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THE DIAGNOSTIC VALUES OF DIFFERENT METHODS TO DISTINGUISH URODYNAMIC URINARY INCONTINENCE SUBTYPES

Hypothesis / aims of study

To investigate the diagnostic values of different methods to distinguish urodynamic observations between urodynamic stress incontinence (USI), detrusor overactivity (DO) or their combination.

Study design, materials and methods

We identified 99 studies of 81,033 subjects that provided diagnostic values of different methods for distinguishing urinary incontinence (UI) that were published in English from 1990 until December 30, 2010. Data extraction was performed independently by two researchers using a standardized form along with an assessment of the study quality and strength of the evidence. Results of individual studies were summarized to analyze sensitivity, specificity, predictive values, and predictive likelihood ratios for correct urodynamic diagnosis of any USI or DO. We pooled diagnostic test data with random effects models using Meta-Analyst software. In cases of heterogeneity we used bivariate pooling methods. Likelihood ratio was evaluated with predefined criteria for assessing the value of a diagnostic test (Table 1)**.**

Table 1. Cut-offs of likelihood ratio for assessing the value of a diagnostic test

Likelihood Ratio	**Interpretation**
>10 (<0.1)	Large and often conclusive increase (decrease) in the likelihood of disease
5-10 (0.1-0.2)	Moderate increase (decrease) in the likelihood of disease
2-5 (0.2-0.5)	Small increase (decrease) in the likelihood of disease
1-2 (0.5-1)	Minimal increase (decrease) in the likelihood of disease

Results

The methodology of urodynamic evaluation was similar across studies. Diagnostic values were similar after random effects versus bivariate pooling methods. Quality of the studies did not contribute to statistical heterogeneity. Table 2 presented the diagnostic values of different methods for diagnosing the different urodynamic UI subtypes. Symptoms of urge UI or mixed UI, Q-tip test, pad test, UDI-6, BFLUTS or some logistic regression models had a minimal or small diagnostic value in identifying urodynamic type of UI. Although positive symptoms of stress UI only slightly increased the likelihood of USI, having no symptoms of stress UI ruled out USI with moderate confidence. Evidence limited to one study each indicated that Gaudenz incontinence questionnaire or a combination of symptoms, Q-tip, and cough stress test provided moderate diagnostic values to distinguish UI subtypes. Ultrasound, transrectal or vaginal, might be useful for USI diagnosis. For DO differential diagnosis, BIDI from diary provided moderate diagnostic values.

Table 2. Diagnostic value of the tests for diagnosing different UI Subtypes

Method	**No. of studies/ No. of subjects**	**Sensitivity**	**Specificity**	**Positive likelihood ratio**	**Negative likelihood ratio**
USI					
Symptoms of stress UI*	27/5,780	0.93^	0.41^	1.54	**0.20†**
Q-tip test*	3/267	0.62	0.60^	1.70	0.60
Pad test*	3/574	0.84	0.77	3.62	0.22
BFLUTS, interview	1/72	0.89	0.30	1.27	0.37
BFLUTS, self-report	1/72	0.88	0.29	1.24	0.41
UDI-6 question 3 score ≥2**	1/128	0.85	0.63	2.32	0.24
UDI-6 question 3 score ≥2**	1/202	0.88	0.55	1.97	0.21
DIS	1/250	0.60	0.77	2.61	0.52
Logistic regression model [1]	1/488	0.77	0.56	1.76	0.41
Logistic regression model [2]	1/200	0.72	0.81	3.79	0.35
Self reported questionnaire [3]	1/161	0.68	0.79	3.23	0.40
Discriminant score	1/252	0.78	0.84	4.97	0.26
Gaudenz-Incontinence-questionnaire predominant stress UI symptoms**	1/1,911	0.56	0.45	1.01	0.99
	1/198	0.98	0.55	2.18	**0.03†**
Combination of symptoms and tests¶	1/87	0.94	0.84	**5.85†**	**0.08†**
Ultrasound (perineal, BND)	1/102	0.73	0.77	3.16	0.35
Ultrasound (transrectal, drop of UV junction)	1/91	0.86	0.96	**20.3†**	**0.14†**
Ultrasound (vaginal, opening of bladder neck/proximal urethral with leakage during cough)	1/124	0.96	0.82	**5.33†**	**0.05†**

DO					
Symptoms of urge UI*	23/5,485	0.82^	0.51^	1.54	0.39
Symptoms of urgency*	9/6,418	0.84^	0.39^	1.36	0.47
Q-tip test	1/100	0.40	0.40	0.66	1.50
Pad test*	2/469	0.72^	0.56^	1.56	0.47
BFLUTS, interview	1/72	0.85	0.16	1.01	0.94
BFLUTS, self-report	1/72	0.81	0.12	0.92	1.58
UDI-6 question 1 score ≥2	1/128	0.83	0.50	1.67	0.33
UDI-6 question 2 score ≥2	1/128	0.75	0.33	1.11	0.77
UDI-6 question 1 and 2 score ≥2	1/128	0.69	0.64	1.90	0.49
Logistic regression model [1]	1/488	0.63	0.65	1.81	0.57
Logistic regression model [2]	1/200	0.81	0.72	2.89	0.26
Self reported questionnaire [3]	1/166	0.67	0.66	1.94	0.51
Gaudenz-Incontinence-questionnaire predominant urge UI symptoms#	1/1,911	0.62	0.56	1.40	0.69
	1/198	0.90	0.70	2.97	**0.15†**
BIDI from diary	1/217	0.88	0.83	**5.12†**	**0.14†**
Combination of symptoms and tests¶	1/87	0.78	0.87	**5.98†**	0.25
Combination of USI and DO					
Symptoms of mixed UI*	11/2,767	0.73^	0.53^	1.45	0.61
Gaudenz-Incontinence-questionnaire mixed UI scores	1/198	0.61	0.87	4.56	0.45
Combination of symptoms and tests¶	1/87	0.67	0.89	**6†**	0.38

BFLUTS: Bristol Female Lower Urinary Tract Symptoms Questionnaire; BIDI: Bladder Instability Discriminant Index; BND: Bladder neck descent; DIS: Detrusor instability score; UDI-6: Urogenital Distress Inventory-6; *: pooled analysis; **: not pooled because of poor reporting quality; #: using different definitions; ¶: combining symptoms, Q-tip, and cough test; ^: significant heterogeneity; bold with†: the likelihood ratio greater than 5 or less than 0.2.

Interpretation of results

Most tests had minimal or small diagnostic value in being able to distinguish USI and DO. Limited evidence suggested symptoms of stress UI, Gaudenz incontinence questionnaire, the BIDI index, ultrasound, or a combination of symptoms, Q-tip, and cough stress test might provide moderate diagnostic values.

Concluding message

Most self- reported UI symptoms have a low diagnostic value for USI and DO. Urodynamics might not be necessary for all women with UI as the diagnosis could be based on low-cost, non-invasive diagnostic methods. Future studies should confirm the validity of these potential tests.

References

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