International Journal of Surgery 12 (2014) 983–988

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Spectrum of penoscrotal positional anomalies in children

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HIGHLIGHTS

- In this cohort study it is possible to apply a new simple classification of penoscrotal positional anomalies.
- Penoscrotal transportation, which are subdivided into: 1. Major transposition classified as: Complete (Extreme) and incomplete; 2. Minor which are subdivided into: Bilateral (Symmetrical) or unilateral.
- Central Scrotalisation of the median raphe.
- Wide penoscrotal distance or caudal penoscrotal transposition.
- This anomaly seems to be a developmental field defect as no obvious chromosomal or hormonal defects have been detected in the studied cases.

ARTICLE INFO

Article history:
Received 1 May 2014
Received in revised form
17 June 2014
Accepted 1 August 2014
Available online 8 August 2014

Keywords:
Penoscrotal
Transposition
Genitourinary
Scrotum and anomalies

ABSTRACT

Background: The normal relationship between the scrotum and penis during fetal development is controlled by several genetic and hormonal factors, and impairment of this positional relation results in a wide spectrum of positional congenital anomalies. **Objective**: This a cohort study analysing 63 cases of penoscrotal anomalies (PSAs) according to severity and other associated malformations to provide a simple classification for recognising, describing and categorizing cases that may require surgical correction. **Design and setting**: Between 2005 and 2013, 63 diverse cases of penoscrotal positional anomaly were detected and analysed based on their hormonal profile and other associated anomaly. **Results**: A wide variety of PSAs were included in the study, 11 cases were of major PST with complete penoscrotal transposition in three, incomplete in eight, and minor degree in 45 cases, which are symmetrical (bilateral) in 29, sixteen are asymmetrical, 4 had midline scrotlisation, and 3 had wide penoscrotal distance. Associated genitourinary anomalies were detected in 29 babies. Sex hormonal assays showed no significant differences between the PSA patients and controls ($P < .05$), and no gross chromosomal anomalies were detected in any cases. **Conclusion**: Penoscrotal positional anomalies include the previously described penoscrotal transposition, and the variants of a central penile scrotalisation, and wide penoscrotal distance. A simple classification for these anomalies adopted herein.

1. Introduction

The external position of male gonads represents one of the most dramatic differences between both sexes. The presence of scrotal tissue around the penis is uncommon, but occurs along a wide spectrum of variants, and is found in association with other major genitourinary and systemic anomalies [1], Penoscrotal transposition was reported for the first time by Appleby in 1923 [2], this anomaly is frequently associated with severe hypospadias, where the penis lies entirely behind the scrotum in complete transposition, but in less severe forms the penis may appears to arise from the centre of scrotum or to be enveloped by scrotal tissues. It has been suggested that scrotal anomalies result from the early division and/or abnormal migration of the labioscrotal swelling [3]. Through examination of neonatal genitalia will permit the paediatric surgeon to detect a rare genitourinary anomalies like penoscrotal transposition anomalies (PSA). The purpose of this study is to investigate a 63 PSA cases with different grades of abnormal topical anomalies of the penis in relation to scrotum which makes it possible to classify this rare condition and detect other associated anomalies, and this could be helpful distinguishing between cases

Abbreviations: Penoscrotal Transposition, (PST); Penoscrotal Anomalies, (PSA).

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http://dx.doi.org/10.1016/j.ijsu.2014.08.001
1743-9191/

that warrants surgical intervention, and those merit only family reassurance and follow up.

2. Materials and methods

All male babies coming to our centre for any surgical problems were examined carefully to detect any congenital genitourinary anomalies and between 2005 and 2013, a total of 2400 babies aged from 1 week to 24 months were reviewed and 63 cases of PSA of different diversity were detected. All of which were tested for sex hormones levels (total and free testosterone, oestrogen, progesterone, luteinising, and follicle stimulating hormones), and the results of these tests were matched with 63 other paediatric patients of the same age and attending the paediatric surgery clinic, but with normal looking penises and scrotums, and without any renal anomalies; these served as a control group to detect any hormonal abnormalities. Chromosomal cytology performed in all PSA cases to identify any gross anomalies, but detailed chromosomal studies were not available in our centre. Abdominopelvic ultrasound evaluation was performed for all cases to detect any other associated congenital anomalies, MRI for 9 cases who had proximal hypospadias or suspected to have renal or other congenital anomalies and voiding cystourethrogram (VCUG) for 8 cases (6 cases of major PST and two cases suspected of major renal anomaly). Cases of PSA were classified according to the position of the penis with scrotum as well as the severity of altered scrotum position. All data were summarised and the results of hormonal analysis were statistically analysed using Student's *t* test and the χ^2 test. A Written consent was obtained from the parents approving the photographing and publication of photos of their children. Our University ethics committee approved this study.

3. Results

Sixty three cases of penoscrotal positional anomalies were identified from a total of 2400 babies examined, providing an approximate overall incidence of 2.5%. Fifty six cases presented different grades of PST, of them eleven cases (18%) had their penis are engulfed completely and symmetrically by the characteristic corrugated scrotal tissues, and three of them had the penis completely caudal to a cephalically migrated scrotum, those cases are considered as major PST and the last three cases considered as complete or extreme (Figs. 1 and 2), where the rest are major incomplete, as the penis had cephalic position with scrotal tissue completely surrounding the penis but still there is part of the scrotum caudal to the penis (8 cases, 13%) Fig. 3. Forty five cases (71%) had a minor degree of PST where the penis still positioned at the summit of the scrotum but with scrotal tissue creeping over the penile tissue but not completely encircling it, 29 cases (46%) of them are bilateral or symmetrical (Fig. 4), but 16 (25%) are unilateral, where the scrotal tissues appreciated only in one side (Fig. 5). Four cases (6%) was detect with central midline creeping of the scrotal skin (Fig. 6), in those cases the median raphe is replaced completely by the crowded scrotal skin (Fig. 7). Three cases (5%) had a reverse of the anomaly of penoscrotal transposition where wide penoscrotal distance detected with absence of the normal junction between the scrotum which migrate caudal and the cephalic penis (caudal scrotal transposition) (Fig. 8) and Table 1.

Cases of PSA are classified according to the position of the penis with scrotum and the severity of altered scrotum position in relation to the penis into three categories.

Of the 63 PSA cases, 24 babies (38%) were also diagnosed with a different genitourinary anomalies as shown in Table 2. Cryptorchidism is the main coincident 7/63, which occurs mainly with minor bilateral cases. Hypospadias (6/63) was associated with

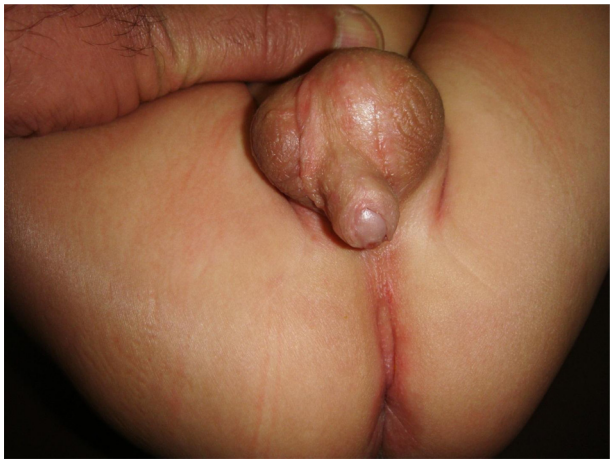

Fig. 1. Complete penoscrotal transposition with the whole scrotum cephalic to the penis.

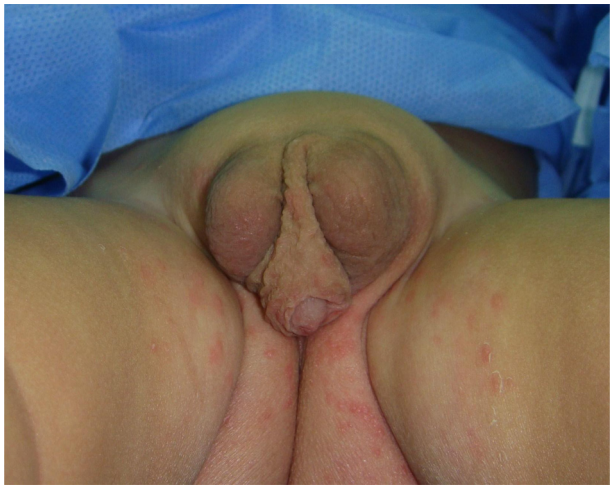

Fig. 2. Another case of complete PST.

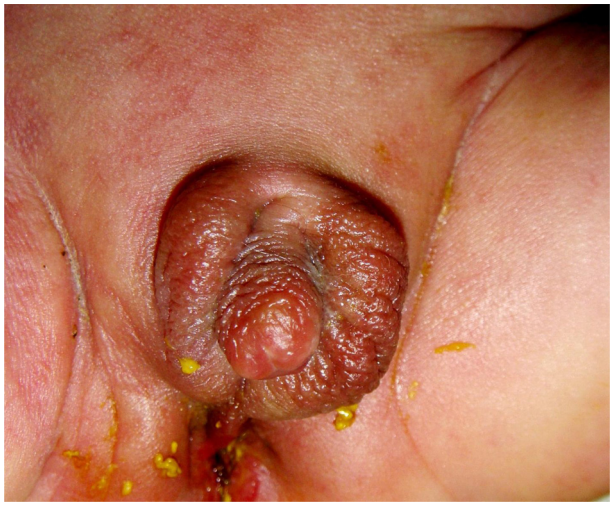

Fig. 3. Incomplete PST (Portion of scrotal tissues creeping around the penis, but rest of scrotal tissues still caudal to the penis).