in isolation does not necessarily predict the presence of obstruction.

The current study revealed comparison of different urodynamic parameters (Q max, BOO, BCI, bladder capacity, PVR, detrusor instability), among patients within obstructed, equivocal and unobstructed groups. There was significant difference in the level of PVR, the highest value was in the obstructed group and the lowest in the unobstructed group, this result might explain the role of bladder outlet obstruction in the increment of PVR, and it is in accordance with Crawford et al<sup>[25]</sup> & Light JK<sup>[24]</sup>. Our study revealed that there was significant decrement in the means of Q max of unobstructed to equivocal and lastly the obstructed groups, this might be due to BOO or detrusor underactivity or combination of both, so Q max alone couldn't differentiate between these conditions. This result was in agreement with Thomas et al<sup>[19]</sup>, Zhang et al<sup>[18]</sup>, Aganovic et al<sup>[10]</sup> & Oelke et al<sup>[17]</sup>.

Our study revealed no significant difference in cystometric capacity among unobstructed, equivocal and obstructed groups, this result agreed with Victor W.<sup>[26]</sup> but disagreed with De la Rosette JJ<sup>[23]</sup> who had found that cystometric capacity significantly reduced in obstructed group in comparison to unobstructed group.

## Conclusions

- LUTS are common, multifactorial, highly prevalent among older men & have a negative impact on health related quality of life.
- Urodynamic studies especially the pressure flow study are most useful for translating these subjective symptoms to

objective basement for better management of patients with LUTS and to determine the underlying abnormalities responsible for these symptoms such as BOO, detrusor underactivity and detrusor instability.

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