

Early Orchiopexy in Undescended Testis – Outcome of Surgical Management in a Tertiary Care Center

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ABSTRACT

Introduction: Undescended testis (UDT) is a common congenital problem encountered in pediatric age group. Boys with UDT may have an increased incidence of testicular hypoplasia, atrophy, infertility, torsion of testis, trauma, and testicular malignancy. Hence, there is a need for locating testis and its placement in the scrotum at an early age. **Materials and Methods:** This was a retrospective study, conducted in a tertiary care center in South India. Data were collected from the medical records and follow-up details of 46 patients who underwent evaluation and surgical management for cryptorchid testis between December 2018 and May 2020. Details were collected regarding history, investigation results, details of surgery, and any intraoperative or post-operative complications. **Results:** The most common age group presenting with UDT in the current study was 9–12 years with 34.79% (16 children). The overall procedure-related success rate for orchiopexy was 97.5%. In the younger age group of 9 months–6 years, all the UDT were placed into scrotal position, without any volume loss in the short-term follow-up. All the orchiectomies performed were in children aged beyond 6 years. **Conclusions:** Orchiopexy needs to be completed by 12 months of age for higher salvageability of testicular units as per the current evidence. However, in view of a significant number of late presenters with a higher rate of testicular loss, there is a need for strengthening of referral system for early referral. Standardized surgical approach, utilization of laparoscopy in managing intra-abdominal testis, and optimal timing of orchiopexy are the key to increase the salvageability of testicular units.

Key words: Cryptorchidism, Orchiectomy, Orchiopexy, Undescended testis

In 1786, John Hunter was the first to observe that the testis was located in the abdomen of the fetus. Undescended testis (UDT) is a common congenital problem encountered in pediatric age group. Cryptorchid testis, literally meaning hidden or obscure testis, refers to the absence of testis in the scrotal position and is most commonly undescended or maldescended. Overall, up to 4% of full-term male newborns may present with UDT. The prevalence is around 33% in premature male newborns and it reaches 60–70% if the birth weight is <1500 g [1]. In majority, the testis descends within the subsequent 3 months, resulting in an incidence of 1% UDT at 1 year. The testis is unlikely to descend after this time. However, testicular descent after 3 months of age is also possible; especially, in preterm infants [4]. About 10% of the cases are bilateral and are commonly associated with complex syndromes or other congenital malformations such as abdominal wall defects or neural tube defects [2].


Factors that predispose to UDT include prematurity, low birth weight, small for gestational age, twins, genetic predisposition,

endocrine disorders (e.g. disruption of hypothalamic-pituitary-gonadal axis), and environmental factors such as nicotine, alcohol, pesticides, and maternal exposure to estrogen during the first trimester [2]. Since 80–90% of a testis is composed of seminiferous tubules, the volume of the testis is significantly related to the semen profile and testicular function, hence testicular volume is an indicator of development of the testis [3]. Since boys with UDT may have an increased incidence of testicular hypoplasia, atrophy, infertility, torsion of testis, trauma, and testicular malignancy, there is a need for locating testis and placement in the scrotum at an early age.

Principles of surgical management of palpable UDT are well established. Management of non-palpable testis is challenging and laparoscopy is an ideal tool for diagnosis and management in this scenario. There is a need for spreading the awareness regarding current concepts of management of UDT; especially, among pediatricians, general surgeons, and referral doctors. Children who undergo early orchiopexy need to be followed up, to evaluate outcomes of UDT with respect to growth potential [4].

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MATERIALS AND METHODS

This was a retrospective study, conducted in a tertiary care center in South India. The medical records and follow-up details of 46 patients, who underwent evaluation and surgical management for cryptorchid testis between December 2018 and May 2020, were used to obtain data regarding their clinical history, investigation results, details of surgery, and any intraoperative or post-operative complications. Intraoperative findings such as location of testis, testicular morphology, and anatomical abnormalities of cord structures were recorded. Patients who underwent orchiopexy for retractile testis or ectopic testis were excluded from the present study.

The sample size calculated was 35 with level of significance (alpha) 5%, absolute available error (d) 3%, and prevalence of pediatric UDT at our hospital was 0.83%. All the children with cryptorchid testis who presented in the newborn period were closely followed through the period of expected mini puberty, for any possible chances of spontaneous descent. Children were evaluated clinically for laterality, palpability, location, size, and consistency of testis.

Systematic palpation of groin and scrotum was done from the inguinal region toward the pubis in a supine or frog-leg position with flat surface of warm fingers. The inner thigh, femoral, pubic, perineal, and penile regions were also inspected and palpated to find the ectopic testis [4,5].

Further evaluation for scrotal morphology, genital anomalies, and head-to-toe examination to rule out any associated syndromic manifestations or isolated anomalies was done. Those children who were followed up from early infancy were subjected for surgery with intent of orchiopexy by 9 months–12 months of age. Children, who presented to us at older age, were evaluated and considered for surgical management, as and when they presented.

Surgical Technique

At surgery, all the palpable testes were reexamined under anesthesia and inguinal orchiopexy was done. During orchiopexy,

the standard surgical principles of orchiopexy were followed which included herniotomy, retroperitoneal dissection as and when required, excision of testicular appendages when present, and inspection of cord structures, testis, and epididymis for anatomical variations. Salvageable testis was placed in subdartos pouch to complete orchiopexy. Atrophic nubbins of testis when found were excised and subjected for histopathological examination (Figs 1-3).

For clinically non-palpable testis, which were palpable under anesthesia, including cases with peeping testis, inguinal orchiopexy was done. Diagnostic laparoscopy was done in children in whom testis was not palpable under anesthesia. At laparoscopy, any atrophic units were excised and biopsied. In instances, where vas and vessels were found to exit internal ring, further inguinal exploration was considered to look for nubbins. Salvageable testes located away from internal ring were subjected for Fowler-Stephens staged orchiopexy. All the children received six doses of beta-human chorionic gonadotropin (hCG), after Stage 1 Fowler-Stephens procedure and considered for Stage 2 procedure after 6 months.

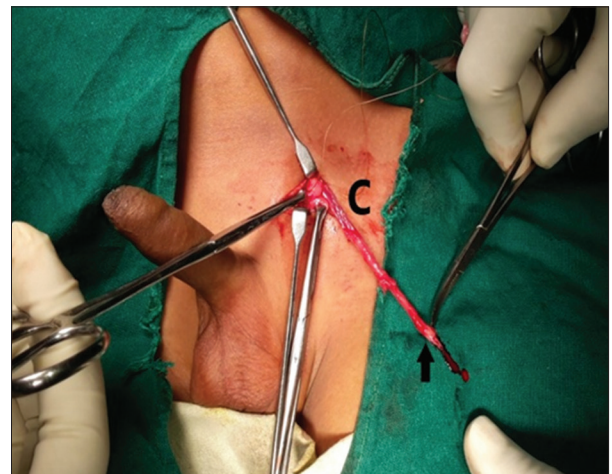


Figure 2: Cord structures (c), ending in atrophic nubbin of testis (Arrow)

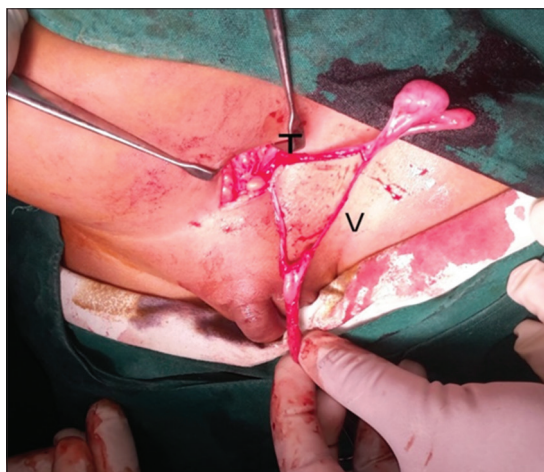


Figure 1: Long looping vas (V) and short testicular vessels (T), in a child with peeping testis located at internal ring

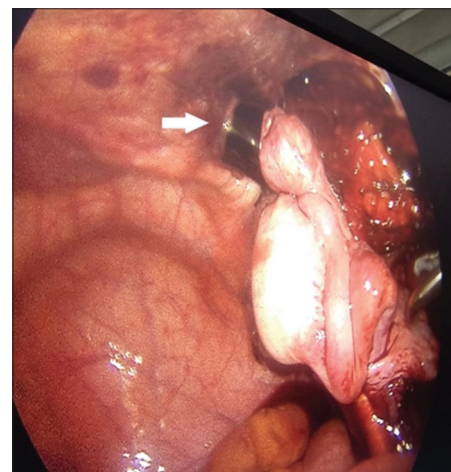


Figure 3: Intra-abdominal testis being mobilized out medial to inferior epigastric vessels at Stephens-Fowler 2nd stage orchiopexy

Definitions

An UDT may be situated along its normal path of descent or in an ectopic location. Testicular position in UDT is categorized as intra-abdominal, inguinal, supra-scrotal, and high scrotal and scrotal accordingly. A normally placed testis is at or below the midpoint of the scrotum without palpable tension on the spermatic cord.

1. Cryptorchid/UDT: Testis neither resides nor can be manipulated into the scrotum
2. Ectopic: Testis has moved along aberrant course beyond inguinal canal: Femoral, pubopenile, perineal, or contralateral scrotum [6]
3. Retractable: Testis can be manipulated into scrotum and it remains there for some time without tension on the cord
4. Gliding: Testis can be manipulated into upper scrotum but retracts immediately when released [7]
5. Acquired UDT: Testis which was previously observed in the scrotal position, “ascends” spontaneously or following attempted orchiopexy or other inguinal surgery (hernia).

RESULTS

During the study period, 46 children underwent surgical management for cryptorchid testis and relevant data were analyzed. The most common age group of presentation was between 9 and 12 years with 34.79% (16 children) followed by 9 months–3 years and 6–9 years age group with 23.91% (11 children in each group). Children in the 3–6 years age group constituted 17.39% (8 children). Youngest child in the present study was 9 months old and the eldest being 12 years of age. About 4.34% of children had family history of UDT (three children) (Table 1).

The most common presenting symptom in the present study was absence of testis in scrotum, seen in 84.78% of cases (39 children), followed by groin swelling in 15.22% of cases (seven children). The right-sided presentation was most commonly seen in 65.22% of cases (30 children) followed by 28.26% (13 children) on the left side. Bilateral UDT was seen in 6.52% of cases (three children). The most common position of UDT was intracanalicular in 60.87% of cases (28 children) followed by intra-abdominal in 15.22% of cases (seven children) (Table 2).

When relation of the location and palpability of testis was analyzed, 22 of the 28 canalicular testis were palpable. All the testes located at superficial inguinal ring were palpable. All the

testes located near deep ring or intra-abdominal position were non-palpable. Testes were not palpable in 20% of patients with cryptorchidism (Table 3).

The most common association with UDT was clinically apparent inguinal hernia, seen in 10.87% of cases (05 children). Most of the children underwent inguinal orchiopexy, accounting for 73.92% of cases (34 children) followed by laparoscopic orchiopexy in 10.87% of cases (five children). Overall, orchiopexy was done in 84.78% of cases of UDT (39 children). About 10.87% of cases (five children) underwent open orchiectomy and 4.34% of cases (two children) underwent laparoscopic orchiectomy, accounting for overall orchiectomy in 15.22% of cases (seven children). Testis which was grossly atrophic nubbins or flabby with loss of testicular morphology was subjected for orchiectomy and was biopsied (Table 4).

Relationship of the surgical procedures, done with respect to the age group, showed that all the children in the age group of 9 months–6 years underwent successful orchiopexy, accounting for 41.30% of total cases (19 children). In the age group of 6–12 years, 43.48% of total cases (20 children) underwent orchiopexy. Overall, 15.22% of total cases (seven children) who underwent orchiectomy belonged to 6–12 years age group. When the relation between UDT and patent processus vaginalis was analyzed, our study showed patent processus vaginalis (hernia sac) in 95.65% of cases (44 children), but only 10.87% (five children) of the above group presented with clinically apparent hernia.

Post-operative complications observed in the present study included hematoma in 5.12% (two children) and wound infection in 2.56% of cases (one child). In the orchiectomy group, 1 child (14.28%) who underwent 2nd stage of laparoscopic Fowler-Stephens

Table 2: Position of testis

Position	No. of cases	Percentage
Intra-abdominal	07	15.22
Near deep inguinal ring	05	10.87
Intracanalicular	28	60.87
Near superficial inguinal ring	06	13.04

Table 3: Relation to location and palpability of testis

Location	No. of cases	No. of palpable testis
Intra-abdominal	07	-
Near deep inguinal ring	05	-
Intracanalicular	28	22
Near superficial inguinal ring	06	6

Table 4: Surgical management

Type of surgery	No. of cases	Percentage
Orchiopexy	34	73.92
Laparoscopic orchiopexy	05	10.87
Orchiectomy	05	10.87
Laparoscopic orchiectomy	02	4.34

Table 1: Age incidence

Age of presentation (years)	No. of cases	Percentage
9 months–3 years	11	23.91
3–6	08	17.39
6–9	11	23.91
9–12	16	34.79
Total	46	100

orchiopexy developed testicular ischemia and scrotal hematoma on the 5th post-operative day, for which orchiectomy was done subsequently. Histopathology changes observed in biopsied testicular units were diffuse tubular hypoplasia in 71.43% of cases (five children) and marked germinal hypoplasia in 28.57% of cases (two children).

DISCUSSION

In our study, UDT was operated most commonly in the age group between 9 and 12 years (16 children, i.e. 34.79%). Illiteracy, ignorance, and poverty on the parental part may be the reason for late presentation. One of the contributing factors we found through parental interview was improper advice by the referral doctors and false reassurance at primary consultation. The youngest age at surgical management in our study is 9 months. All the infants who presented early to our department were closely followed and surgical management was completed by 9 months–18 months.

Over the past few decades, the recommended age of orchiopexy progressively decreased from 10–15 years in the 1950s to 5–6 years in the 1970s, 2nd year in the early 1980s, and 1–2 years in the 1990s and 2000s. At present, orchiopexy is recommended between 6 and 12–18 months [3]. This is supported by the fact that “minipuberty,” which is noted between 3 and 12 months of age, is essential for the neonatal gonocyte transformation into a type A spermatogonium a step that is now postulated to be crucial for attainment of fertility potential, as the stem cells for spermatogenesis are created in this period [8,9].

Of the 7 children (15.22%) who underwent orchiectomy, specimens revealed diffuse tubular hypoplasia (71.43%) and marked germinal hypoplasia (28.57%). Complete testicular epididymal dissociation was observed in two cases of orchiectomy. Major epididymal abnormalities are said to be associated with severe impairment of sperm maturation and hindered transportation, hence, early successful orchidopexy alone may not ensure subsequent fertility. This fact stresses the need for critical evaluation of testicular and epididymal anatomical aberrations at the time of orchiopexy [5,6] (Fig. 2).

Bilateral UDT was observed in 3 children (6.52%), among whom two children had intra-abdominal testis on one side each, of which one intra-abdominal testis could be salvaged. Child with bilateral palpable UDT underwent uneventful orchiopexy on both sides. In series of Alümeti *et al.*, incidence of bilateral UDT was higher (30.26%) [7]. Higher incidence of intra-abdominal testis in bilateral presentation of UDT indicates possible role of endocrine disruptors/abnormalities, though none could be demonstrated in our study.

In the present study, the most common site was intracanalicular (60.87%). All the testes which were peeping, canalicular, or located further distally were brought down to scrotal position by open inguinal orchiopexy uneventfully.

In this study, 18 cases (39.13%) were non-palpable. On ultrasound examination, in four cases, testes were located at intra-abdominal, five were near deep inguinal ring, and six were at intracanalicular position. Ultrasonography was not able to locate the position/presence of testis in three of these cases, which were later located in intra-abdominal position on diagnostic laparoscopy. Diagnostic laparoscopy was limited to non-palpable testis without palpable nubbins and those with no evidence of testis in inguinoscrotal ultrasound. Non-palpability of any testicular unit was concluded only after examination under anesthesia. Ultrasound can detect 97% of viable inguinal testes. However, ultrasound can detect only 30% of extra-abdominal testicular nubbins and 38% of viable intra-abdominal testes with an overall a sensitivity of 45% and specificity of 78% [10-12]. Laparoscopy is most specific and sensitive diagnostic procedure for impalpable UDT, more so in case of bilateral cryptorchidism [13-20].

hCG has been shown to induce testicular descent, presumably by increasing weight and vascularity of testis and also by stimulating testosterone and/or dihydrotestosterone production [21]. In the present study, beta-hCG therapy has been used selectively in children, post-Stage 1 Fowler-Stephens procedure with intent to promote testicular vascularity, and size before considering Stage 2 procedure [21].

When the outcome of surgical management in our study was analyzed, 40 children (86.95%) underwent orchiopexy, among them, 39 UDT (84.78%) were brought to scrotal position successfully and did not show volume loss in short-term follow-up. One child in the 9–12 years age group underwent orchiectomy on the 5th post-operative day after the 2nd stage Fowler-Stephens orchiopexy. The overall procedure-related success rate for orchiopexy was 97.5%. In the younger age group of 9 months–3 years and 3–6 years, all the UDT were placed into scrotal position, without any volume loss in the short term, which reinforces the need for early intervention. All the orchiectomies performed were in children beyond 6 years of age (Table 5).

In one of the multicenter retrospective analysis involving 2213 boys in Germany, who were treated for cryptorchidism, only 18.7% of children underwent orchiopexy in the recommended age group of 6 and 12 months. This fact outlines the importance of need for community-oriented programs to create awareness about this condition in the general population and also among referral doctors so that for majority of children with UDT, orchiopexy can be completed by 1 year of age [15-17]. Children with significant retractile testis are at a greater risk for acquired cryptorchidism and should be followed closely at yearly intervals until puberty so that orchiopexy if found necessary can be performed early [18].

CONCLUSIONS

Orchiopexy needs to be completed by 12 months of age for higher salvageability of testicular units as per the current evidence. The

Table 5: Surgical procedures with respect to age group

Type of surgery	Age 9 months–6 years		Age 6 years–12 years	
	No. of cases	Percentage	No. of cases	Percentage
Orchiopexy	19	41.30	20	43.48
Orchiectomy	0	0	07	15.22

significant number of late presenters with higher rate of testicular loss shows the need for early referral. Standardized surgical approach, utilization of laparoscopy in managing intra-abdominal testis, and optimal timing of orchiopexy thereby prove as the key to increase the salvageability of testicular units.

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