

DETERMINANTS OF THE ABILITY TO INCREASE FUNCTIONAL BLADDER CAPACITY IN CHILDREN WITH MONOSYMPTOMATIC NOCTURNAL ENURESIS.

Aims of Study

In monosymptomatic nocturnal enuresis (MNE) a small functional bladder capacity (FBC) is often considered as a major cause. It has been repeatedly suggested that normalization of the FBC may help to cure enuresis and may have an effect on the efficacy of other therapies. However factors related to the ability to increase the FBC were not thoroughly studied. We evaluated whether the bladder in children with MNE and a small FBC can be increased to a level considered normal for age. Furthermore factors related to the ability to increase the FBC were studied.

Methods

69 children (43 boys and 26 girls) between 5 and 14 years old were included. They all suffered from refractory MNE and had, according to the definition by Hjalmas (1), a bladder capacity that was too small for their age. Exclusion criteria were: history of urinary tract infection, frequency (>8 voidings/day), daytime urinary incontinence, nocturnal polyuria and voiding dysfunction.

At baseline a conventional cystometry was performed in all patients. The volume voided at strong desire is defined as the maximal cystometric capacity (MCC). Furthermore all spontaneous voidings were measured during three days per week. The mean of these voidings is defined as the average functional bladder capacity (AFBC) and estimates the daily used bladder capacity. Bladder training was done by giving the children once daily a water load of 20 ml/kg and asking them to refrain from voiding as long as possible. This volume voided is defined as the maximal functional bladder capacity (MFBC). The voiding charts were every 4 weeks analysed by the doctor. If after the first 4 weeks the increase in MFBC was less than 10%, oral anticholinergics were given. Bladder capacities are standardized by conversion to a percentage of the predicted bladder capacity for age based on the formula proposed by Hjalmas. Data are presented as mean \pm standard deviation. For statistical analysis non parametrical tests were used.

Results

Bladder overactivity (BOA) was seen in 67% of the patients. In these children no difference was noted in MFBC nor AFBC compared with children without BOA, but MCC was significantly smaller ($p=0.03$). After 4 weeks, MFBC increased more than 10% in 14 children (20%). Consequently oral anticholinergics were started in the other 55. Baseline parameters between the two groups are compared in table 1.

	<i>> 10% increase in MFBC</i>	<i>< 10% increase in MFBC</i>	<i>P value</i>
Age (y)	8.9 \pm 2.4	9.4 \pm 2.4	NS
MCC (%)	79.7 \pm 13.2	61.2 \pm 16.3	0.0002
MFBC (%)	63.8 \pm 12.0	48.3 \pm 12.7	0.0001
AFBC (%)	38.9 \pm 10.7	34.2 \pm 10.9	NS
OAB			
Number (%)	35.7%	89.1%	0.006
Pressure (cmH ₂ O)	5 \pm 7.6 (median: 0)	42.3 \pm 42.3 (median: 30)	0.002

Data from the children who did or did not reach the bladder capacity expected for age are compared in table 2.

Table 2: comparison of parameters based on the response at the end of bladder training			
	<i>MFBC < 100%</i>	<i>MFBC > 100%</i>	<i>P value</i>
Number patients (%)	20.3%	79.7%	
Age (y)	10.5±2.6	8.9±2.3	0.02
Before training			
MCC (%)	57.9±14.4	66.7±17.7	NS
MFBC (%)	46.9±8.9	52.6±14.8	NS
AFBC (%)	33.2±4.9	35.7±12.0	NS
OAB			
Number (%)	100%	58.2%	0.003
Pressure (cm H ₂ O)	59.1±44.6 (median: 48)	28.5±37.7 (median: 15)	0.015
After training			
MFBC (%)	86.9±6.4	124.0±18.1	0.000000
AFBC (%)	69.7±10.4	94.2±16.0	0.000001
Duration training (m)	4.4±2.9	2.8±1.9	0.015

All children who had a good initial response after 4 weeks reached the goal capacity even without anticholinergics. Children who failed to reach this level were significantly longer trained. In these, the bladder training was stopped at some stage mainly because of lack of success.

Conclusions

In children with MNE and a small functional bladder capacity, BOA is predominant feature. In our group, presence of BOA could not be determined by analysis of the initial voiding charts. But we noticed that unsuccessful training for 4 weeks corresponded significantly more with BOA and with BOA of higher severity. Even with the use of anticholinergic drugs combined with training 20% of these children will not reach a normal bladder capacity within 4 months. Elderly children proved less successful. However if retention control training permitted to reach more than 10% capacity increase within 4 weeks, anticholinergic drugs were not necessary.

Our results show that age and BOA have a negative impact on the ability to increase bladder capacity in children with refractory MNE and small bladders. Retention control training and eventually anticholinergics can give normalisation of the MFBC in 80% within an average of 3 months. After such period one should try alternative treatment to keep the child, which has so far not sufficiently improved, motivated.

(1) Hjalmas K. Urodynamics in normal infants and children. *Scand J Urol Nephrol* 1988; Suppl **114**: 20-7.