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The Frequency of Penile and Scrotal Abnormalities in Early Childhood Boys Attending Pediatric Mansoura University Hospital

Ibrahim Abo Bakr Abdel-Hamid[1], Nanees Abd El-Badie Salem[2], Ahmed Fathy State[1], Amir Yahia Abdel-Raheem Abdel-Aal Leila*[1]

Departments of [1]Dermatology, Andrology and STDs and [2]Pediatric Endocrinology and Diabetes, Faculty of Medicine, Mansoura University, Egypt

***Corresponding author:** Amir Yahia Abdel-Raheem Abdel-Aal Leila, **Mobile:** (+20) 01060352021,

E-Mail: amiryahialeila@yahoo.com

ABSTRACT

Background: Scrotal and penile anomalies are among the common lesions in children, and some have no gross functional or morphological import on the patient. But many of them can be corrected by surgical operation at the earliest possible period, preferably when less than 2–3 years of age.

Objective: To determine the frequency of penile and scrotal abnormalities among boys (between 1-7 years of age) attending Pediatric Mansoura University Hospital.

Patients and methods: This was an observational cross-sectional study which set in the Mansoura University Children Hospital over a period of one year (February 2020 to January 2021). The study was undertaken on 5005 boys aged from 1-7 years.

Results: 0.2 % of the studied boys have phimosis, 0.3% hooded prepuce, 1.2% concealed penis, 0.8% penile torsion, 0.1% webbed penis and 0.1 % trapped penis. Chordee was detected among 0.4% of the studied cases, 0.4% hypospadias and 0.1 % penile epidermoid inclusion cysts. 0.4% have bifid scrotum, 0.2% scrotal pigmentation and 0.1% of the cases have scrotal hypoplasia. Mean anogenital distance was 4.186 cm ranging from 2.9 and 6.2 cm. Hydrocele and undescended testis (1.2% and 1% respectively). Inguinoscrotal hernia was detected among 1.5%. Highest mean stretched penile length among boys aged from 64 to 86 months (5.92 cm) followed by boys aged 38 to 63 months (5.5 cm) and the least for group aged 12 to 37 months (4.7 cm).

Conclusion: External genitalia abnormalities are common in boys. Careful screenings of children are mandatory to avoid the further complications.

Keywords: Early childhood boys, Frequency of penile, Scrotal abnormalities.

INTRODUCTION

Abnormalities of the male external genitalia and groins are a set of lesions, which may be congenital or acquired but are rather obscured to many kids and their parents. This is particularly so where the parents may not be certain of what a normal external genitalia and groin should look like **(1).**

Among the congenital ones are hypospadias, epispadias, buried penis, micropenis, ambiguous genitalia, phimosis, paraphimosis, aphallia (penile agenesis), diphallia, chordee without hypospadia, hernia, hydrocoele, bifid scrotum, ectopic scrotum, cryptorchidism/undescended testis, retractile testes and epididymal cyst. The acquired ones may result from circumcision which includes excessive residual foreskin, excessive removal of skin, meatal stenosis, granuloma, penile torsion, secondary chordee, skin bridges, glans amputation, inclusion cyst and urethro-cutaneous fistula **(1).**

When a male child is born, it requires full examination for the symmetry of external genitalia, pigmentation of the genitals, presence of palpable gonads and labioscrotal fusion. The measurement of the penis should be noted. The position of the penile meatus and the number of perineal openings also need assessment **(2).**

Genital anomalies are common, they may be congenital, acquired or iatrogenic. Congenital anomalies usually result from a disorder of genital differentiation and genital growth. They may be associated with different organ anomalies or other syndromes. Acquired anomalies may be caused by infections and obesity, while iatrogenic anomalies could be due to circumcision and other penile surgeries **(3)**.

Disorders of sex development (DSD) are a wide variety of conditions with various features and pathophysiology that most commonly present in the newborn or the adolescent. Affected newborns usually present with deformed genitalia, whereas adolescents present with delayed sexual development during the pubertal years **(4).**

With the recent progress in prenatal diagnosis including prenatal ultrasound (US) techniques and amniocentesis, fetal genitalia abnormalities can be diagnosed as early as 13–16 weeks of pregnancy **(5).** Early diagnosis and treatment of certain abnormalities such as undescended testis, hypospadias and varicocele could be of great importance for future children fertility **(6).**

The aim of this study was to determine the frequency of penile and scrotal abnormalities among boys (between 1-7 years of age) attending Pediatric Mansoura University Hospital.

PATIENTS AND METHODS

This was an observational cross-sectional study, which set in the Mansoura University Hospital [Mansoura University Children Hospital (MUCH)], a

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tertiary teaching and referral hospital, over a period of one year (February 2020 to January 2021). The study was undertaken on 5005 boys aged from 1-7 years who attended the outpatient clinics of the hospital.

Inclusion criteria: Boys, and age: from 1-7 years.
Exclusion criteria: Neonates and infants, late childhood boys (7-16 years), and adults.

All the boys participating in this study were subjected to the following:

A- History taking (through the parents): Full personal history taking including name, age, residence (rural or urban), religion, medical and surgical history. Gestational age (GA): fullterm or preterm (when the baby is born early before 37 weeks of pregnancy, it is a premature). History of drug intake either by the mother during pregnancy or by the child after birth. Present history taking including onset, course, duration and complications of the anomaly, its possible causes and previous treatments. Consanguinity, history of neonatal deaths and other associated anomalies. Family history taking including congenital anomalies and other diseases.

B- Clinical examination: All boys were submitted to complete general and local examinations to assess the anomaly, its physical and psychological effect if present.

I. **General examination:** Body built, look of boys, mental status, vital signs, upper, lower limbs, chest, heart, abdomen and skeletal examinations. Body mass index (BMI) was also recorded.
II. **Local examination:** All boys were carefully examined for the followings:

Penile evaluation:

Penis: absent or present and number. Circumcision: circumcised or not circumcised (intact prepuce). Foreskin: retracted or not (phimosis). Hooded prepuce (incomplete circumferential foreskin). Concealed penis (buried in prepubic tissues). Trapped penis (due to scar following circumcision or trauma). Webbed penis (the scrotal skin is attached abnormally on the underside of the penile shaft). Penile torsion (the penis is rotated or twisted on its axis), degree "angle". Chordee (penile curvature or bending of the penis). Meatus opening (normal, hypospadias or megameatus). Penile masses: (parameatal urethral cysts, epidermoid inclusion cysts and cyst of the median raphe). Stretched penile length.

Scrotal evaluation:

Central scrotalisation of the median raphe (median raphe is replaced completely by scrotal tissue). Scrotal agenesis and side. Scrotal hypoplasia and side. Bifid scrotum (midline cleft in the scrotum). Scrotal pigmentation. Ectopic scrotum. Scrotoschisis (testis eviscerated through a scrotal wall defect). Anogenital distance (AGD). Genital edema. Abundant suprapubic fat pad. Undescended testis and side wether left, right or bilateral.

Penoscrotal evaluation:

- Penoscrotal transposition: 3 grades, minor, incomplete and complete: (i) Minor (scrotal tissue is creeping to one or both sides of the penis). (ii) Incomplete (scrotal tissues surrounding completely the root of the penis). (iii) Complete (scrotum is located cephalic to the penis).
- Wide separation between penis and scrotum.

Genetic assessment: In the form of karyotyping in selected abnormal cases when necessary.

Ethical consent:

Study protocol was approved by Mansoura Faculty of Medicine Institutional Research Board (IRB). An informed written consent was obtained from parents of each participant sharing in the study. Collected data were used only for scientific purpose. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Qualitative data were described using number and percent. Quantitative data were described using median, range (minimum and maximum), mean, and standard deviation. ANOVA test was used for comparison among different times in the same group in quantitative data. Normality was tested using Kolmogrov-Smirnov test/Shapiro–Wilk test. Student t test was used for comparison of 2 groups with continuous parametric variables. The results were considered significant when the p-value was less than 5% ($p \leq 0.05$).

RESULTS

Table 2 shows the demographic data and history of the studied cases. 60% of cases were in the age group from 12-37 months, 57.6% delivered by CS delivery, 12.7% were preterm and 4.1% have positive consanguinity.

Table (1): Demographic characters and history among studied cases

	N=5005	%
Age/months Mean±SD Median (range)	36.93±18.69 35(12-86)	
Age groups / months 12-37 38-63 64-86	 3002 1504 499	 60.0 30.0 10.0
Mode of delivery Vaginal Cesarian Section	 2124 2881	 42.4 57.6
Gestational age Full term Preterm	 4370 635	 87.3 12.7
History of consanguinity No Yes	 4800 205	 95.9 4.1

Table (2) demonstrates that 87.5% of the studied boys were circumcised and the most common anomaly (12.3%) was retracted foreskin.

Table (2): Frequency of penile abnormalities among studied cases

	N=5005	%
Penis number (one)	5005	100.0
Not circumcised Circumcised	628 4377	12.5 87.5
Foreskin No (circumcised) Retracted Phimosis	 4377 616 12	 87.5 12.3 0.2
Hooded prepuce Absent Present	 4990 15	 99.7 0.3
Stretched penile length/ cm	5.065±0.58	
Concealed penis	59	1.2
Trapped penis	5	0.1
Webbed penis	6	0.1
Penile torsion	39	0.8
Degree of torsion 15 ° 45 ° 90°	n=39 7 30 2	 17.9 76.9 5.2
Chordee (Penile curvature)	18	0.4
Meatus opening Normal Hypospadias	 4983 22	 99.6 0.4
Penile Masses Normal (No masses) Inclusion cysts Parameatal urethral cysts Median raphe cysts	 4998 7 0 0	 99.9 0.1 0.0 0.0

Table (3) demonstrates that there was statistically significant higher mean stretched penile length among boys aged from 64 to 86 months.

Table (3): Measurement of stretched penile length/cm according to age group of the studied boys

	Stretched penile length/cm	Test of significance
Age groups/months		
12-37	4.70±0.41[ab]	F=14560.19
38-63	5.50±0.28[ac]	P<0.001*
64-86	5.92±0.33[bc]	

Similar superscripted letters denote significant difference between groups within same column. F: One Way ANOVA test, *: Statistically significant

Table (4) illustrates that 67 cases had minor penoscrotal transposition.

Table (4): Penoscrotal transposition and frequency of scrotal abnormalities among studied cases

	N=5005	%
Penoscrotal transposition:		
Normal	4913	98.2
Minor	67	1.3
Incomplete	25	0.5
Complete	0	0.0
Wide separation between penis and scrotum	3	0.059
Central scrotalisation of the median raphe	52	1.0
Scrotal abnormalities:		
Scrotal agenesis	0	0.0
Scrotal hypoplasia	5	0.1
Bifid scrotum	18	0.4
Scrotal pigmentation	11	0.2
Ectopic scrotum	0	0.0
Scrotoschisis	0	0.0

Table (5) illustrates that mean anogenital distance was 4.186 cm. Inguinoscrotal hernia was detected among 74 cases (1.5%) and 92.7% of the studied anomalies were detected since birth. Other associated congenital anomalies were present in 33 boys (0.7%). Such anomalies include mouth anomalies (cleft lip), Down syndrome, ventricular septal defect, hydrocephalus, limb myopathy, nephrotic syndrome and imperforate anus.

Table (5): Testicular and other congenital abnormalities frequency among studied cases

	N=5005	%
Anogenital distance/cm Mean±SD (range)	4.186±0.31 (2.9-6.2)	
Abundant suprapubic fat pad	1633	32.6
Genital edema (Hydrocele)	61	1.2
Undescended testis	49	1.0
Undescended testis side	n=49	
Right	18	36.7
Left	22	44.9
Bilateral	9	18.4
Inguinoscrotal hernia	74	1.5
Other congenital anomalies	33	0.7
Duration of anomaly since /years Mean±SD (range) Anomalies since birth	2.66±1.68 (1.0-7.0) 92.7%	

Table (6) illustrates that there was statistically significant higher anogenital distance among boys with age group from 64 to 86 months.

Table (6): Anogenital distance measurement according to age groups.

	Anogenital distance/cm Mean±SD	Test of significance
Age groups/months		
12-37	4.02±0.26[ab]	F=2049.35
38-63	4.38±0.17[ab]	P<0.001*
64-86	4.58±0.17[ab]	

Similar superscripted letters denote significant difference between groups within the same column F: One Way ANOVA test, *: Statistically significant

Table (7) illustrates that there was statistically significant lower mean anogenital distance among cases with hypospadias than normal cases. Mean anogenital distance among cases with undescended testis was shorter than cases with normal descended tests with statistically significant association. A statistically significant lower anogenital distance was detected among cases with small penile length with the highest association was detected for age group from 12 to 37 months.

Table (7): Association between anogenital distance in children with hypospadias, undescended testis and small penile length

		Anogenital distance / cm	Test of significance
Meatal opening	Normal	4.19±0.30	t=11.01
	Hypospadias	3.47±0.49	p<0.001*
Undescended testis	- ve	4.19±0.29	t=17.37
	+ve	3.45±0.366	p<0.001*
Small penile length (cm)			
12-37	Small length (< 2.35 cm)	2.90±0.0	t=4.34
	Normal length (> 2.35 cm)	4.02±0.26	p<0.001*
38-63	Small length (< 4.38 cm)	4.25±0.18	t=2.15
	Normal length (> 4.38 cm)	4.38±0.17	p=0.03*
64-86	Small length (< 4.38 cm)	4.35±0.65	t=2.78
	Normal length (> 4.38 cm)	4.58±0.16	p=0.006*

t:Student t test, *: Statistically significant

DISCUSSION

The aim of this study was to determine the frequency of penile and scrotal abnormalities among boys (between 1-7 years of age) attending Pediatric Mansoura University Hospital.

This was an observational cross-sectional study that was carried out on 5005 boys who attended the outpatient clinics of Pediatric Mansoura University Hospital, their mean age was 36.93 ranging from 12 to 86 months, 60% were in the age group from 12-37 months, 57.6% were delivered by CS delivery, 12.7% were preterm and 4.1% had positive consanguinity.

Preterm delivery was significantly associated with the following abnormalities; penile abnormalities, penoscrotal abnormalities, scrotal abnormalities and undescended testis. **Niedzielski *et al.* [(7)]** also reported the major role and the risk of prematurity in occurrence of undescended testis as the trans-abdominal phase of the testicular descent lasts from the 8th to 15th week and the inguinoscrotal phase lasts from the 25th to 35th week of gestation.

History of consanguinity was significantly associated with penile abnormalities, penoscrotal abnormalities and scrotal abnormalities.This supports the results of **Casale *et al.* [(8)]** study done in the population of North-Eastern France, with a consanguineous mating was known in 1.21% of the cases with congenital anomalies, vs. 0.27% in controls ($p < 0.001$).

In this study 87.5% of the studied boys were circumcised. Regarding the abnormalities detected in our study, 12.3 % have retracted foreskin, 0.3% hooded prepuce, 1.2% concealed penis, 0.8% penile torsion, 0.1% webbed penis and 0.1 % trapped penis. Curved penis was detected among 0.4% of the studied cases, hypospadias in 0.4% and penile masses in the form of epidermoid inclusion cysts in 0.1 %.

Closely similar to our study, **Morris *et al.* [(9)]** illustrated that circumcision rate is over 90% in Israel and many Muslim-majority countries, 86.3% in South Korea, to 80% in the United States, to 58% in Australia, to 45% in South Africa, to 20.7% in the United Kingdom, to under 1% in Japan and Honduras.This rate variation may be due to religious, cultural and hygienic measures. As regard phimosis, our study showed its prevalence was 0.2% but in **Morris *et al.* [(10)]** phimosis was reported in most newborns, then gradually decreased in prevalence. Most studies did not differentiate primary from secondary

phimosis, so values reported were net phimosis prevalence.

According to the penile abnormalities frequency among the studied cases, it is distributed as the following from the most to least frequents; concealed penis (1.2%), penile torsion (0.8%), chordee (curved penis) and hypospadias (0.4%), hooded prepuce (0.3%) and 0.1% for trapped penis, webbed penis and penile masses. While in **Adekanye *et al.*** [(1)] it is distributed as the following; penile torsion (6.49%), penile chordee (5.58%), micropenis (4.07%), hypospadias (0.45%).

The frequency of the concealed penis anomaly in our study was 1.2%, however **Matsuo *et al.*** [(11)] reported a prevalence of 3.7% in Japanese newborn infants and this variation may be due to racial and geographical factors.

Regarding aphallia**,** similar to our study; **Nisar *et al.*** [(12)] revealed that it is a very rare congenital anomaly of unknown cause occurring 1 in 30 million live births with 3 reported cases associated with congenital anomalies such as unilateral renal agenesis, bilateral undescended testes, anorectal malformation and rectovasical fistula.

Song *et al.* [(13)] showed that parameatal urethral cyst is an ultra-rare benign condition, and only a few cases have been reported in the literature, which came in the same line with our results.

In the present study, there was statistically significant higher mean stretched penile length among boys aged from 64 to 86 months (5.92 cm) followed by boys aged 38 to 63 months (5.5 cm) and the least for group aged 12 to 37 months (4.7 cm). **Jaiswal *et al.*** [(14)] showed that a total of 843 boys were enrolled in the study. Mean small penile length (SPL) was 4.1 ± 0.4, 5.4 ± 0.8, and 10.2 ± 1.7 cm at 1, 10, and 18 years of age respectively, and showed a gradual rise with age. The current study revealed that there was statistically significant positive correlation between age of the studied boys and stretched penile length ($r= 0.901$, $p<0.001$). This minimal difference with our results may be due to racial factors.

The current study showed 67 cases have minor penoscrotal transposition, 25 incomplete penoscrotal transposition (PST) without any case of complete penoscrotal transposition, which is close to **Cohen *et al.*** [(15)] study that reported a very rare cases of complete PST with less than 20 cases have been reported in the literature.

In the same line, our study didn't reveal any cases of scrotoschisis**,** scrotal agenesis and ectopic scrotum, which is close to the very rare cases of scrotoschisis reported in **McLaughlin *et al.*** [(16)] with less than 20 cases have been published in the literature, and **Murashima *et al.*** [(17)] study, which illustrated only one reported case of left ectopic scrotum in a three years old boy without associated congenital anomalies.

This study also showed that mean anogenital distance was 4.186 cm ranging from 2.9 and 6.2 cm. Abundant suprapubic fat pad, genital edema and undescended testis were 32.6%, 1.2% and 1%, respectively. Inguinoscrotal hernia was detected among 74 cases (1.5%) and mean duration of anomaly was 2.66 years with 92.7% of the studied anomalies were detected since birth. Other associated congenital anomalies were present in 33 boys (0.7%). Such anomalies included mouth anomalies (cleft lip), ventricular septal defect, hydrocephalus, limb myopathy, nephrotic syndrome and imperforate anus. There was statistically significant association between the frequency of undescended testis, genital oedema with age of the studied boys (with the highest frequency detected for age group from 38 to 63 months).

The prevalence of undescended testis in **Adekanye *et al.*** [(1)] study was found to be 0.9%, which is close to our study and the widely quoted prevalence of 1% by age 1. **Onuora and Evbuomwan** [(18)] also reported a prevalence of 0.5% out of 2200 between the ages of 6 and 12 years in Nigeria. These boys with undescended testis, particularly with bilateral lesion, may likely have fertility problem later in life, even if the lesion is corrected at their present age.

The incidence of inguinoscrotal hernia was 1.5%, which is low compared to other studies with that ranges between 2.4–13.7% but comparable to that in the general population that ranges between 1–5% [(19, 20)]. The reasons for this could not be based on the design of the study perhaps some other unidentified factors may be responsible. It has however been reported in studies with low incidence that prematurity and other diseases may make the prevalence high, which is likely to be absent in the population sampled[(19, 20)].

This study revealed statistically significant higher anogenital distance among boys with age group from 64 to 86 months (4.58 cm) followed by boys aged from 38 to 63 months (4.38 cm) and the least was for boys aged from 12 to 37 months (4.02 cm).

There was statistically significant lower mean anogenital distance among cases with hypospadias than normal cases (3.47 versus 4.19 cm). Mean anogenital distance among cases with undescended testis was shorter than cases with normal descended tests (3.45 versus 4.19 cm) that came in favor of **Thankamony *et al.*** [(21)] study results which revealed that boys with cryptorchidism and hypospadias had shorter mean AGD than healthy boys (both $p < 0.0001$).

The prevalence of genital edema (hydrocele) in children older than 1 year of age is probably less than 1%. The prevalence of hydrocoele in this study was 1.2 %, which was higher than 0.23% found in Southern Jordan and 0.78% found in West of Iran in **Yegane *et al.*** [(22)] and **Al-Abbadi and Smadi** [(23)] studies.

CONCLUSION

External genitalia abnormalities are common in boys. There is obviously a delay in the diagnosis and management of children at this age group. Careful screenings of children at pre-school and school age are

mandatory to avoid the further complications. Increased public awareness of such abnormalities and the need for early referral are very important.

RECOMMENDATIONS

Similar studies should be done on a large number of population with different socioeconomic status, education, culture and religion.

Boys with genital anomalies should be carefully evaluated clinically and investigated as well. Screening systems for diagnosis and appropriate treatment of these abnormalities are necessary. Early restoration of the normal genital status is essential in order to improve the reproductive capacity.

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