

Current Trends and Guidelines in Surgical Management of Undescended Testis

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Abstract

Background: Undescended testis is one of the most common congenital malformations encountered in male neonates and is related to a multifactorial process. The incidence varies and depends on gestational age affecting 1.0-4.6% of full term and 1.1-45% of preterm neonates. Despite spontaneous descent within first months of life, nearly 1% of all full term male infants still have undescended testes at 01 year of age. It may affect both sides up to 30%. In new born cases with non-palpable, undescended testes on both sides and any sign of disorders of sex development, such as con-comitant hypospadias, urgent endocrinologic and genetic evaluation is required. **Materials and Methods:** This study was carried out in the Department of surgery, Great Eastern Medical School & Hospital, Srikakulam, Andhra Pradesh, India. A total of 30 patients were selected for the study from among admitted cases. A thorough clinical assessment, laboratory investigations and radio-imaging studies like Ultrasonography, computerized-tomography and magnetic resonance imaging were performed. Diagnostic laparoscopy was useful to detect non-palpable and abdominal testis. After confirming diagnosis, open orchidopexy was performed in 24 cases. Laparoscopic orchidopexy was done in 04 cases and orchidectomy in 02 cases. **Results:** Undescended testis was found most commonly among boys of 01-03 years of age group with an incidence of 55.6% in the present study. Absence of testis in the scrotum was the common complaint in

25 cases (83.4%). 04 cases presented with complications such as inguinal hernia and 1 case with torsion of testis. **Conclusion:** The present study concludes that early placement of undescended testis in the scrotal position (orchidopexy) is the gold standard treatment. It also prevents potential impairment of fertility and reduces the risk of testicular malignancy. No consensus exists on the role of hormonal treatment.

Keywords: Cryptorchidism; Intracanalicular Testes; Magnetic Resonance Imaging; Orchidopexy; Testicular Volume; Testicular Atrophic Index; Ultrasonography; Undescended Testis.

Introduction

Cryptorchidism is a term that has been most often used synonymously for undescended testis. It is one of the most common congenital anomaly found at birth and affects 1.0%-4.6% full term and 1.1%-45% of pre-term babies [1] About 70%-75% undescended testis will spontaneously descend usually by 03 months of age [2] and by 01 year of age, the incidence declines to about 0.8%-1.2% and remains constant throughout the adulthood [3].

Undescended testis is classified as congenital and acquired, palpable and non-palpable, unilateral or bilateral to decide the modality of treatment. About 80% of UDT are palpable and 20% are non palpable [4]. Palpable testes are located along the inguino-scrotal descent route where as in non-palpable category, the testis was not found during physical examination of the patient. The more precise working classification of testis maldescent has been suggested as high or low abdominal, inguinal, supra or high scrotal, ectopic, emergent and gliding for the benefit of future studies and to compare results of treatment

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studies [5]. Intra-abdominal testis is impalpable, most commonly the testis is located just at the internal inguinal ring. Intra-canalicular testis lies in the region of inguinal canal and the external oblique makes palpation of testis very difficult. Emergent testis lies in the superficial inguinal ring. It may be palpable with the abdominal muscles well relaxed. High scrotal and Mid-scrotal testis lies in the scrotum but not placed in bottom of the scrotum. These testis are likely to undergo torsion. Retractable testis is not located in the scrotum and is due to failure of attachment of lower pole of testis to the scrotum by gubernaculum. However, these testis descent normally when the child is asleep or relaxed. Ectopic testis lies outside the normal route of descent and is found in five sites such as femoral, perineal, superficial inguinal pouch, suprapubic and opposite scrotal compartment. Gliding testis can be manipulated into upper scrotum but retracts when released. In Vanishing testis the testis become atrophic due to loss of blood supply. This is a perinatal event and is also referred as "testicular regression syndrome" [6].

The testis descends from abdomen to scrotum to find a lower ambient temperature for normal spermatogenesis. The difference between scrotal temperature and body temperature in adult male is 2-4°C lower, which is conducive for normal spermatogenesis. The descent of testis occurs in 02 stages with different anatomical mechanisms and hormonal controls. The trans-abdominal phase between 8th -15th week and inguino-scrotal phase lasts from 25th -35th week of gestation. An interval of around 10 weeks of inactivity between the phases is not readily explained [7,8]. The factors interfering with the descent of testis include obstruction i.e., lateral adhesions at deep inguinal ring, retro-peritoneal adhesions. Short vas deferens, short testicular vessels, short pampiniform plexus and inefficient pull by gubernaculum testis.

The anomalies associated with undescended testis include polyorchidism, splenogonadal fusion, transverse testicular ectopia, kallmann syndrome, prune belly syndrome, posterior urethral valves, cloacal extrophy and spina bifida [9]. The etiology of UDT remains largely unknown and several hypotheses have been proposed such as combination of genetic, anatomical, hormonal and environmental factors etc., [10]. This disorder is associated with certain complications such as impaired spermatogenesis and infertility, risk of testicular germ cell tumor and testicular trauma as well as torsion of testis and strangulation of associated inguinal hernia [11,12]. Hence its early diagnosis and treatment is of paramount importance.

Materials and Methods

A prospective study was carried out in department of surgery, Great Eastern Medical School and Hospital, Ragolu, Srikakulam, Andhra Pradesh, INDIA from March 1st 2014 to march 31st 2017. After adhering to the selection criteria, 30 participants were included in the study. Ethical clearance from institutional committee was obtained before start of the study.

Selection Criteria

Inclusion Criteria

Patients with undescended testis above one year of age.

No upper age limit

Patients willing to undergo surgery for UDT.

Exclusion Criteria

Children with undescended testis less than one year of age.

Patients with retractile testis and ectopic testis.

Patient's unfit for surgery.

Patients with clinical diagnosis of undescended testis were evaluated with a thorough history including data on the course and the duration of pregnancy, medications used and exposure to environmental toxins as well as birth weight, position of testis at birth, other defects and diseases of the child and family history. Palpation of testis allowed differentiation between palpable and non palpable testis. The external genitalia were also assessed. The gonads are carefully examined for size, turgor, palpable para-testicular anomalies and presence of hernia or hydrocele. Ultrasonography was done in palpable testis with 100% accuracy and sensitivity of 76% and specificity of 100%. It allows to assess parenchymal structure and size of the testis and as well testicular volume (TV). It also facilitates to calculate Testicular atrophy index (TAI) which is a valuable objective tool of assessment in the treatment of UDT [13]. Testicular Atrophy Index of the affected testis can be calculated as:

$$\text{TAI (\%)} = (\text{contralateral TV} - \text{affected TV}) / \text{Contralateral TV} \times 100.$$

Computed tomography and magnetic resonance imaging studies were done only in impalpable abdominal testis. In the present study orchidopexy was done in 28 cases and orchidectomy in 2 cases

depending up on the position and viability of testis. The follow-up of all cases were done with regard to complications during the study period.

Statistical Analysis

Standard statistical methods like SPSS was adopted for the analysis.

Results

A total of 30 cases of undescended testis were enrolled in the study and all the cases were children. In the Present study maximum incidence of UDT was found in age group 01-03 years (56.06%) followed by age group 04-06 years (23.4%). Average mean age was 4.36 years [Table 1] [14].

In our Study group, the common presenting symptom was absence of testis in the scrotum in 25 cases (83.40%) followed by swelling in the groin & pain in 07 cases each. 05 cases presented with complications such as inguinal hernia & torsion of testis [Table 2] [15].

The common side of UDT was on right side in 18 cases which accounts for 60 % and in 2 cases only it was bilateral (06.60 %) [Table 3] [16,17].

In our present study 10 cases of emergent testis and 14 cases of intra canalicular testis were palpable. 05 cases of intra abdominal testis and 01 case of intra canalicular testis, which are impalpable [Table 4][18].

Inguinal hernia was the common complication encountered in 04 cases (13.40 %) and torsion of testis in 01 case (03.30 %) in our study [Table 5][19].

Table 1: Age distribution

Age Group (yrs)	No of Cases	%
01-03	17	56.60
04-06	07	23.40
07-09	02	06.60
10-13	03	10
>14	01	03.40
Total	30	100

Table 2: Clinical presentation

Symptoms	No. of Cases	%
Absence of testis in the scrotum	25	83.40
Swelling in the groin	07	23.40
Pain	07	23.40
Symptoms of Complication such as hernia , torsion of testis	05	16.60

Table 3: Position of Undescended testis

Side	No. of Cases	%
Right	18	60
Left	10	03.40
Bilateral	02	06.60

Table 4: Relation between position and palpable testis

Position of Testis	No. of Cases	Palpable Testis		Impalpable Testis	
		No.	%	No.	%
Emergent	10	10	100	00	00
Intra-Canalicular	15	14	93.40	01	6.6
Intra Abdominal	5	00	00	05	100

Table 5: Complications

Complications	No. of Cases	%
Inguinal hernia	04	13.4
Torsion	01	3.3
Trauma	00	00
Malignancy	00	00

Table 6: Investigations

Investigations	No. of Cases
Ultrasonography of abdomen	24
Diagnostic Laparoscopy	06

Table 7: Type of operative procedure

Type of surgery	Standard Single stage Orchidopexy High Inguinal T	Mid & Low Inguinal T	Fowler-Stephens Single Stage Orchidopexy	Two Stage Orchidopexy	Orchidectomy
Open	04	20	00	00	01
Laparoscopic	00	0	04	00	01

Table 8: Post Operative Complications

Complications	No. of Cases	%
Hematoma	01	03.30
Wound Infection	01	03.30

Table 9: Duration of Hospital stay

Duration of stay (days)	No of cases	%
<2	00	00
2-4	17	56.6
4-6	12	40
>6	01	03.4
Total	30	100

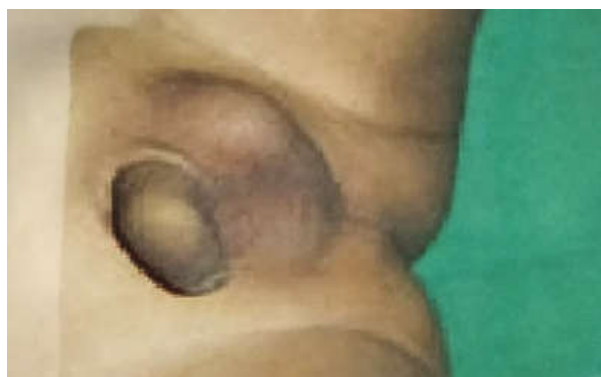


Fig. 1: Pre-operative picture of right Undescended testis



Fig. 3: Laparoscopic view of intra-abdominal testis



Fig. 2: Mobilisation of Right intra-canalicular testis

Ultrasonography was diagnostic in 24 cases of Palpable Testis and diagnostic laparoscopy in 05 cases of intra abdominal testis and in 1 case of Intra canalicular testis [Table 6] [20, 21].

In the present study, 24 cases underwent standard single stage open orchidopexy and 04 cases underwent Laparoscopic Single Stage Fowler-stephens Orchidopexy, Orchidectomy was done only in 02 cases [Table 7][22, 23, 24].

Wound infection and hematoma were the only post operative complications encountered in 01 each case (03.30 %) [Table 8].

The duration of hospital stay in our cases ranged from 03-07 days and the mean duration of stay was 3.7 days [Table 9].

Discussions

An undescended testis is one of the most common genital anomalies in boys and prompt treatment can minimize the risk of complications. It is also suggested to await spontaneous descent of testis during the first 6 months of life. Although there are standardized guidelines for boys with palpable undescended testis, there are no formal guidelines for managing boys with non-palpable testis. Laparoscopy is both a diagnostic and therapeutic procedure, which is safe when performed by a skilled operator. Testicular biopsy in UDT is generally not recommended in childhood. Intra-operative testicular biopsy in children is controversial and at present reserved for use in patients with ambiguous genitalia, chromosomal disorders or as a part of clinical studies. In our study, the maximum numbers of UDT cases were in the age group of 01-03 years which accounts for 56.60% of all cases and the mean age was 04.36 years. Jacob RE et al 2009 reported that mean age of undescended testis was 03-07 years [14]. Absence of testis in the scrotum was the common clinical presentation in 25 cases (83.40%) followed by pain and swelling in the groin in 07 cases (23.40%). Steven G et al 2000 has also reported absence of testis in the scrotum in his study [15].

In the present study, 18 cases of UDT were in right side (60%) and in 02 cases, bilateral undescend was seen (06.60%). Ashley RA 2010 and Mouriquand PD 2008 reported that right side was the most common side of undescend (70%) [16,17]. In the present study 15 cases were intra-canalicular testis (50%), out of which 14 cases were palpable and 01 was impalpable, 10 cases were emergent testis (33.4%) and only 05 cases were intra-abdominal (16.6%). Hadziselimovic 1983 also reported that the most common position was intra-canalicular (63%) and 08% were intra-abdominal [18].

In our study, only 04 cases presented with inguinal hernia (13.40%) as a complication followed by testicular torsion in 1 case (03.30%). Lao OB et al 2012 reported that hernia was the most commonly associated complication with undescended testis [19]. In the present study, 24 cases of palpable testis were diagnosed by ultrasonographic studies and 06 cases of impalpable testis with diagnostic laparoscopy which revealed exact location of testis in 05 cases of abdominal testis and 01 case of intra-canalicular testis. Ekenze SO 2013 reported that ultrasound does not reliably localize non-palpable testis and does not rule out an intra-abdominal testis [20]. Moore RG et al, 1994 stated that diagnostic laparoscopy has been commonly used for assessment of non-palpable testis, with the accuracy of testicular localization reported

to be >95% [21]. Even diagnostic laparoscopy was found to be more accurate in our cases.

In the present study 24 cases underwent standard single stage orchidopexy and 01 case had orchidectomy due to torsion of testis. 04 cases underwent laparoscopic single stage Fowler-Stephens orchidopexy and 01 case had orchidectomy due to testicular atrophy. The success rate of standard single stage orchidopexy was 96% and laparoscopic orchidopexy was 80% in our cases. Esposito et al 1997 has shown high success rate of laparoscopic Fowler-Stephens technique for intra-abdominal testis (97%) [22]. Lindrgen et al 1999 has also shown high success rate of >95% with Laparoscopic FS Technique [23]. Taran I, Elder JS 2006 reported the success rate of orchidopexy to be >95% in inguinal testis [24]. In the present study, 01 case had developed wound infection and 01 case scrotal hematoma as a post-operative complication which is well within the acceptable limits. The duration of hospital stay of patients ranged from 04 - 07 days. The follow-up study of all the cases were done at 02 weeks, 06 weeks, 03 months, 06 months, 01 year and during the study period. None of the patients have reported any complications such as decrease in size of the testis and migration of testis during the followup period.

Conclusion

The present study concluded that every undescended testis should be brought to the scrotum as early as possible, regardless of its primary dimensions and position using an appropriate surgical technique such as Open orchidopexy in palpable testis and Fowler-Stephens laparoscopic orchidopexy in abdominal & non-palpable testis. Boys with unilateral non-palpable testis should undergo diagnostic laparoscopy followed by inguinal exploration (open orchidopexy) or laparoscopic FS Procedure. In boys with bilateral non-palpable testis surgical treatment should be preceded by hormonal tests. Boys after orchidopexy need ultrasound evaluation for Testicular Volume and Testicular Atrophic Index measurement every 12 months. T.A.I. may indicate the method of further treatment

- TAI 0-25% - Follow-up until 18 years then hormonal tests and semen analysis.
- TAI 25-49% - Follow-up until 18 years then hormonal tests and testicular biopsy.
- TAI \geq 50% - Biopsy of the diminished testis.

Results of histo-pathological evaluation revealing *testicular dysgenesis or atrophy* are decisive for *orchidectomy* regardless of age of the patient.

Boys with retractile testis and acquired testis usually don't need medical or surgical treatment but require close follow-up until puberty. However USG should be performed every 12 months. In case of a decrease in TV (TAI < 25%) Orchidopexy is recommended.

Hormonal therapy either as an adjuvant or neo-adjuvant setting is not standard treatment for undescended testis. However patients have to be evaluated on an individual basis.

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Conflict of Interest

There are no conflicts of interest

Key Messages

Early placement of Undescended testis in the scrotal position (Orchidopexy) is the gold standard treatment. It also prevents potential impairment of infertility and reduces the risk of testicular malignancy.

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