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Prevalence of Underactive Bladder with Overactive Bladder with or without Evidence of Detrusor Overactivity in Overactive Bladder Patients

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Hypothesis / aims of study

In1987, Resnick et al. first introduced the concept of patients experiencing both voiding and filling phase symptoms simultaneously. The International Consultation on Incontinence Research Society later defined this condition as COUB (Coexistent Overactive-Underactive Bladder) in the same patient.

The syndrome of coexistence of overactive and underactive bladder represents a significant clinical and epidemiological challenge in the field of urology (1). Overactive bladder (OAB) is widespread and therefore represents a serious public health issue. Research shows that the overall prevalence of OAB syndrome is 31.70%, with a notably higher incidence in women (39.25%) compared to men (24.15%). Moreover, evidence from another study found that 60% of institutionalized elderly individuals suffer from bladder overactivity (2).

Underactive bladder, although slightly less common, is also predominantly found in geriatric populations and in those with comorbidities such as diabetes mellitus and neurological diseases.

However, the coexistence of this pathology with a hypocontractile detrusor is not unusual. In fact, recent studies suggest that the coexistence of overactive bladder and underactive bladder is frequent, especially in elderly populations, it may be the main cause of urinary incontinence in older adults, although the exact prevalence of this condition is not yet clearly defined due to heterogeneity in diagnostic criteria and variability in research methods (3).

OBJECTIVES:
The main objective of this study is to determine the prevalence of the coexistence of overactive and underactive bladder syndrome in a private hospital in Lima, Peru, during January to December 2022. In addition, it seeks to identify the risk factors and comorbidities associated with this condition.

This approach will allow a better understanding of the clinical profiles of affected patients and will help define more effective intervention strategies. Through a comprehensive review of medical records and the application of appropriate urodynamic tests, it is expected to accurately delineate the prevalence and risk factors, providing crucial data for the formulation of health policies and the improvement of clinical care in this specific population.

Study design, materials and methods

Methods

Study Design and Population

This retrospective observational study, conducted at Private Hospital between January and December 2022, included 76 patients who underwent multichannel urodynamic studies following International Continence Society (ICS 2024) standards. Initial uroflowmetry measured flow patterns and peak flow rate (Qmax). Bladder and rectal pressure lines were inserted to assess detrusor and abdominal pressures during saline xfilling.
Patients with comorbidities such as hypertension, diabetes, gastrointestinal disorders, postmenopausal urogenital syndrome, pelvic pain syndrome, prior pelvic or prostatic surgery were included.
Patients under 18 years of age, pregnant female patients, and those who presented empty clinical data or incomplete urodynamic data and those who do not comply with good urodynamic practices were excluded.
Urodynamic parameters in the storage and voiding phases were analyzed and reported. Storage phase parameters included bladder sensitivity (increased, decreased, or normal), presence of detrusor overactivity (present or absent), compliance (poor or normal), and any urinary incontinence. Voiding phase parameters included flow pattern, detrusor pressure at peak flow, peak urinary flow rate, and postvoid residual urine measurement.
For men with underactive bladder, the bladder contractility index (BCI) was used to define male detrusor underactivity. BCI = Pdet at Qmax + 5*Qmax. A BCI < 100 cmH2O was considered weak, BCI of 100-150 cmH2O was considered normal contractility, and BCI > 150 cmH2O was considered strong.(4). For women with underactive bladder, the PIP1 value derived from the sum of PdetQmax plus Qmax was used, defining a value less than 30 as weak (5).
For men, the Bladder Outlet Obstruction Index (BOOI) was used, with values above 40 indicating obstruction. In women, the Solomon-Greenwell Number (SGN) assessed bladder outlet obstruction. SGN is calculated as Pdet at Qmax minus 2.2 times Qmax. An SGN greater than 18 indicates a high likelihood (>90%) of obstruction, while an SGN greater than 5 suggests probable obstruction (>50%).

Statistical analysis

Patients were categorized into two groups: Group 1 (COUB) included those with both OAB and UAB, while Group 2 comprised OAB patients without UAB. Statistical analysis, performed using Stata v14, compared urodynamic parameters and other characteristics between groups, with significance defined as $p < 0.05$.

Ethical considerations

Ethical approval was obtained from the Ethics Committee, and patient confidentiality was maintained. Informed consent was not required due to the study's retrospective nature.

Results and interpretation

In a study of 76 patients, 33 (43.42%) were diagnosed with COUB syndrome. Of these, 45.45% were women (p=0.43). The mean age in COUB syndrome was 44.03 ± 14.09 and in overactive bladder without underactive bladder was 46.72 ± 15.26 (p=0.43). The patients with this syndrome showed a increased presence of constipation but it is has not significant differences (p=0.12). In both groups, the prevalence of bladder pain syndrome, at 37.21% for COUB syndrome patients and 45.55% for overactive bladder patients (p=0.47).

Our study found no significant association between prior surgery and the COUB syndrome, despite Abarbanel et al. reporting higher prevalence rates of impaired contractility in men (30%) and women (6%) linked to prostate surgery or indwelling catheters.

One of the more notable findings in this study was the significant association between COUB syndrome and the absence of detrusor overactivity. Detrusor overactivity was present in only 24.24% of the COUB syndrome group compared to 46.51% in the OAB-only group ($p < 0.05$). This suggests that the absence of detrusor overactivity could be a potential predictor for the development of UAB in OAB patients. Clinicians should consider this marker when evaluating patients with OAB symptoms, as the absence of detrusor overactivity might indicate a progression towards UAB.

The main limitation of our study is its retrospective nature. Also, it is important to note that the symptoms were obtained in a directed manner, not using a validated questionnaire. This overactive bladder condition is frequently linked to reduced blood supply and ischemia. Pathological changes in myocytes can diminish contractile force without nervous abnormalities. Numerous studies have documented ultrastructural alterations in myocytes and fibrosis observed in bladder biopsy examinations.

	COUB		OAB only		TOTAL		
	n	%	n	%	n	%	
Patients (%)	33	43.42	43	56.58	76	100	p
Age, median (p25, p75)	43 (33, 55)		43 (33, 57)		43 (33,56)		0.43
Female, n (%)	15	45.45	24	55.81	39	52.32	0.37
Body Mass Index ≥24, n (%)	23	69.7	28	65.12	51	67.11	0.674
Bladder pain syndrome, n (%)	16	37.21	15	45.45	31	40.79	0.47
Nocturia ≥ 2, n (%)	26	78.79	35	81.40	61	80.26	0.78
Constipation, n (%)	14	42.42	11	25.58	25	32.89	0.12
Neurological disease, n (%)	7	21.21	9	20.93	16	21.05	0.9
Depressive disorder, n (%)	2	6.06	6	13.95	8	10.52	0.27
Generalized anxiety disorder, n (%)	9	27.27	14	32.56	23	30.26	0.62
Pelvic surgery previous, n (%)	12	36.36	15	34.88	27	35.53	0.89

	COUB		OAB		TOTAL		
	n	%	n	%	n	%	
	33	43.42	43	56.58	76	100	p
Cistometric capacity, median (p25, p75)	300 (300, 350)		300 (300, 360)		300 (300, 350)		0.1
Abnormal uroflowmetry, n (%)	20	60.61	29	67.44	49	64.47	0.54
Voiding efficiency <80%, n (%)	25	75.76	30	69.77	55	72.37	0.56
Detrusor overactivity, n (%)	8	24.24	20	46.51	28	36.82	0.046
Post-void residual volume ≥100mL, n (%)	23	69.7	27	62.79	50	65.79	0.53
Dysfunctional voiding, n (%)	10	30.30	7	16.28	17	22.37	0.15

Conclusions

In conclusion, our study emphasizes the importance of considering UAB in patients with OAB, particularly when detrusor overactivity is absent. The lack of standardized diagnostic criteria for the coexistence of these conditions complicates their identification, but our findings suggest that careful urodynamic evaluation could help predict UAB development in OAB patients. In addition, this finding underscore the need for further research into the interplay between OAB and UAB, particularly regarding potential predictors such as age, detrusor overactivity, and abnormal uroflowmetry.

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