

THE AFTER-CONTRACTIONS IN PEDIATRIC URODYNAMICS: ITS INCIDENCE AND CLINICAL SIGNIFICANCE

Hypothesis / aims of study

The after-contraction (A-C) is a detrusor contraction occurring at the end of micturition. A-Cs are commonly observed in pediatric urodynamic studies and tend to disappear with maturation [1]. They are found in studies with either suprapubic or transurethral catheters [1]. The relationship of A-C with detrusor overactivity (DO) and/or detrusor-sphincter discoordination (dysfunctional voiding) are proposed [2, 3]. But the clinical significance and diagnostic value of A-C have not been fully established. The aim of this study is to determine the incidence of A-C and the possible relationship with age, sex, the reasons for UDS and other UDS parameters in neurologically normal children.

Study design, materials and methods

We retrospectively reviewed 147 video-urodynamic study (V-UDS) records of 93 children under 12 years old attending for urinary frequency, incontinence, nocturnal enuresis, voiding difficulty, urinary tract infection (UTI) or hydronephrosis. Transurethral catheters were used for bladder filling and intravesical pressure recordings. All examinations were carried out without any anaesthesia or sedatives. A-Cs were defined as detrusor contractions of at least 15 cmH₂O seen after the voiding contraction. In children under age 3, several voids were recorded at the same session and all voiding phases were assessed because the behaviour of detrusor and sphincter was changeable.

Results

Forty seven V-UDS records of 39 children (32 boys and 7 girls) under age 3 years and 80 V-UDS records of 58 children (33 boys and 25 girls) at the age of 3 years and over were reviewed. In children under age 3, 32 had the episodes of UTI and the others attended for hydronephrosis. In children at the age of 3 and over, the reasons for UDS were episodes of UTI in 29, incontinence in 19, hydronephrosis in 5, symptoms of voiding difficulty in 3 and nocturnal enuresis in 2.

A-Cs were noted in 55% (21/38) of children under age of 3. There was no difference in the incidence of A-C between boys and girls (57% vs. 55%). A-C did not always occur in every voiding cycles in children whose several voiding phases were observed. The mean value of amplitude of A-C in this group was almost same in boys and girls (103.7±55.6cmH₂O vs. 105.9±62.3 cmH₂O) and higher than the mean value of P_{det max} (85.3±54.1cmH₂O in boys, 74.0±29.7cmH₂O in girls).

In 58 children 3 years old and over, an A-C was noted in 60% (35/58). The incidence of A-C was not different between boys (60%) and girls (60%) nor changed with age. The mean value of the amplitude of A-C in the elder group was 73.1±36.9cmH₂O in boys and 84.0±56.4cmH₂O in girls. In 62% of these children, the amplitude of A-C was higher than the P_{det max} (boys 59.5±14.3cmH₂O, girls 51.5±14.1cmH₂O). DO was observed in 33% of children at the age of 3 and over. The incidence of DO was not significantly different between children with and without A-C (38% and 26%, respectively). However the incidence was significantly higher in children whose A-C amplitude was higher than 80cmH₂O when compared that with the remaining children (absent A-C or A-C amplitude<80cmH₂O) (62% vs. 26%, p=0.03).

The detrusor-sphincter discoordination was noted in 73 of 80 (91%) voiding cycles in children under 3 years old. The incidence of A-C was significantly higher in voiding cycles without detrusor-sphincter discoordination (7/7 vs. 25/73, p=0.001). And the incidence of A-C decreased with increase in number of interruption of urine stream caused by detrusor-sphincter discoordination. Detrusor sphincter-discoordination was noted in 25% of children 3 and over. The incidence of A-C was significantly higher in children without detrusor-sphincter discoordination (38/58) than the others (6/19). (p=0.02)

There were 7 boys and 2 girls who had the severe A-Cs, of which amplitude was more than 80cmH₂O, and duration was longer than the preceding voiding duration. Among these children, 5 children attended for urge incontinence and 4 of the 5 had multiple DOs. Anticholinergic drug was effective in all the 4 with multiple DOs. A girl attended for bilateral severe hydronephrosis and renal dysfunction. But she had no VUR or upper urinary tract obstruction. The only urodynamic abnormality demonstrated in her was severe A-C. The amplitude of the A-C was more than 200cmH₂O, and its duration was more than 1 minute.

The girl underwent internal urethrotomy and antimuscarinic medication. At three months after the operation her hydronephrosis improved in association with disappearance of A-Cs, and the effect lasted on the medication more than 2 years postoperatively.

Interpretation of results

There was no difference in incidence of A-C in relation to sex, age or reasons for UDS contrary to the previous report [1]. The reason for demonstrating no relation with age in this study is not clear, but it may be attributed that the elder children had LUT symptoms more frequently than the younger group. A-Cs occurred more frequently in children without detrusor-sphincter discoordination than those with detrusor-sphincter discoordination.

There was a girl with severe hydronephrosis, who had no abnormality except A-C. Her hydronephrosis improved with disappearance of the A-C after the treatment. We thought A-C was the possible cause of hydronephrosis and assumed higher amplitude and longer duration A-C may be dangerous for upper urinary tract function.

Concluding message

A-C was common in children who underwent UDS and the incidence did not change with age, sex or reasons for UDS. High amplitude A-C was related to DO. A-Cs occurred more frequently in children without detrusor-sphincter discoordination than those with detrusor-sphincter discoordination. It may be possible that severe A-C causes upper urinary tract deterioration.

References

1 BJU International (2002)90; 286-293

2 British Journal of Urology (1996)78; 780-782
3 BJU International (2000)85; 246-248

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HUMAN SUBJECTS: This study did not need ethical approval because this was a part of our routine clinical practice. but followed the Declaration of Helsinki Informed consent was obtained from the patients.