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Patterns of urodynamics in elderly patients

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ABSTRACT

Purpose: To assess whether clinical diagnoses of lower urinary tract symptoms in elderly patients associates with urodynamic diagnosis.
Materials and methods: A retrospective analysis of an urodynamic database between the years 2000 and 2011 was conducted to assess whether clinical diagnoses correlate with urodynamic findings in elderly population. Patients were divided into 4 groups according to clinical diagnoses; overactive bladder, stress urinary incontinence, bladder outlet obstruction and underactive bladder symptoms.
Results: Nine hundred and sixty-six patients were at or above the age of 75 years. The most common clinical presentation was overactive bladder. The highest association between clinical and urodynamic diagnosis was at the overactive bladder group (85%) in men and stress urinary incontinence group (74%) in women.
Conclusion: Patients with OAB symptoms will most likely have a diagnosis of detrusor overactivity on urodynamic studies. Urodynamic studies will unlikely change the management of frail elderly patients thus should be only offered to selected patients above the age of 75 years.

1. Introduction

Lower urinary tract dysfunction is a major cause of morbidity and decreased the quality of life in elderly men and women. A number of studies have shown that the prevalence and bother of Lower Urinary Tract Symptoms (LUTS) increases with age [1–3]. With the increase in elderly population; this is becoming a more and more bothersome issue.

In order to have a correct evaluation of the elderly patient with Lower Urinary Tract Symptoms (LUTS), a thorough understanding of the pathophysiologic changes that occur with aging is needed. Being multifactorial in origin, LUTS demands a comprehensive assessment of the lower urinary tract organs, associated medical conditions, medications used and functional impairments [4].

As the individual ages, the urinary tract changes even in the absence of pathological diseases. Other effects of aging on the lower urinary system include; a decline in detrusor function and bladder capacity thus affecting the ability to postpone voiding in both males and females, as well as, decreasing urinary flow rate with age. The rate of infravesical obstruction in aging men is said to be 50% due to Benign Prostatic Hyperplasia (BPH) [5,6]. Other manifestations of ageing of the lower urinary tract include; a higher prevalence of involuntary detrusor contractions and increased Post Void Residual (PVR) volume due to underactive bladder during voiding. Urinary output during the nighttime is also increased even in the absence of congestive heart failure, Benign Prostatic Obstruction (BPO), or other medical conditions [7].

Frail elderly patients may require special consideration. Although, there is no agreed definition of "frailty", this term is commonly used to describe a spectrum of conditions in older people; including general debility and cognitive impairment [8]. Most of them will not undergo surgical or invasive treatments for their incontinence. In this setting, the Minimum Data Set and Resident Assessment Protocol [9], when administered by trained staff, provided a stepwise and non-urodynamic diagnosis of the type of incontinence without serious misclassification [10]. However, these measures are mainly used in the nursing home setting. Adoption of these measures at other settings such as community-dwelling older adults or those living at assisted living environment could lead to better outcomes.

This retrospective study evaluates whether the clinical diagnoses correlates with the urodynamic diagnosis.

2. Material and methods

A retrospective analysis of the urodynamic database of a tertiary teaching hospital revealed that 11,713 patients had urodynamic studies between the years 2000 and 2011. The database was reviewed by an independent researcher. Ethical

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approval to conduct this study was granted by the local ethics committee.

Clinical classification: patients were classified into four groups depending on the clinical diagnosis; Overactive Bladder syndrome (OAB), Stress Urinary Incontinence (SUI), Detrusor Underactivity during voiding (DUA) and obstructed bladder outlet.

Urodynamic technique: The Pressure/Flow Studies (PFS) was performed using a standardized fluid filled urodynamic technique with different urodynamic units (Aquarius Laborie-USA, Dantec Dynamics-UK,). An 8Fr urethral catheter was used to fill the bladder and a 16G catheter was used to record the bladder pressure. A 4.5Fr urodynamic balloon catheter was inserted into the rectum for recording abdominal pressure. The pressure transducers, zeroed to atmosphere, were leveled to the upper edge of the symphysis pubis and connected to the pressure lines according to the International Continence Society good urodynamic practice guidelines [11].

During filling cystometry (CMG), the bladder was filled with saline or contrast medium (Urograffin) depending on whether standard urodynamics was performed or video urodynamics, respectively. The filling rate was 50 mL/min at room temperature. Male patients were filled standing and voided in the standing position as well, while female patients were filled sitting and voided in the sitting position. Men who had balance or gait issues or couldn't stand for the period of the test were allowed to perform the test sitting down. Assessment of detrusor overactivity waves as well as urodynamic stress urinary incontinence was carried out during the filling phase through recording the vesical and abdominal pressures. Urodynamic Stress urinary Incontinence (USI) is observed during filling CMG when there is loss of urine that is accompanied by increase in abdominal pressure without any change in detrusor pressure. On the other hand, Detrusor Overacivity (DO) was defined as an involuntary detrusor contraction during the filling CMG [12]. During micturition, urine flow, bladder and abdominal pressures were recorded. Flow was measured using a weight transducer flowmeter.

The Bladder Outlet Obstruction Index (BOOI) was used to define the obstruction status for male patients. BOOI was calculated using the following equation: BOOI = pdetQmax $-$ 2 $\times$ Qmax (pdetQmax: Detrusor pressure at maximum flow rate) [13]. The Bladder Contractility Index (BCI) was used to define the underactive bladder status for patients. BCI was calculated using the following equation: BCI = pdetQmax + 5 $\times$ Qmax [13].

Urodynamic classification: men were classified as obstructed group according to their BOOI: BOOI $>$ 40: obstructed using the International Continence Society (ICS) pressure-flow nomogram. On the other hand, the bladder contractility nomogram using the BCI was used to classify with DUA (BCI = $<$ 100). Women were defined as obstructed if they had a Qmax $<$12 mL/s and pdetQmax $>$25 cmH_2O [14]. The point chosen to define women as having urodynamic detrusor underactivity was Qmax $<$ 12 mL/s and pdetQmax $<$ 10 cmH_2O [15]. Men were defined as having detrusor underactivity if the BCI is $<$ 100.

According to the urodynamic findings, patients were divided into four groups as well; Detrusor Overactivity (DO) and/or Urodynamic Stress Incontinence (USI) during filling, and Bladder Outlet Obstruction (BOO) and/or Detrusor Underactivity (DUA) during voiding.

3. Results

Data analysis of the urodynamic database revealed that 966 patients above or equal to the age 75 years underwent urodynamic studies for lower urinary tract dysfunction. Of these patients, 412 (42%) were males; 554 (56%) were females. The mean age was 79 + 7.3 years among these patients with a range of 75–90 years and median of 80 years. The most common presenting clinical diagnosis was OAB (61.5%).

The majority of studied cases showed association between clinical diagnosis and urodynamic findings as shown in (Table 1). Descriptive analysis of clinical and urodynamic diagnoses in both men and women is also shown in (Table 1).

4. Discussion

Elderly patients should not be considered differently from younger subjects simply because of their chronological age [16]. However, frail elderly patients should be considered very carefully to avoid complications of invasive diagnostic and intervention techniques. Elderly patients tend to have changes in the function of the lower urinary tract as they age. Urodynamic findings in elderly patients tend to demonstrate DO, even in individuals that do not spontaneously report symptoms or bother [17,18]. There may also be a reduction in bladder capacity, urinary flow rate and detrusor contractility. Because of these age dependent changes, the utility of urodynamic investigations has to be judged against this specific background in elderly patients where diagnosis and treatment of specific conditions are strongly dependent on and related to frailty by itself [7].

In our study, the most common presenting complaint was OAB (61.5%), similar data are available in the literature [19]. This suggests that there is a good association between clinical diagnosis and urodynamic findings in elderly patients thus avoiding unnecessary invasive investigations. However, bladder outlet obstruction (BOO) appeared to correlate relatively poorly with symptoms in both men (56%) and women (28%). This was similar to other studies that demonstrated a lack of correlation of symptom scores and urodynamic findings of BOO [20]. This could be because of the non-specific LUTS that BOO tend to present with.

However, a review of literature by Leijsen et al. found a poor level of agreement between clinical and urodynamic diagnosis in classifying the type of urinary incontinence in women of different ages [21].

Table 1
Comparison of clinical and urodynamic analysis of men and women.

Clinical Diagnosis	Urodynamic Diagnosis							
	DO		BOO		USI		DUA	
	Men	Women	Men	Women	Men	Women	Men	Women
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
OAB (*n*: m = 227, f = 367)	192 (85)	244 (67)	77 (34)	0 (0)	1 (0.5)	42 (11)	32 (14)	7 (2)
Obstructive (*n*: m = 75, f = 7)	60 (80)	3 (43)	42 (56)	2 (28)	0 (0)	3 (43)	13 (17)	0 (0)
SUI (*n*: m = 29, f = 282)	17 (58)	151 (53)	1 (3.5)	1 (0.4)	18 (62)	209 (74)	3 (10)	11 (4)
DUA (*n*: m = 14, f = 1)	7 (50)	0 (0)	1 (7)	0 (0)	0 (0)	0 (0)	10 (71)	1 (100)

OAB: Overactive Bladder; SUI: Stress Urinary Incontinence; BOO: Bladder Outlet Obstruction; DUA: Detrusor Under Activity; DO: Detrusor Overactivity; m: male; f: female; Data in bold highlights the patients where clinical and urodynamic diagnoses were the same.

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