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RISK FACTORS PREDICT UPPER URINARY TRACT DETERIORATION IN PATIENTS WITH SPINAL CORD INJURY--A LONGITUDINAL STUDY

Hypothesis / aims of study

Neurogenic bladder is one of the major complications in patients with spinal cord injury (SCI). Our purpose was to investigate the risk factors predicting upper urinary tract deterioration in patients with SCI.

Study design, materials and methods

In this longitudinal cohort study, we reviewed the medical records and upper tract imaging studies of 112 patients with a mean follow up of 2 years. Variables evaluated for an influence on renal function included patient age, gender, educational background, interval since injury, injury level and completeness, bladder management method, presence of adverse outcomes such as recurrent urinary tract infections and bladder stones and video urodynamic data. Renal function was assessed by serum creatinine, and by upper tract abnormalities on renal ultrasound, intravenous pyelography(IVP), computed tomography(CT)or Magnetic Resonance Imaging(MRI). The results were analyzed statistically.

Results

Chi-square test analyses demonstrated lumbosacral spinal cord lesion more likely contributed to upper urinary tract deterioration(p=0.032). Table1 shows Upper tract abnormalities was present in 23 patients (65.7%) in the spontaneous voiding group, 10(20%) in the clean intermittent catheterization group, 15(78.9%) in the indwelling urethral catheterization group, and 7(87.5%) in the suprapubic Foley catheterization group (p<0.001). When we divided bladder management into catheter free (spontaneous and intermittent voiding) and indwelling catheter (urethral and suprapubic catheterization) two groups, there were upper tract dysfunction in 33(38.3%) and 22(81.5%), respectively (p<0.001). Table2 shows Urodynamic data maximum cystometric capacity less than 200ml and/or bladder compliance less than 20ml/cm.water during filling was significantly correlated with those with abnormal upper tracts secondary to spinal cord injury (chi-square test p=0.019 and p<0.001,respectively). The presence of detrusor sphincter dyssynergia was associated with upper tract complications (chi-square test, p=0.06), but without statistically significance. Maximal detrusor pressure more than 40cm water may be relevant to the upper urinary tract dysfunction (chi-square test, p=0.063). Multiple COX analyses revealed injury level and bladder management were associated with upper tract abnormalities. The relative risk of renal deterioration in lumbosacral spinal cord injury was 4.204, and indwelling urethral catheterization is 5.819, which is the most important risk factor.

Table 1.Clinical parameters(bladder management method:)

	Overall(n)	upper urinary tract deterioration(%)	upper urinary tract normal(%)	P Value(1-way analysis of variance or chi-square test)
spontaneous voiding	35	23(65.7)	12(34.3)	<0.001
intermittent	50	10(20.0)	40(80.0)	<0.001
catheterization	19	15(78.9)	4(21.1)	<0.001
indwelling catheterization	8	7(87.5)	1(12.5)	0.309
suprapubic catheterization				

Table 2.urodynamic parameters

	Overall(n)	upper urinary tract deterioration(%)	upper urinary tract normal(%)	P Value(1-way analysis of variance or chi-square test)
MCC（ml）：				
＜200	26	18(69.2)	8(30.8)	
≥200	86	37(43.0)	49(57.0)	0.019
BC（ml/cmH2O）：				
<20	87	48(55.2)	39(44.8)	
≥20	23	5(21.7)	18(78.3)	0.004

Interpretation of results

Lumbosacral spinal cord injury, chronic indwelling urethral catheterization and suprapubic cystostomy were predictors of impaired upper tract function. Indwelling urethral catheterization was the most important risk factor and lumbosacral spinal cord injury is the second important factor. Decreased maximum cystometric capacity, low compliance bladder, DSD and increased maximal detrusor pressure during filling phase may be the major urodynamic risk factors predicting upper urinary tract deterioration in spinal cord lesion.

Concluding message

Risk factor; upper urinary tract deterioration; neurogenic bladder; urodynamics; spinal cord injury

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