Studies of bladder sensitivity in patients with myelodysplasia

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In 41 patients with myelodysplasia, the sensitivity in the lower urinary tract was investigated both with the evaluation of the perception of bladder filling and with the determination of the electrical sensory threshold of the urinary bladder wall. Visceral proprioceptive and/or exteroceptive bladder sensitivity proved, rather unexpectedly, to be present in a majority of the patients. The findings of these investigations did not correlate with any of the data of a clinical neurological examination. The evaluation of the sensory innervation of the lower urinary tract is of importance for diagnosis and therapy. Its investigation necessitates specific tests.

Key words: myelodysplasia; neuropathic bladder; sensitivity; clinical neurological examination.

Introduction

In patients with myelodysplasia, dysfunctions of the lower urinary tract are frequently found.¹

Whilst in the neurourological literature the interest is mainly on the motor function of the lower urinary tract, the evaluation of the sensitivity is as important: motoricity and sensitivity are indivisible also regarding lower urinary tract function^{2,3} and deficient bladder sensation itself is a possible cause of diverse urological disorders.⁴ Moreover sensory analysis of the bladder is extremely important, in that its absence is often in itself sufficient to diagnose a neuropathic bladder.⁵

Sensation is the prerequisite of conscious bladder control and information about sensation can, for that reason, be very important for bladder training in patients with a neuropathic bladder.⁶ In this study we investigated, with specific tests, the sensitivity in the lower urinary tract in a group of patients with myelodysplasia.

A clinical neurological examination of the lumbosacral region gives information about the central nervous system, the spinal cord and the peripheral nerves involved in bladder and urethral function. We considered if a clinical neurological examination can provide information about the sensitivity in the

lower urinary tract in patients with myelodysplasia.

Methods

In 41 patients with lumbar-sacral myelodysplasia, who were referred during an 8-month period for urodynamic investigation, both a clinical neurological examination and specific tests for the determination of the sensitivity of the lower urinary tract were performed.

They were 23 male and 18 female patients, with a mean age of 15 years (range from 4 to 45 years). Their mental condition permitted good cooperation during the tests.

The clinical neurological examination consisted of the testing of skin sensation in the lumbosacral dermatomes,⁷ of the bulbocavernosus⁸ and the anal reflexes⁹ and of the voluntary contraction of the anal sphincter.¹⁰

The sensitivity of the lower urinary tract was evaluated by the determination of the perception of bladder filling and/or detrusor contraction during the tonic phase¹¹ of a medium fill cystometry. The bladder was filled through a 5 or 8 French urethral catheter, at a constant flow (30 ml/min) (JTL RM 302 pump) with a solution of

700 ml sterile water and 200 ml Urografine 76% (Schering) at room temperature. Patients were in the supine position on a Hydrajast urological table. If patients mentioned some specific sensation of bladder filling but not the classical different perceptions which can be perceived (first sensation of filling, first desire to void, strong desire to void),¹² they were considered to have a pathological sensation.

In 23 patients the sensory threshold of the bladder wall was determined with electrical stimulation.¹³ A stimulation catheter was used with 2 ring electrodes mounted 6 cm apart.

This catheter was introduced transurethrally into the empty bladder. Both electrodes were positioned against the bladder wall (radioscopic control). Stimulation was given with a constant current stimulator (Dimed Belgium), giving square wave impulses of 0.5 msec length, 10 msec interval. The amplitude was gradually increased from 0 to 25 mA until the patient experienced sensation. At least 3 separate measurements were done. A maximum difference of 1.25 mA was accepted for reproducibility. A threshold of the bladder wall of more than 10 mA was considered to be a sign of decreased sensation.¹⁴ Absence of sensation at an amplitude of > 25 mA was considered as absent electrosensation.

Results

The results are presented in Table I. In a number of patients we could not perform some of the investigations, mainly because of age and/or the impossibility to introduce the stimulation catheter through the urethra. In a majority of the patients in whom the tests were done, bladder filling and/or electrical stimulation could be perceived.

Discussion

From our study, we can conclude that an evaluation of the sensitivity of the lower urinary tract in myelodysplasia patients with specific tests is important. A majority of the patients had a normal ($n = 2$) or pathological but present ($n = 9$) perception of bladder filling, and/or a normal ($n = 8$) or decreased ($n = 11$) electrical sensitivity of the bladder wall.

The determination of filling perception is of clinical value.^{12,15,16} The perceptions are elicited by stimulation of sensory receptors in the bladder wall, travelling through the different lumbar and sacral peripheral nerves.¹⁷ Visceral proprioception is often the key to conscious bladder control. The electrical sensitivity threshold determination is as important, for the evaluation of

Table I Results of the sensitivity tests and of the clinical neurological examination

Lumbosacral sensation	Clinical examination		Bladder sensitivity							
	Bulbocavernous +anal reflex	Voluntary anal contracture	Filling perception				Electro-sensation			
			N	P	A	ND	N	P	A	ND
N 8			2	2	1	3	3	1	—	4
A 27			10	6	8	3	5	10	4	8
ND 6			0	1	1	4	—	—	—	6
	N 7		1	1	3	2	2	2	—	3
	A 31		11	8	6	6	6	9	4	12
	ND 3		—	—	1	2	—	—	—	3
		N 1	—	—	—	1	—	—	—	1
		A 36	12	8	9	7	8	11	4	13
		ND 4	—	1	1	2	—	—	—	4

N = normal

P = pathological

A = absent

ND = test not done.

visceral exteroception.^{13,14} The knowledge about both types of afferent innervation improves the neurological diagnosis considerably and may be important for urological therapy and bladder training.¹⁸

In a majority of the patients clinical examinations showed important neurological deficits: absent skin sensation and absent reflexes—which could suggest absent sensitivity in the lower urinary tract. The specific evaluation with the tests described above however showed normal or reduced, but present sensation in most of the same patients. We have described in a prior study¹⁹ that the correlation between a clinical neurological examination and the motor urodynamic function was very poor in 47

children with lumbosacral myelodysplasia. Our present study leads us to the same conclusion concerning sensation in the lower urinary tract.

Conclusion

The evaluation of sensitivity in the lower urinary tract should also be done with specific tests in children with myelodysplasia. The evaluation of bladder filling perception together with determination of the electrical sensory threshold permits us to gain major information on the afferent innervation of the lower urinary tract. Such information can be very important for bladder management.

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