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CLINICAL UTILITY OF VOIDING TRANSRECTAL ULTRASONOGRAPHY IN LOCALIZING OBSTRUCTIVE LESION
IN REFERENCE TO PRESSURE-FLOW STUDY

Aims of Study

To evaluate the infravesical obstruction in men with lower urinary tract symptoms (LUTS), pressure-flow study (PFS) has been the gold standard (1). PFS is, however, a physiological test and not be able to offer information concerning the detailed anatomical location of obstruction or dysfunction in lower urinary tract, including bladder neck and the prostate. Definite localization of obstructive lesion could promise the proper selection of therapeutic strategy. Real time monitoring with the longitudinal view of transrectal ultrasonography (TRUS) during voiding could demonstrate the dynamic movement of the urethra and the bladder neck as well as the prostate (2). Although voiding TRUS has been reported to be a useful imaging tool for voiding (3), objective criteria in diagnosing obstruction remain unclear because of the lack of quantitative indices. In this study, in 32 patients with LUTS assessed by PFS as well as in 10 healthy young males, we measured the dynamic change of lower urinary tract with voiding TRUS with the aim of quantitative assessment of obstructive site. Attention was focused on a clinical significance of the quantitative measurements in patients comparing to those in healthy young men.

Methods

Voiding TRUS was performed using a longitudinal scanning of the urethra during voiding in standing position in a total number of 42 men including 32 patients and 10 healthy young men. In 1999, consecutive 32 patients (mean 68.3 years) with LUTS underwent both PFS and voiding TRUS. Among 32 patients 6 (19%) could not urinate with an ultrasound probe in the rectum. In all of the 10 healthy young males (mean 23.8 years), voiding TRUS was performed successfully. In 36 subjects who could void with TRUS monitoring, the diameter of bladder neck (D-BN)

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as well as the diameter of prostatic urethra (D-PU) were measured perpendicularly to an axis of the urethra at the maximum urethral opening. Both D-BN and D-PU were measured at the maximum flow. D-PU was measured at the middle point between the bladder neck and the verumontanum. BN index was obtained by dividing D-PU by D-BN. Prostate volume (PV) was also measured using conventional TRUS. The value of Abrams-Griffiths (AG) number was obtained according to PFS.

Results

In 10 healthy young men, D-BM and BN index ranged from 8 to 18 mm (13.9 ± 4.3 mm) and from 0.28 to 1.22 (0.78 ± 0.29), respectively. Based on these data, cut-off values were determined tentatively as mean \pm 2SD, and the diagnosis as bladder neck obstruction (BNO) was made when D-BN was 5.3mm or less with BN index of 1.36 or more.

In 26 patients in whom voiding TRUS could be obtained, there were significant differences in D-BN (3.6 ± 2.6 mm vs 13.0 ± 4.80 mm, $p < 0.0001$) between patients with and without obstruction. Both D-BN ($r = 0.541$, $p < 0.01$) and BN index ($r = 0.617$, $p < 0.01$) correlated significantly with AG number. In a subgroup of 13 patients who had PV less than 30 ml, BN index was significantly lower in those with obstruction ($p < 0.01$), showing a significant correlation with AG number ($r = 0.901$, $p < 0.0001$).

In this study, among 12 patients with obstruction as determined by PFS, 3 were diagnosed to have BNO based on diagnostic criteria using D-BN and BN index, and 9 were as prostatic obstruction. Satisfactory therapeutic results were obtained by selective transurethral resection of the bladder neck as well as the enlarged prostate, respectively.

Conclusions

Measurements of dynamic change in lower urinary tract during voiding with TRUS could contribute to the precise localization of obstructive lesion in men with LUTS.

1. Urology 44:153,1994
2. Neurourol Urology 17:377,1998
3. Radiology 153:791,1984