

MEASUREMENT OF URETHRAL COMPLIANCE

Hypothesis / aims of study

Intravesical pressure during micturition has been shown to directly correlate to urethral resistance. As urethral resistance increases, flow rate declines and higher intravesical pressures are measured. Since urethral resistance affects intravesical pressures and flow rate, a direct measurement of this parameter would be desirable in bladder outlet obstruction (BOO) diagnosis. The concept of urethral resistance measurement remains confusing and has not yet been defined despite several model analysis and reviews [1]. Moreover, intrinsic dynamics of the urethra are not available in the standard pressure flow studies.

The aim of the study is to evaluate urethral compliance, comparing isometric bladder pressure measured in the bladder and noninvasive urodynamic evaluation.

Study design, materials and methods

In a prospective study 43 men with mean age 64.8 years (8.5 SD) with lower urinary tract symptoms were analyzed to evaluate urethral compliance. The initial evaluation consisted of the International Prostatic Symptoms Score (IPSS) and quality-of-life (QoL) score, physical examination including digital rectal examination and neurological examination. Patients with a known history of previous lower urinary tract surgery, prostate or bladder carcinoma, bladder calculi, or neurological deficit were excluded from the study.

Initially, the patients were evaluated by a conventional pressure flow study followed by measurement of isometric bladder pressure utilizing a Foley catheter for bladder neck obstruction during tentative to initiate voiding. A noninvasive urodynamic study was performed during the same appointment using an external device, that allows fossa navicularis occlusion during micturition and bladder isometric pressure measurement. The urethral compliance was calculated subtracting the bladder pressure measured during bladder neck occlusion from the pressure measured at the fossa navicularis during flow occlusion.

The results of studied patients were analyzed statistically for reliability and correlation in patients with a BOO index utilizing the Abrams Griffiths number [2], obtained from the conventional urodynamic study and age (40 to 50 years, 51 to 60 years and > 60 years). Patients found to be in the equivocal range were considered unobstructed for data analysis.

Results

In the patients studied the mean IPSS was 13 ± 6.9 and the mean prostatic volume was 34.7 ± 31.2 cc. Twenty-one patients had BOO, defined by Abrams-Griffiths number > 40. Of these men, the mean urethral compliance was 11.95 ± 8.08 ml/cmH₂O. Twenty two men without BOO had mean urethral compliance of 11.19 ± 8.28 ml/cmH₂O. In the patients aged 50 to 60, 61 to 70 and ≥ 71 , the mean urethral compliance measured was 10.23 ± 8.4 , 12.70 ± 8.7 and 14.28 ± 11.28 ml/cmH₂O, respectively.

Interpretation of results

There is no difference in the urethral compliance with increasing age ($p = 0.15$). In patients with BOO confirmed during conventional urodynamic study, urethral compliance measured was not different from unobstructed patients ($p > 0.05$). The urethral compliance was not a statistically significant predictor ($p > 0.05$) of bladder outlet obstruction (BOO) compared with other variables in the initial evaluation.

Concluding message

Considering the increase in the use of noninvasive study (isometric pressure and interrupted flow), the knowledge of urethral compliance can influence the evaluation parameters. More studies are necessary to define the urethral compliance applicability.

1. *Computers in Biology and Medicine* 2001;**31**: 27-40
2. *BJU Int* 1999;**84**: 14-5

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CLINICAL TRIAL REGISTRATION: This clinical trial has not yet been registered in a public clinical trials registry.

HUMAN SUBJECTS: This study was approved by the HC UNICAMP and followed the Declaration of Helsinki Informed consent was obtained from the patients.