Prepubertal Penile Length in Distal and Mid Penile Hypospadiac Children is Comparable to Normal Boys

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Abstract

Aim
To measure the penile length in hypospadiac patients and compare the length with normal Indian children

Method
The penile length was measured in 50 hypospadiac patients (Group A) and compared with 50 normal boys (Group B) forming the age matched control group. The stretched penile length (SPL) was measured on the dorsal aspect of the penis. In cases with associated chordee the length was measured after chordee correction

Results
The mean age of the Hypospadiac boys (5.98 ± 2.39 years) was comparable with that of the normal boys (6.04 ± 3.12 years) (p>0.05). The mean SPL was 4.62 ± 0.46cm while the median (range) was 5 (2.6-6.3) cm in Group A. The mean SPL 4.95 ± 0.82cm while median (range) was 5 (3-8) cm in Group B. When the SPL was further subgrouped into type of hypospadias after chordee release, it was much less in the proximal hypospadias (p<0.05). There was a positive correlation with age in both the groups (p<0.05).

Conclusion
The SPL in distal and mid penile hypospadias is similar to age matched control group while it is less in patients with proximal penile hypospadias. Presence of severe chordee in proximal penile hypospadias may be a contributing factor to shorter SPL. There is a positive correlation between penile length and age of the subject.

Note: This paper was awarded the best poster prize at the 29th International Society of Hypospadias and Disorders of Sexual Differentiation, 22-24 November, 2013, held at Lucknow, India.

Introduction
The accurate measurement of the penile length in children is relevant when an anomaly of the external genitalia is suspected due to abnormal appearance. These conditions include ambiguous genitalia, micropenis, buried penis and hypospadias. There may be underlying severe endocrine and chromosome disorders. There have been various studies trying to create regional nomograms for penile length in children [1-4]. However, studies evaluating the penile length in hypospadiac children are sparse [5].

In hypospadias where the urethral meatus lies on the ventral surface of the shaft, the penile length may be a concern as one would like to know if the growth of the phallus is also affected due to hypospadias. The presence of ventral curvature known as chordee may further aggravate the shortening of the phallus due to restricted growth if not corrected in time. Hence a study was planned to assess whether the penile length is cases with simple hypospadias is affected due to the presence of the hypospadias.

Aim
To measure the penile length in hypospadiac patients and compare the length with normal Indian children less than 12 years of age.

Methods
The penile length was measured in 50 hypospadiac patients (Group A) and compared with 50 normal boys forming the age matched control group (Group B). The stretched penile length was measured on the dorsal aspect of the penis. Stretched penile length was measured by a single examiner to the nearest mm. In cases with associated chordee the length was measured after chordee correction. Group A was further sub grouped into A1;A2;A3 depending upon the type of hypospadias as Distal; Mid; Proximal penile Hypospadias. The presence of chordee was noted as mild; moderate; severe as the degree of curvature as ≤ 30⁰; 31⁰-60⁰; ≥ 61⁰. Student’s t test was applied for statistical analysis.

Exclusion Criteria
Micropenis was excluded from normal boys without hypospadias, Disorders of sexual differentiation including 5 alpha reductase deficiency, were excluded from the study group.

Results
The mean age of the Hypospadiac boys (5.98±2.39 years) was comparable with that of the normal boys (6.04±3.12 years) (p>0.05).

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The mean penile length was 4.62±0.46 cm and the median (range) was 5 (2.6-6.3) cm in Group A. The mean length 4.95±0.82 cm and median (range) was 5 (3-8) cm in Group B. Distal; Mid; Proximal penile hypospasias were present in 22; 17; 11 cases respectively. Chordee was present in 29 cases (mild in 9, moderate in 7, severe in 13). When the penile length was further sub grouped into type of hypospadias after chordee release (Groups A1; A2; A3), it was much less in the proximal hypospadias (Table 1). The difference in the SPL in Group A3 and Group B was statistically significant (p<0.001).

| Group (G) (n)          | Mean SPL ± SD (in cm) |
|------------------------|------------------------|
| Distal Hypospadias (A1) (22) | 5.14±0.32             |
| Mid Hypospadias (A2) (17)     | 4.96±0.28             |
| Proximal Hypospadias (A3) (11) | 3.62±0.42             |
| Normal Group (B) (50)         | 4.95±0.82             |

Table 1: Mean stretched penile length (± Standard deviation) in the various Groups.

Thus it was planned to compare the penile length in hypospadiac boys with the normal boys of similar race and region. Penile nomograms are available in various countries based on local population. The timing of surgery for hypospadiac repair in the west has gradually reduced to as early as 6-12 months. The penile stretched length of the full-term infant was 3.5 cm plus or minus 0.7 cm and the diameter was 1.1 cm plus or minus 0.2 cm [6]. However, in our region we found it difficult to create a good urethral tube in children younger than 3 years of age as the phallic size was less. Thus though nomograms are available in different parts of the world, we could not compare patients from our region with them.

The normal stretched penile length values for children younger than 5 years of age were reported as a little higher from a Turkish study as 4.82 ± 0.44 cm in 1-2 years (n = 135), 5.15 ± 0.46 cm in those 2-3 yrs old (n = 120), 5.58 ± 0.47 cm in those 3-4 yrs. old (n = 117), and 6.02 ± 0.50 cm in those 48.1 to 60 months old (n = 113) [7]. The fastest rate of increase in penile length was seen in the first 6 months of age, with a value of 1 mm/month [7]. They reported a significant correlation between penile length and the weight, height, and body mass index of the boys (r = 0.881, r = 0.864, and r = 0.173, respectively; P = 0.001). We have not compared the penile length with these as we did not want to have confounding factors that may influence these factors such as ethnicity and nutrition.

Tomova et al measured the SPL in 6200 Males aged 0 to 19 Years [8]. They found that the penile length and circumference demonstrated gradual growth with maximum growth between 12 to 16 years of age. In their series, the mean penile length remained less than 5 cm up to 10 years age. They noticed an increase in penile length 1 year after the enlargement of testes, and the changes ceased to be significant after 16 years [8]. The penile length increased simultaneously with penile circumference [8]. They also reported a modest though significant difference was found with respect to penile size between urban and rural populations.

**Discussion**

There is a genetic and ethnic basis for the height worldwide. Perhaps the phallic length is also related to the genetic makeup and the race. While examining the phallic length especially while correcting chordee, it was a dilemma whether the normal length has been achieved.

Also the need to perform early surgery in cases where the penile growth was restricted due to associated chordee was a concern.

Thus the penile length in distal and mid penile hypospadias is similar to age matched control group while it is less in patients with proximal penile hypospadias (p<0.001). The correlation coefficient for age and SPL was r = 0.58 in Group A, r = 0.59 in Group B and r = 0.59 taking all 100 patients together. There was a positive correlation between SPL and age of the subject in both the groups all the patients together (p<0.05) (Figure 1).

**Figure 1**: Dot Charts depicting the positive correlation of stretched penile length with age in Hypospadiac boys (A) and normal boys (B).
[8]. Children from rural regions had longer penile lengths than those from urban regions (mean 3.64±0.49 cm vs 3.49 ± 0.49 cm at age 1 year; p=0.01). This disparity remained significant during pubertal development (mean 9.72± 1.17 cm vs 9.29 ± 1.04 cm at age 19 years; p=0.01) [8]. This disparity may suggest an effect of the environment or food habits on the SPL. The height, body weight and testicular size of children have been reported to significantly increase with great economic development in Korea [9]. However, there was no significant change in SPL noted except for penile growth pattern [9].

The reliability of the method used in measurement of the SPL has remained a subject of debate [10]. However, SPL measurement has been realized as one of the most reliable methods in children to compare the penile length [11].

Measuring the penile length in comparison with nomograms from a similar population will help in early recognition of endocrine and genetic disorders associated with shorter phallic length. Identifying patients with hypospadias with a shorter penile length may help to make a selection for preoperative hormonal stimulation.

A previous study reported that penile size increased slowly till 4 years old followed by a steady phase [12]. It then increased rapidly during puberty [12]. Similar results have been reported by a study on Asian Indian boys aged 0-10 years [13].

We found that the mean penile SPL in proximal penile hypospadias after chordee release was significantly less than controls.

A similar study comparing the penile length in 40 hypospadiac patients with 100 normal patients was reported by Fievet et al [5]. Contrary to our finding, they did not find any difference in penile length between the hypospadias group and the control group regardless of degree of hypospadias. Their mean penile lengths were also similar to our study. They reported a mean penile length in the control group as 4.07 ± 0.92 cm and in the hypospadias group as 4.36 ± 0.9 cm (4.48 ± 0.89 cm for distal hypospadias and 4.21 ± 0.79 cm for proximal hypospadias). We have recorded a lower length in the proximal penile group. The reason for disparity may be the presence of severe chordee in our patients. They have not mentioned anything regarding the presence of chordee. Also the age group they studied was below 5 years of age.

On the contrary, results similar to ours have been recently reported by Moriya et al who measured the post-pubertal SPL in hypospadias patients at a median age of 17.2 years and found the SPL in severe hypospadias was significantly shorter than in mild hypospadias (p = 0.004) [14].

The presence of severe chordee may thus be responsible for the shorter SPL in patients with proximal hypospadias. These patients should be subjected to early chordee release to allow proper development of the phallic length.

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