173 Clinical and Urodynamic Predictors of Q-tip Test in Women with Lower Urinary Tract Symptoms

FAR EASTERN MEMORIAL HOSPITAL 亞東紀念醫院

Sheng-Mou Hsiao[a,b,c], Ho-Hsiung Lin[a,b]

[a]Department of Obstetrics and Gynecology, Far Eastern Memorial Hospital, New Taipei, Taiwan

[b]Department of Obstetrics and Gynecology, National Taiwan University College of Medicine and National Taiwan University Hospital, Taipei, Taiwan

[c]Graduate School of Biotechnology and Bioengineering, Yuan Ze University, Taoyuan, Taiwan

Introduction and Hypothesis

Q-tip test is used to measure urethral hypermobility, and could predict the surgical outcome. However, some factors may affect the reliability of Q-tip test. Our aim was to identify independent clinical or urodynamic predictors of Q-tip test.

Methods

Between January 2014 and June 2019, 176 consecutive women with lower urinary tract symptoms who underwent Q-tip test and urodynamic studies were included in this retrospective study.

Conclusions

Age, point Ba, USI, Qmax, PTR at MUP and IIQQ5 were independent predictors of Q-tip angle. However, none could be used as a good surrogate for Q-tip test owing to their lack of good correlation coefficients.

Results

Multivariable regression analysis revealed that age (coefficient = -0.55 degree), point Ba (coefficient = 4.1 degree), urodynamic stress incontinence (USI, coefficient = 9.9 degree), maximum flow rate (Qmax, coefficient = 0.13 degree) and pressure transmission ratio (PTR) at maximum urethral pressure (MUP) (coefficient = -0.14 degree), and the score of the fifth question in the Incontinence Impact Questionnaire (IIQQ5, coefficient = -4.1 degree) were independent predictors of the Q-tip angle with a constant of 87.0. The Spearman's rank correlation coefficients between the Q-tip angle and the following variables were -0.38 for age, 0.34 for point Ba, 0.32 for urodynamic stress incontinence, 0.28 for maximum flow rate, -0.28 for PTR at MUP, and -0.23 for IIQQ5. Based on the receiver operating characteristic curve (ROC) analysis to predict urodynamic stress incontinence, the cut-off value of PTR at MUP <81% was determined with the ROC area of 0.70.

Fig 1. (a) Comparisons of Q-tip angle between the urodynamic stress incontinence (USI) and non-USI groups. (b) The receiver operating characteristic (ROC) curves of using Q-tip angle to predict urodynamic stress incontinence (USI). (c) Scatter fit plots of Q-tip angle and pressure transmission ratio (PTR) at maximum urethral pressure (MUP).
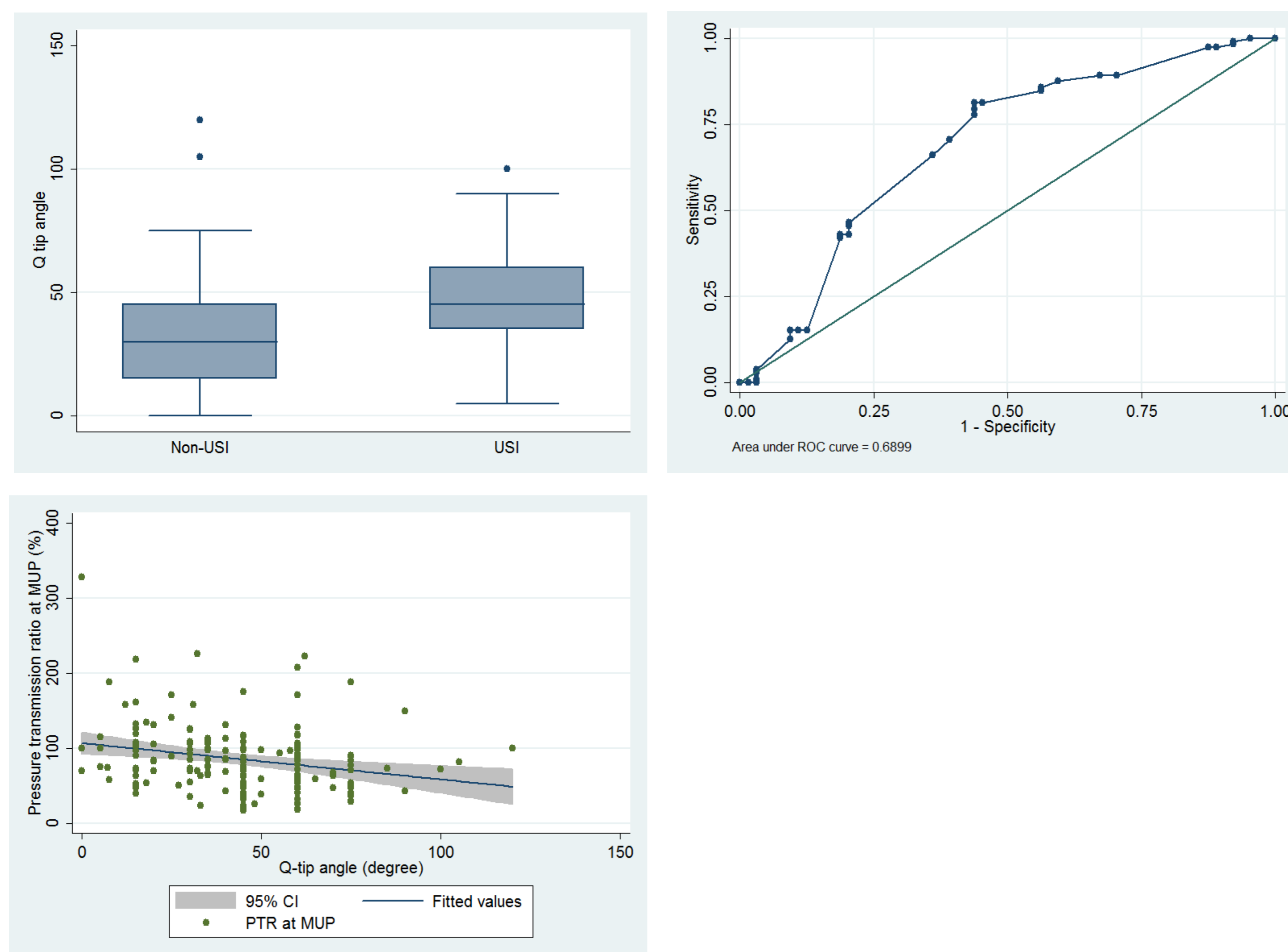

Fig 2. (a) Comparisons of pressure transmission ratio (PTR) at maximum urethral pressure (MUP) between the urodynamic stress incontinence (USI) and non-USI groups. (b) The receiver operating characteristic (ROC) curves of using pressure transmission ratio (PTR) at maximum urethral pressure to predict urodynamic stress incontinence (USI).
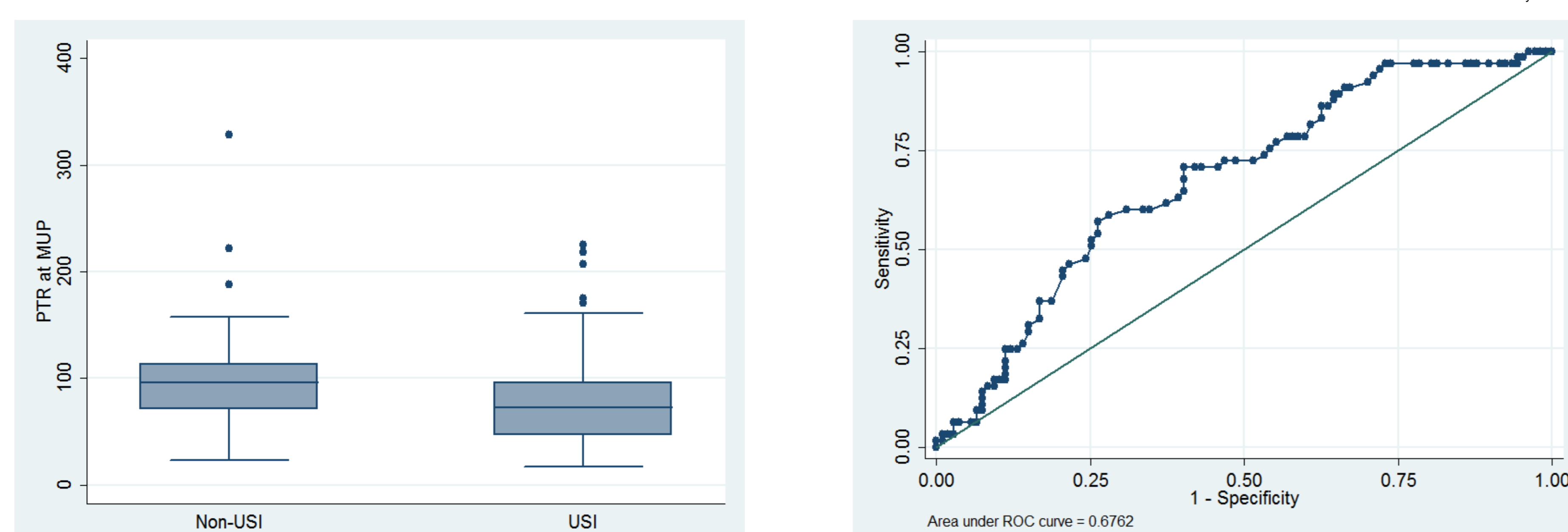

Table 1. Baseline data of women with stress urinary incontinence (n = 176)

Variables	Values
Age (years)	58.1 ± 12.7
Parity	2.6 ± 1.2
Q-tip angle (degrees)	43.1 ± 22.5
POP-Q	
Aa	-1.5 ± 2.1
Ba	-1.4 ± 2.4
C	-5.0 ± 4.0
Clinical diagnosis	
Stress urinary incontinence	102 (58)
Overactive bladder syndrome	70 (40)
Pelvic organ prolapse	40 (23)
Voiding dysfunction	7 (4)
Urodynamic diagnosis	
Urodynamic stress incontinence	112 (64)
Bladder oversensitivity	92 (52)
Detrusor overactivity	41 (23)
Bladder outlet obstruction	10 (6)
Pad weight (g)	47.7 ± 64.6
Qmax (mL/s)	26.6 ± 22.5
Voided volume (mL)	278 ± 160
Postvoid residual (mL)	104 ± 85
Voiding time (s)	29 ± 24
Strong desire (mL)	286 ± 111
PdetQmax (cmH2O)	36.5 ± 26.2
MUCP (cmH2O)	63.4 ± 31.1
Functional profile length (cm)	2.5 ± 1.9
PTR at MUP (%)	85.6 ± 44.5
UDI	6.3 ± 3.4
IIQ	6.5 ± 5.2
Daytime frequency (72 h)	25.1 ± 8.7
Nocturia (72 h)	4.6 ± 3.0
Urgency (72 h)	9.2 ± 11.7
Incontinence (72 h)	3.5 ± 8.9
Total voided volume (mL, 72 h)	5630 ± 2233
Average voided volume (mL)	198 ± 78

Values are expressed as the mean ± standard deviation or number (percentage). IIQ = Incontinence Impact Questionnaire, Short Form; MUCP = maximum urethral closure pressure; MUP = maximum urethral pressure; PdetQmax = detrusor pressure at maximum flow rate; POP-Q = Pelvic organ prolapse quantification system; PTR = pressure transmission ratio; Qmax = maximum flow rate; UDI = Urogenital Distress Inventory Questionnaire, Short Form.

Table 2. Correlations of Q-tip angle with clinical and urodynamic variables (n = 176)

Variables	Spearman's rho	p
Age (years)	-0.38	<0.0001
Parity	-0.19	0.01
Aa	0.34	<0.0001
Ba	0.34	<0.0001
C	0.18	0.02
Clinical diagnosis		
Stress urinary incontinence	0.23	0.002
Overactive bladder syndrome	-0.25	0.001
Pelvic organ prolapse	-0.01	0.93
Voiding dysfunction	-0.15	0.04
Urodynamic diagnosis		
Urodynamic stress incontinence	0.32	<0.0001
Bladder oversensitivity	-0.09	0.22
Detrusor overactivity	-0.24	0.001
Bladder outlet obstruction	-0.09	0.24
Pad weight (g)	0.19	0.01
Qmax (mL/s)	0.28	0.0001
Voided volume (mL)	0.18	0.02
Postvoid residual (mL)	-0.09	0.22
Voiding time (s)	-0.05	0.52
Strong desire (mL)	0.10	0.19
PdetQmax (cmH2O)	-0.02	0.82
MUCP (cmH2O)	0.15	0.05
Functional profile length (cm)	-0.08	0.28
PTR at MUP(%)	-0.28	0.0002
UDI	0.04	0.60
[†]UDIQ3 (0-3)	0.17	0.03
IIQ	-0.08	0.30
[†]IIQQ5 (0-3)	-0.23	0.003
Daytime frequency (72 h)	0.10	0.44
Nocturia (72 h)	-0.01	0.95
Urgency (72 h)	-0.06	0.65
Incontinence (72 h)	-0.18	0.17
Total voided volume (mL, 72 h)	0.09	0.48
Average voided volume (mL)	-0.01	0.95

The abbreviations were the same as in Table 1. UDIQ3 = the score of the third question in the UDI questionnaire. IIQQ5 = the score of the fifth question in the IIQ questionnaire. [†]Only the scores of the questions in the UDI and IIQ Questionnaires, which were significantly correlated to the Q-tip angle, were shown here.

Table 3. Clinical and urodynamic factors to predict Q-tip angle (n = 176)

Variables	Multivariable analysis Coefficient (degree, 95% CI)	[†]p
Age (years)	-0.55 (-0.80 to -0.32)	<0.001
Ba	4.1 (2.8 to 5.4)	<0.001
Urodynamic stress incontinence	9.9 (3.7 to 16.0)	0.002
Qmax (mL/s)	0.13 (0.01 to 0.26)	0.036
PTR at MUP (%)	-0.14 (-0.21 to -0.07)	<0.001
IIQQ5 (0-3)	-4.1 (-7.1 to -1.1)	0.008
Constant	87.0 (69.5 to 104.5)	<0.001

R^2 = 0.42. CI = confidence interval. The other abbreviations are the same as in Table 1.
[†]Multivariable backward stepwise linear regression using all statistically significant variables (p < 0.05) in Table 2. Herein, those variables without statistical significance were not shown.