

RISK FACTORS OF URETHRAL DIVERTICULA IN MALES WITH SPINAL CORD INJURY

Hypothesis / aims of study

Urethral diverticula (UD) constitute a rare urological pathology in males, except in the group of patients who suffer from spinal cord injury (SCI), where they can be found in up to 4% [1].

Most UD are asymptomatic, but those that become complicated lead to major disturbances such as calculi, abscesses, periurethral infections, cutaneous fistula, and what is more dangerous, urethral carcinomas. Therefore, the prevention of UD has a vital importance, and in order to achieve it, is necessary to become familiar with their risk factors

Our hypothesis is that there are clinical and functional alterations which favour UD. The objective of our study is to carry out a case-control study to evaluate clinical and urodynamics risk factors that could be related in the development of UD in male patients with Spinal Cord Injury (SCI).

Study design, materials and methods

A case control study was performed on a sample group of males with SCI. The required sample size was first calculated. To that aim, and given that in women urinary tract infection (UTI) is a known risk factor for UD, we proposed according to Dahlberg et al, a mean proportion of UTI of 35% in the UD group versus a 10% in patients without UD. A minimum of 51 patients in each group would be necessary, with a two-sided significance level of 95%, and a statistical power of 80%.

The sample was composed of 55 cases and their correspondent matched controls. Cases were obtained from radiological images showing UD (it had to be an agreement between two radiologists and one urologist). Controls were 55 patients from the same population of the cases, whose urethral images the three reviewers agreed that were not urethral diverticula, paired by date of radiological study and same age \pm 5 years.

Clinical history of all patients was thoroughly reviewed. The data were completed by a telephonic survey following an established previous protocol, searching for some specific clinical risk factors. Urodynamics studies were also evaluated. All these studies were accomplished according to International Continence Society (ICS) specifications, with a Solar® polygraph (MMS, Enshede, The Netherlands).

Because the study consists of a retrospective design, specific approval by ethics committee was not required. However we asked all patients to sign an informed consent when Urodynamics study was performed. Regarding the telephonic interview, the answer by the patients was always voluntary.

The program SPSS version 11 was used for statistical analysis of the data. The statistical tests used were Fisher's exact test for dichotomous variables, Pearson's chi-squared test for categorical variables, and the Student's t comparison of means test for parametric variables. The Odds Ratio (OR) of each risk factor was calculated with a 95% confidence interval. Finally, a logistic regression analysis was evaluated to determine which variables independently were influencing as risk factors for UD, searching for the maximum coefficient determination and the more parsimonious model. The statistical significance was set at a two-sided 95% level. The quantitative variables were expressed as mean \pm standard deviation.

Results

The mean age of the patients was 45 ± 12.2 years. The mean time course of the lesion was 203 ± 124.1 months. The level and grade of spinal injury is shown in table 1.

Univariate analysis showed the following risk factors: the age of spinal injury: [239 ± 131 . 4 months in patients with UD versus 168 ± 106 . 2 months in patients without UD ($p=0.000$)], the sphincterotomy procedure, the lower urinary tract infections (LUTI) and the use of either indwelling catheter (IC) or the external condom drainage (ECD). The sphincterotomy procedure had been carried out in 25.5% of patients with UD versus 5.5% of patients without UD ($p= 0.002$). The OR to develop UD after a sphincterotomy procedure is 5.89 times more than if patients have not undergone this operation previously (confidence interval between 1.9 and 1.8).

A rate of 38.2% of patients with UD had indwelling catheter versus a 16.4% without UD ($p = 0.008$). OR: 3.14 (confidence interval between 1.15 and 3.12). A percentage of 69.1% of patients with UD had ECD versus a 49.3% of patients without UD ($p= 0.031$). OR: 2.30 (confidence interval between 1.47 and 1.18). A 38.0% of patients with UD had lower urinary tract infections versus a 17.1% of patients without UD ($p= 0.0369$). OR: 2.96, confidence interval between 1.89 and 1.27).

None of the urodynamics parameter could be found to represent a risk factor of UD.

Regarding the location of the UD, we found the stress urinary incontinence as the only factor to develop UD in the prostatic urethra. On the other hand we can conclude that the sphincterotomy, the ECD, the LUTI, and the detrusor sphincter dyssynergia are risk factors to develop diverticula in the bulbo-membranous urethra. Finally, we could point out the IC as the only risk factor for penile urethral diverticula.

Multivariate analysis showed that all of these risk factors were independent among them except the age of the injury for UD in general and, the ECD for UD in bulbo-membranous urethra.

Interpretation of results

Clinical factors are responsible for the formation of UD by several ways. Lower urinary tract infections can produce UD by affection of the paraurethral glands that get obstructed and later the abscess break into the urethral lumen. Patients with indwelling catheter can generate UD by the infection associated or by compression of urethra and its consecutive ischemia. External Condom drainage could cause UD by external compression of bulbo-membranous urethra, and sphincterotomy by direct injury of bulbo-membranous urethra.

The urodynamics factor can only explain the localitation of UD. Stress Urinary Incontinece associated to a weakness of urethral sphincteric mechanism could favour prostatic UD, while detrusor sphincter dyssynergia could increase the pressure in bulbo-membranosu urethra and therefore favour the formation of UD at this level.

Concluding message

According to our study, there is evidence of some specific risk factors for the development of UD in male patients with SCI and, therefore, we would be able to adopt the appropriate preventive measures to avoid them.

Table 1.- Level and grade of spinal cord injury

Grade of injury	Level of injury				Total
	C4-C8	D1-D6	D7-L2	L3-cauda equina	
Incomplete	16	6	9	6	37
Complete	21	22	29	1	73
Total	37	28	38	7	110

References

1. Rimón U, Hertz M, Jonas P. Diverticula of the male uretra: a review of 61 cases. Urol Radiol 1992; 14: 49-55
2. Dahlberg A, Perttilä I, Wuokko E, Ala-Opas M. Bladder management in persons with spinal cord lesion Spinal Cord. 2004;42(12):694-8.

Disclosures

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