

Original Research Article

Evaluation of incidence of cryptorchidism with special reference to anatomical and clinical aspects

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ABSTRACT

Background: Cryptorchidism is simply defined as the absence of one or both testes from the scrotum. It is the most common birth defect of the male genitalia. The testis may be located intra-abdominal or inguinal. This article mainly deals with embryology, etiology, anatomy and incidence types of cryptorchidism in Tumakuru rural district.

Methods: This study was interdepartmental and prospective, consisting of 66 cases conducted at the Department of Pediatric Surgery and Anatomy and the period of study was from April 2013- March 2017. Cryptorchidism has been classified into 1) Intra-abdominal, 2) Inguinal, 3) Ectopic testis (perineum).

Results: Out of 66 cases, testis in inguinal canal is the most common incidence followed by the intra-abdominal and Ectopic testis. Least found was ectopic and torsion in the inguinal canal. Complications are torsion and vanishing testis.

Conclusions: This condition is repairable in a vast majority of cases. Early diagnosis and surgical intervention have to be carried out to correct this defect.

Keywords: Congenital anomalies, Cryptorchidism, Ectopic testis, genital anomalies, Testicular anomalies, Undescended testis

INTRODUCTION

Cryptorchidism represents the most common birth defect of the male genitalia and sexual differentiations. It is simply defined as the absence of one or both testes from the scrotum.¹ The prevalence of Cryptorchidism in premature boys is reported to be as high as 30% while in full-term newborns ranges between 1% and 3%.² Although infant born with descended testis, in 75% of cases in full term neonates and in 90% of preterm neonates, it may descend to scrotum later.³

Primordial germ cells which are destined to form the gonadal structure originates from yolk sac. They move

forwards to the gonadal ridge in coelomic epithelium by amoeboid movement in 4th or 6th week of pregnancy.

The presence of SRY gene in Y chromosome, primordial cells are differentiated into bipotential gonadal / ovarian cells during 4th or 6th week of gestation. Anti-Mullerian hormone secreted by sertoli cells causes regression of Mullerian structures.

Testosterone is secreted by Leydig cells by 10th week. This stimulates the wolffian duct to form epididymis, vas-deferens and seminal vesicles. Testosterone is converted into dihydrotestosterone by 5-alpha reductase, resulting in virilization of the external genital region

during 10th to 12th week. Transabdominal descent of testis occurs between 7th and 15th week. This depends on insulin-like peptide (INSL3) and is related to the receptor leucine-rich repeat family of G-protein-coupled receptor *(LGR8). Inguinoscrotal descent is dependent on androgens. Hence mutation / polymorphism of INSL3 and LGR8 may cause undescended testis (UDT).³ The mechanism regarding the descent of testis is still debatable although there is evidence that endocrine, genetic, and environmental factors are involved.⁴

The most common clinical presentations are pain in the groin with empty scrotum and the common complication includes torsion and vanishing testis. By modern and early surgical intervention, this defect may be corrected. This article mainly deals with embryology, etiology, anatomy and incidence types of cryptorchidism in Tumakuru rural district.

Patients with undescended testis should be treated because of increased risk of infertility, testicular cancer, torsion or accompanying inguinal hernia.

METHODS

The prospective study was conducted at the Department of Pediatric Surgery and Anatomy at Sri Siddhartha Medical College, Tumakuru, Karnataka, India. The period of study was from 2013 to 2017. The study includes 66 cases of cryptorchidism irrespective of caste, religion and socio-economic status. Cases were analyzed with respect to different types of cryptorchidism. The types and associated complication were as below.

Inclusion criteria

- Intra-abdominal,
- Inguinal,
- Vanishing testis,
- Ectopic testis (perineum),
- Torsion in the inguinal canal.
- Inguinal with Hypospadias.

Physical examination by palpation method and by ultrasound method were used.

We examined 66 patients of pediatric age group presented with absence of testis in scrotum.

Clinically undescended testis is diagnosed by using two hand technique. Palpation should take place in an anxiety-free atmosphere with warm hands. As cold and anxiety can cause the cremasteric reflex thereby causing the retraction of testis. Patients to be examined in supine position, with legs abducted. Examination should begin with exploration of the UDT at anterior superior iliac spine and sweep the groin from lateral to medial with non-dominant hand. Once the testis is palpated, the examiner should grasp the testis with the dominant hand and continue to sweep the testis towards the scrotum with

the other hand. Testicular mobility, size, consistency and spermatic cord tension should be assessed. If the testis remains in the scrotum after it is maintained there for some time, then it is considered as retractile testis.

The difference from retractile and UDT is success of delivery and stability of the testis within the scrotum. The retractile testis will remain intra-scrotal after overstretching of the cremaster muscle. Whereas UDT will return to its undescended position after being released.⁵

USG is a useful in diagnosing impalpable testis. Impalpable testis should be examined by laparoscopic surgery with or without radiological guidance. MRI is a useful technique particularly for ectopic testis located in abdomen, which cannot be detected by using laparoscopic or open surgery. CT is the least preferred technique.⁶

Inclusion criteria

All cases with cryptorchidism.

Exclusion criteria

Cases presented with other genetic abnormalities.

RESULTS

The study includes 66 cases whose age ranging from 6 months to 12 years. Most of the cryptorchidism cases were detected at early age groups (6 months to 2 years) which accounts for 50% (33 cases) and very few cases were detected at later age groups (6-12 years) which accounts for 7.57% (5 cases). The incidence of cryptorchidism according to age distribution and laterality among the study population was tabulated in Table 1.

Table 1: Age distribution and laterality among the study population.

Age distribution	Laterality		Total (%)
	Right	Left	
6 months- 2 yrs	9	24	33 (50%)
2-4 yrs	6	14	20 (30.3)
4-6 yrs	3	5	8 (12.12)
6-12 yrs	2	3	5 (7.57)
Total	20	46	66 (100)

P value <0.05 is considered as significant

According to laterality, the incidence of cryptorchidism on the left side was seen to be more than right side in all age groups which is statistically significant.

In the present study, cryptorchidism was classified into Intra-abdominal, Inguinal, Ectopic testis (perineum) and Inguinal with Hypospadias. The incidence of

cryptorchidism based on above said classification according to the age distribution was tabulated in Table 2.

Table 2: Location of undescended testes according to the age distribution.

Location of testis	6mts-2yrs	2-4 yrs	4-6 yrs	6-12 yrs	Total no. of cases (%)
Inguinal	27	11	5	4	47 (71.2)
Intra-abdominal	5	4	2	1	12 (18.2)
Vanishing	-	3	-	-	3 (4.55)
Ectopic (perineum)	-	1	-	-	1 (1.51)
Torsion in inguinal canal	-	-	1	-	1 (1.51)
Inguinal with hypospadias	1	1	-	-	2 (3.03)

The most common among them were inguinal with incidence of 47 (71%) cases. Out of 47 cases, 27 inguinal cases were detected and corrected between 5 months to 2 years of age (Figure 1, 2).



Figure 1: The inguinal type of cryptorchidism. Assessing the length of the spermatid.



Figure 2: The inguinal type of cryptorchidism. Testis placed in sub-dartos Pouch.

The second most common site for cryptorchidism was intra-abdominal with the incidence of 12 (18.2%) cases (Figure 3, 4). Ectopic testis and torsion in inguinal canal was found to be the least with the incidence of 1.51% (1 case) each.



Figure 3: Intra-abdominal type of cryptorchidism. Intra-abdominal testis.



Figure 4: The intra-abdominal type of cryptorchidism. Assessing the mobility of testis.

DISCUSSION

Embryological background

Prior to gonadal differentiation, undetermined gonad lies in perirenal position. It is loosely held in place by dorsal and ventral ligaments. Dorsal ligament is referred to as cranial suspensory ligament (CSL), whereas ventral ligament later develops into gubernaculum. In the male, androgen induced dissolution of CSL occurs, simultaneously Mullerian inhibiting substance (MIS) from fetal Sertoli cells causes Mullerian derivatives to disappear. The gubernaculum grows and thickens to become a plum ligamentous body. This retains the testis close to the inguinal region, while rest of the abdominal contents grow dorsally, thus effectively separating testis from the kidney. The most important factor responsible for this step is insulin-like factor 3 (INSL also Known as

relaxin-like factor RLF). These are major products of fetal and adult Leydig cells. Later inguinal canal and scrotum formed into which testis descend at or shortly before birth. This step seems to involve the gubernaculum which facilitates the passage of testis into the scrotum⁷. Failure of above said steps may lead to the undescended testis.

Other causes of cryptorchidism

- Patients with defects in androgen production or metabolism show varied forms of reduced virilization, including abdominal, inguinal, scrotal testis. However exact role of androgens in testicular descent still quit unclear.^{8,9}
- Mullerian inhibiting substance (MIS), produced by immature Sertoli cells, is responsible for involution of the Mullerian tract in male embryos. It has been considered as a possible factor in testicular descent and cryptorchidism. MIS was found to have a very weak effect on the growth of gubernaculum.¹⁰
- Pregnant mothers were being treated with diethylstilbestrol (estrogen) as hormonal support to pregnancy. This was found to have a high rate of cryptorchidism and other genital defects.¹¹
- Deletion of transcription factor Hoxa-10 leads to cryptorchidism.¹²
- Severance of genitofemoral nerve either in spina bifida or in experimental animals also leads to cryptorchidism, which appears to be partially alleviated by application of calcitonin gene-related peptide (CGPR).¹³
- The incidence of cryptorchidism correlates with the use of Dichlorodiphenyltrichloroethane (DDT) or organochlorine compounds.^{14,15}

In the present study, the prevalence of cryptorchidism among the study population was highest in the age group between 6 months to 2 years (50%). The prevalence dropped significantly as age increases i.e. in the age group between 6 -12 years to 7.57%. Similar findings were documented by Kumanov P et al among Bulgarian boys¹⁶. He concluded that the prevalence of cryptorchidism was higher in children between one and ten years (2.1%) and dropped significantly in older boys to 0.6%. In the age group under 1 year, his study showed approximately 3.2% incidence which was comparatively higher (50%) in present study. Whereas in the age group between 6-15 years, he reported an incidence of 1.58% which was comparatively higher in our study under the age group 6-12 years 7.57%.

Table 3: Comparison of different authors based on laterality.

Cryptorchidism	Authors			
	Barthold et al	Kumanov et al	Biswas et al	Present Study
Right Side	70%	73.9%	55.2%	30.3%
Left Side	30%	17.4%	31%	69.7%

In this series, cryptorchidism was classified based on laterality, left side incidence was seen to be more than right side in all age groups which is statistically significant. But, we found in the literature the incidence reported more on the right side as shown in Table 3.¹⁶⁻¹⁸

In the present study, the majority of cases were in inguinal region (71.2%) including the inguinal canal, superficial and deep inguinal ring. The second most common site for cryptorchidism was intra-abdominal which accounts for 18.2% of cases. A population-based cross sectional study among Bulgarian boys was conducted by Kumanov et al.¹⁶ His finding regarding the incidence at inguinal region was very less when compared to our study (24.47%).

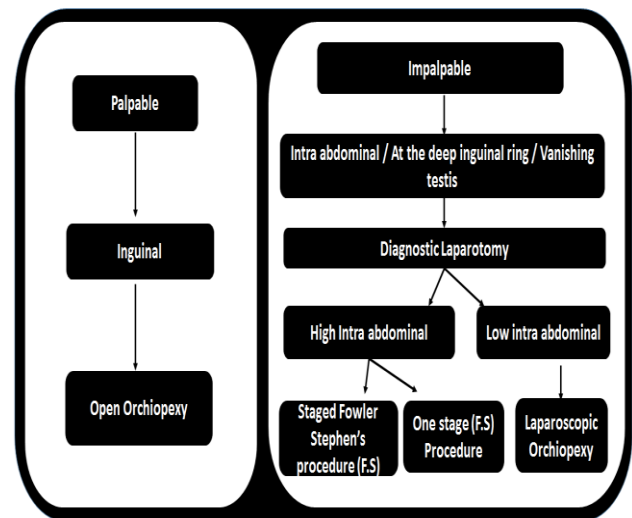


Figure 5: Management of cryptorchidism.

Another study conducted by Biswas SC et al reported 93.1% incidence at the inguinal region, which includes inguinal canal (41.4%), superficial inguinal ring (31%) and deep inguinal ring (20.7%).¹⁸ Above said data was much higher than our findings. He also documented 6.9% incidence of cryptorchidism at intra-abdominal.

A recent study conducted on 10875 boys by Schneuer FJ et al recorded 4980 (45.7%) boys with undescended testis. Of these, 94.8% were Inguinal (unilateral 77.7% and bilateral 17.1%), 1.1% ectopic and 1.2% torsion¹⁹. The latter data was close to our findings (1.5%). Brief description regarding the management of cryptorchidism had been explained in Figure 5.

CONCLUSION

The undescended testis is the most common genital malformation in boys and should be diagnosed and treated early. If medicinal therapy (LHRH and hCG) is ineffective, orchidopexy should be performed immediately to reduce the risk of further damage to the testicular tissue. Parents should be informed of the

possibility of testicular malignancy and reduced prospects of fertility.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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