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VIDEO-URODYNAMIC EVALUATION OF NEGATIVE PROGNOSTIC FACTORS FOR SPONTANEOUS RESOLUTION OF PRIMARY VESICO-URETERAL REFLUX IN MALE INFANTS

Hypothesis / aims of study

It is known that boys often void with a high detrusor pressure during infancy but this is spontaneously resolved with development [1, 2]. We presumed that this might link to spontaneous resolution of primary vesico-ureteral reflux (VUR) in male infants. We prospectively evaluated the prognostic factors for spontaneous resolution of primary VUR in male infants by repeated video-urodynamic studies (V-UDS).

Study design, materials and methods

Patients: This prospective study comprised 20 male infants (34 ureteral units, UU) with primary VUR diagnosed by V-UDS. The majority of patients (75%) were diagnosed after episodes of urinary tract infection during infancy and the remaining 25% were prenatally diagnosed having hydronephrosis. Median age at the first V-UDS was 6.0 months (1-12 months).

V-UDS procedures: Bladder filling and intravesical pressure recordings were obtained via a double lumen 18G (1.15 mm in outer diameter) transurethral catheter. Contrast medium (room-temperatured, 30% meglumine iotalamate: Conray®) was instilled in to the bladder at a rate of 10 ml/min. Intravesical, abdominal, and subtracted detrusor pressures were recorded simultaneously with pelvic floor muscle EMG activity through surface electrodes placed on the perineal skin. All examinations were carried out without any anesthesia or sedatives with the infants lying supine. When the recordings were interfered by lack of cooperation, such as crying, the study was repeated until interpretable data was obtained.

Followup methods: Patients were followed according to a program of repeated V-UDS yearly. Median followup was 12 months. Spontaneous improvement of VUR was determined as the disappearance of VUR or down-grade with two or more grades.

Evaluation parameters: The following parameters were evaluated regarding the possible relation with spontaneous improvement of VUR: VUR grades, detrusor overactivity (DO), the maximum voiding detrusor pressure ($P_{det.max}$) at the base-line and at the final V-UDS, and the detrusor pressure at which VUR is detected (P_{VUR}) at the base-line and at the second V-UDS.

Statistical analysis: The results are expressed as mean ± standard deviation. A linear regression was used for the analysis of the relationship between $P_{det.max}$ and age. A Student's unpaired two-tailed *t*-test was applied for parametric comparisons and Chai-square test for non-parametric data comparisons. A provability level of < 0.05 is considered as statistically significant.

Results

The overall spontaneous improvement rate of VUR was 35% (12 UU improved, 22 UU not improved). When these VURs were divided into two groups, low gardes (≤ grade 2, n=11 UU) and high grades (≥ grade 3, n=23 UU), there was no statistically significant difference in the spontaneous improvement rate between the two groups (low grades 30% vs. high grades 45%, p=0.63). Boys with DO had a lower improvement rate (21%) than those without DO (45%), but this difference was not statistically significant. Negative correlation of $P_{det.max}$ with age (development) was found in both groups with and without spontaneous improvement (Fig. 1). Although there was no significant difference in the mean $P_{det.max}$ at the final V-UDS between the two groups, the mean $P_{det.max}$ at the base-line V-UDS in the boys having spontaneous improvement was 92±20 cmH_2O, which was significantly (p=0.004) lower than that (118±25 cmH_2O) in those without spontaneous improvement (Fig. 2). Moreover, the boys with $P_{det.max}$ greater than 100 cmH_2O at the base-line had a significantly (p=0.017) lower improvement rate (19%) than those with $P_{det.max}$ less than 100 cmH_2O (62%). The mean P_{VUR} at the base-line V-UDS did not differ between the two groups. However, the mean P_{VUR} at the second V-UDS (performed at 1-2 year old) in the group without spontaneous improvement was lower than that in the group with spontaneous improvement (23±34 cmH_2O vs. 51±29 cmH_2O, respectively), but this difference was not statistically significant (p=0.093). The boys with P_{VUR} at the second V-UDS less than 50 cmH_2O had a significantly (p=0.034) lower improvement rate (6%) than those with P_{VUR} greater than 50 cmH_2O (44%).

Interpretation of results

The present results confirmed the findings previously reported [1, 2] that male infants void with a high pressure but this is spontaneously resolved during development. In contrast to our expectation, the decrease in $P_{det\ max}$ in those having spontaneous improvement of VUR was similar to that in those without VUR-improvement. Only the major difference of $P_{det\ max}$ between the two groups was the base-line value at the first V-UDS during the infant year. It might be speculated that extraordinarily high voiding pressures during antenatal and infantile periods cause irreversible changes of vesico-ureteral junction so that VURs hardly disappear later. Another risk factor against VUR-improvement that we have found is low P_{VUR} after the infant year. This means that boys elder than 1 year old in whom VUR is detected with a low detrusor pressure ($< 50 cmH_2O$) may hardly release from their VURs.

Concluding message

The present study indicate that the negative prognostic factors for spontaneous resolution of primary VUR in male infants are $P_{det.max}$ greater than 100 cmH_2O during the infant year and P_{VUR} less than 50 cmH_2O after the infant year. The results of the present study do not support the hypothesis that the spontaneous decrease in $P_{det.max}$ observed in male infants during development is an etiological factor for spontaneous resolution of VUR in those boys.

References:

1. Video cystometry in young infants with renal dilation or a history of urinary tract infection. Urol Res 29:249-55, 2001
2. Videourodynamic findings in young infants with severe primary reflux. J Urol 171:829-33, 2004

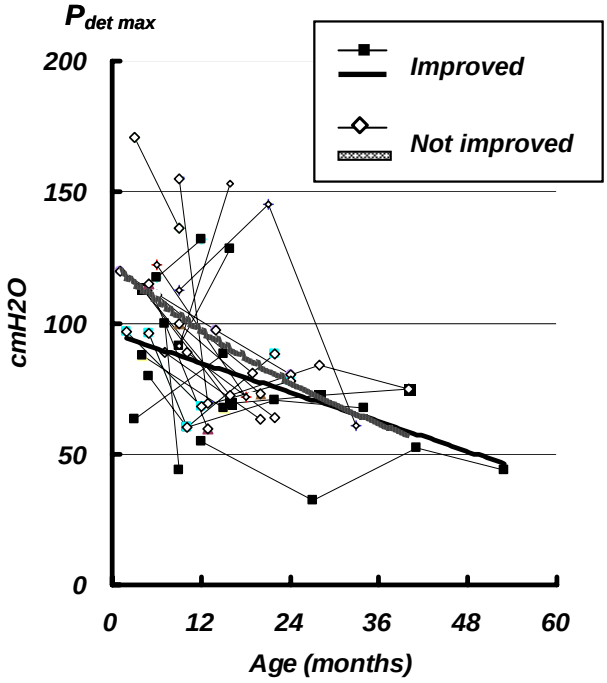

Fig. 1 The negative correlation of the maximum voiding detrusor pressure ($P_{det\ max}$) with development in boys with and without spontaneous improvement of primary VUR

Improved group: $P_{det\ max} = -0.93 \times months + 95.88$

n=32 ureteral units, p=0.0103 R^2=0.20

Not improved group: $P_{det\ max} = -1.80 \times months + 123.34$

n=52 ureteral units, p=0.00011 R^2=0.26

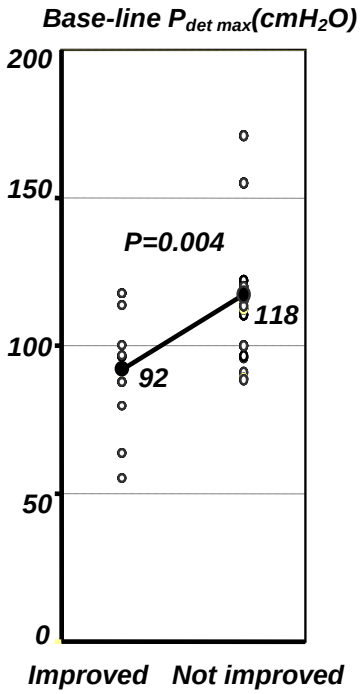

Fig. 2 The base-line $P_{det\ max}$ in male infants with and without spontaneous improvement of primary VUR

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