Effect of voiding position on uroflowmetry and Post Void residual in males adult

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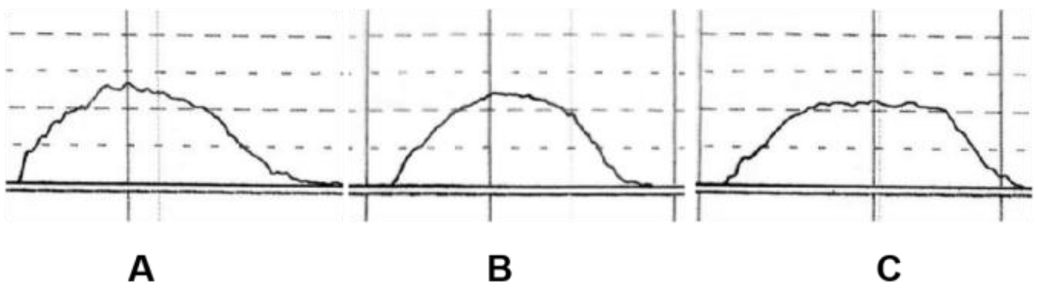
Introduction

Urine flow measurement (UFM) combined with post voided residual (PVR) measurement is a widely used noninvasive urodynamic study(NUDS) method, which is mainly used to screen for voiding dysfunction. It has been reported that voiding position may be an important factor affecting the results of urine flow measurement.There are different views on the optimal urination position for men at home and abroad, and the relevant literature is limited. Studies have shown that pelvic floor muscle relaxation can reduce bladder exit resistance. In healthy women, seating with forward-bending position is the best position to relax the pelvic floor muscle, and this position has the most stable urine flow curve. However, the study of seating with forward-bending position in men has not been reported. The purpose of this study is to investigate whether the urination position affects the urinary flow measurement and PVR of males adult, and to explore the better urination position of males adult.

Methods and Materials

Approved by the Ethics Committee of our hospital, this study included a total of 98 male participants aged 22-78 years from October 2022 to October 2023, all of whom were medical students and urological outpatients in our hospital. According to age and presence of dysuria symptoms, the participants were divided into young healthy group (group A: 43), young dysuria group (group B: 11), middle-aged and elderly healthy group (group C: 16), and middle-aged and elderly people with dysuria group (group D: 28). Urine flow was measured in standing position, seating with forward-bending and seating position, and PVR was measured by B-ultrasound immediately after each urination. The statistical software SPSS 26.0 was used to compare the differences of voided volume (VV), maximum urine flow rate (Qmax), average urine flow rate (Qave) and PVR among the three voiding positions by repeated measurement ANOVA and non-parametric Friedman Test.

Fig 1. Typical urine flow curves of three voiding positions
A:standing position; **B:**seating with forward-bending position; **C:**seating position



Result

1. Group A:The Qmax and Qave values of standing and seating with forward-bending urination were significantly higher, and the PVR values were significantly lower than those of sitting urination ($P<0.05$); There was no significant difference in Qmax, Qave and PVR values between standing position and seating with forward-bending position.
2. Group B:The Qmax and Qave values of seating with forward-bending urination were significantly higher, and the PVR values were significantly lower than those of sitting and standing urination ($P<0.05$); The PVR value of sitting urination was significantly lower than that of standing urination ($P<0.05$). There was no significant difference in Qmax and Qave values between standing and sitting urination.
3. Group C:The Qmax and Qave values of seating with forward-bending urination were significantly higher, and the PVR values were significantly lower than those of sitting and standing urination ($P<0.05$); The Qmax and Qave values of seating urination were significantly higher, and the PVR values were significantly lower than those of standing urination ($P<0.05$)
4. Group D:The Qmax and Qave values of seating with forward-bending urination were significantly higher, and the PVR values were significantly lower than those of sitting and standing urination ($P<0.05$); The Qmax and Qave values of seating urination were significantly higher, and the PVR values were significantly lower than those of standing urination ($P<0.05$).

Discussion

In this study, seating with forward-bending urination showed better urine flow rate parameters in all groups of adult males, which may be related to the increase of abdominal pressure during seating with forward-bending position. When the body is bent forward, the Angle between the torso and the thigh decreases, and the abdominal pressure increases compared with the sitting position. In middle-aged and elderly people, urine flow rate parameters of sitting on the toilet are better than those of standing, which may be related to the difficulty of standing for a long time and the desire to end urination earlier.

Table 1. Urinary flow rate and PVR measurement results of three different voiding positions in young healthy men

	Standing	seating with forward-bending	seating	P1	P2	P3
Qmax(ml/s)	26.00±2.33	26.41±2.12	23.50±2.52	0.116	<0.001	<0.001
Qave(ml/s)	14.03±2.21	14.27±2.18	11.77±1.89	0.286	<0.001	<0.001
PVR（ml)	9.97±2.26	9.43±1.97	12.10±3.28	0.068	<0.001	<0.001
VV(ml)	211.6[169.5，265.9]	206.8[173.5，262.8]	203.7[175.9，260.0]	P=0.486		

Table 2. Urine flow rate and PVR measurement of three different voiding positions in young men with dysuria symptoms

	Standing	seating with forward-bending	seating	P1	P2	P3
Qmax(ml/s)	15.25±1.47	16.65±0.96	15.00±1.33	0.004	0.975	0.001
Qave(ml/s)	7.99±0.70	8.48±0.47	7.79±0.72	0.013	0.336	0.001
PVR（ml)	45.73.±4.68	41.51±4.82	48.78±4.04	<0.001	0.005	<0.001
VV(ml)	220.05±34.13	221.05±31.41	216.69±28.31	P=0.254		

Table 3. Urine flow rate and PVR measurement results of three different voiding positions in middle-aged and elderly healthy men

	Standing	seating with forward-bending	seating	P1	P2	P3
Qmax(ml/s)	19.37±1.54	21.16±1.81	20.57±1.74	<0.001	<0.001	0.002
Qave(ml/s)	8.44±0.82	9.53±0.93	9.21±0.95	<0.001	<0.001	0.004
PVR（ml)	22.34±2.81	19.79±2.67	20.80±2.66	<0.001	<0.001	0.001
VV(ml)	196.6[169.5,255.9]	203.8[168.5,242.8]	189.7[165.8,241.3]	P=0.261		

Table 4. Urine flow rate and PVR measurement results of three different voiding positions in middle-aged and elderly men with dysuria symptoms

	Standing	seating with forward-bending	seating	P1	P2	P3
Qmax(ml/s)	7.18±0.79	8.15±0.90	7.83±0.83	<0.001	<0.001	<0.001
Qave(ml/s)	3.90±0.34	4.42±0.38	4.22±0.47	<0.001	<0.001	<0.001
PVR（ml)	80.36±10.58	69.20±8.71	73.15±9.14	<0.001	<0.001	<0.001
VV(ml)	208.84±28.53	209.21±27.26	209.90±25.00	P=0.785		

Conclusions

The position of urination may affect the urinary flow rate index and PVR in adult males. The results of this study suggest that seating with forward-bending position may be more beneficial for improving urinary flow rate indicators and emptying the bladder in adult males, which is more significant in middle-aged and elderly populations. The normal value of urine flow measurement should be related to the urination position, and different normal values should be set for different urination positions.

References