

Original Article

ULTRASONOGRAPHIC STUDY OF UNDESCENDED TESTES WITH EMBRYOLOGICAL CORRELATION

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ABSTRACT:

Undescended testes or cryptorchidism is the most common congenital anomaly of male reproductive system. The descent is multifactorial with gubernaculum playing major role. Ultrasound is the standard imaging technique of choice in children with a non-palpable testis as it is non-invasive and does not use ionizing radiation. Position of testis is also important in deciding whether patient will need abdominal or inguinal exploration. The aim was to study the position of undescended testis by high frequency ultrasound and its embryonic explanation. Total 46 boys with undescended testis were examined by high frequency ultrasound the prevalence was more on right side (22 out of 46), where testis was found located in the inguinal canal.

Keywords : Cryptorchidism; Gubernaculum; Inguinal canal.

INTRODUCTION : The term cryptorchidism, derived from the Greek words 'Kryptos' meaning 'hidden' and 'orchis' meaning testicle, is the absence of one or both testis from the scrotum[1].

Undescended testis is the commonest congenital anomaly of male reproductive system and in view of low fertility and high rate of occurrence of neoplasm locating them at the earliest is important. Incidence is around 0.8- 2% in full term new born and around 18-30% in premature births (Güvenç et al., 2005)[2]. About two thirds of cases without other abnormalities are unilateral; one third involve both testes. In 90% of cases an undescended testis can be felt in the inguinal canal; in a minority the testis or testes are in the abdomen or nonexistent (truly "hidden").

Undescended testes are associated with reduced fertility, increased risk of testicular germ cell tumors

and psychological problems when the boy is grown. Undescended testes are also more susceptible to testicular torsion (and subsequent infarction) and inguinal hernias. Without intervention, an undescended testicle will usually descend during the first year of life, but to reduce these risks, undescended testes can be brought into the scrotum in infancy by a surgical procedure called an orchiopexy[3].

The descent of the testes consists of the opening of a connection from the testis to its final location at the anterior abdominal wall, followed by the development of the gubernaculum, which subsequently pulls and translocates the testis down into the developing scrotum. Ultimately, the passageway closes behind the testis.

Material & Method : Total 46 boys of age 6 month to 18 years referred with clinical diagnosis of

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undescended testes were subjected to high frequency ultrasound by linear broadband transducer of frequency 7.5-10 MHz on GE Voluson 8 Core vision ultrasound machine in Dr. O.P. Gupta Imaging Center, Baccha Park, Meerut, Uttar Pradesh. The examination was targeted to look for undescended testis in inguinal region and/or pelvis. The location of testis was noted followed by its size, echotexture & vascularity. If necessary repeat examination was conducted.

Results : Total 46 patients were studied between the age group of 06 months to 18 years. In 46 patients 36 (78%) patients had unilateral undescended testes and 10 bilateral. In unilateral undescended testes prevalence was observed more on right side i.e. 22 (61%) and 14 (39%) on left side. Ultrasound localized the position of testes more in the inguinal canal some in abdomen and few testes could not be localized. Out of 46 undescended testes 40 (87%) in the inguinal canal, 04 in abdomen and 02 was not localized.

Most of undescended testes between the age of 04 year to 18 years were smaller and size and with low vascularity in comparison to normal testis. In one undescended testes which was present in inguinal canal having carcinoma on lower pole.

Table No. 01, Side of undescended testes

Side	No. of Patients	Percentage
Right	22	47.8
Left	14	30.7
Bilateral	10	21.5
Total	46	100

Discussion : Descent of the testis involves two different phases trans-abdominal and inguinal phase. Gubernaculum testes plays major role in descent of testes. Gubernaculum condenses during 7th week. In the trans-abdominal phase between 7th and 12th week the extra inguinal portion of gubernaculum shortens and pulls the testis down to the vicinity of deep inguinal ring. In inguino-scrotal phase the testis remains in the vicinity of deep inguinal ring from 3rd to 7th month, but then enters the inguinal canal. By 9th month just before normal term delivery the testis

have completely entered the scrotal sac [4]. During the trans-abdominal phase the testis is held by the gubernaculum near the inguinal region. As the fetus enlarges insulin [3] secreted by leydig cells stimulates gubernaculum enlargement augmented by MIS (mullerian inhibiting substance) and T (testosterone) which also causes regression of cranial suspensory ligament (CSL)[5].

During inguino-scrotal phase the gubernaculum migrates and elongates towards the scrotum under androgenic action which is indirect via genitofemoral nerve (GFN) and release of calcitonin-Genetone Related-peptide (CGRP). Insufficient testosterone during development may result in failure to produce enough nerve cells in the genitofemoral nerve; then at the time of testicular migration too little CGRP is produced than required to stimulate contractions in the gubernaculum and assist testicular descent (Park & Hutson)[6]. The gubernaculum gives rise to both smooth and striated muscles. The testis is descended through processus vaginalis via the propulsive force generated by the muscles. Failure of descent is associated with the diminution of smooth muscle content and decrease in sympathetic tone that depends on androgens[7]. Normal testicular descent is dependent on the intact hypothalamus-pituitary axis. Malformations of CNS and congenital hypogonadotropic hypogonadism may be associated with cryptorchidism[8]. Other factors include increased intra-abdominal temperature and HCG from maternal circulation.

In 2007 according to Sinha et al[9] of the 250 cases under study 202 (80.8%) were unilateral in that cases of right sided undescended testis were 110 (54.5%) and 92 (45.5%) cases of left sided undescended testis and 48 (19.2%) cases of bilateral undescended testis were present.

According to Christofer (2008)[10], the right testis is affected in 50% of cases, the left testis is affected in 30% of cases, and double arrest occurs in 20% of cases.

According to Ajmer (1989)[11], he studied 313 cases of undescended testis the right testis is affected in 119 (39%) of cases, the left testis is affected in 92 (30%) of cases, and double arrest occurs in 51 (31%) cases In all the above studies right sided undescended testes is more common than left sided

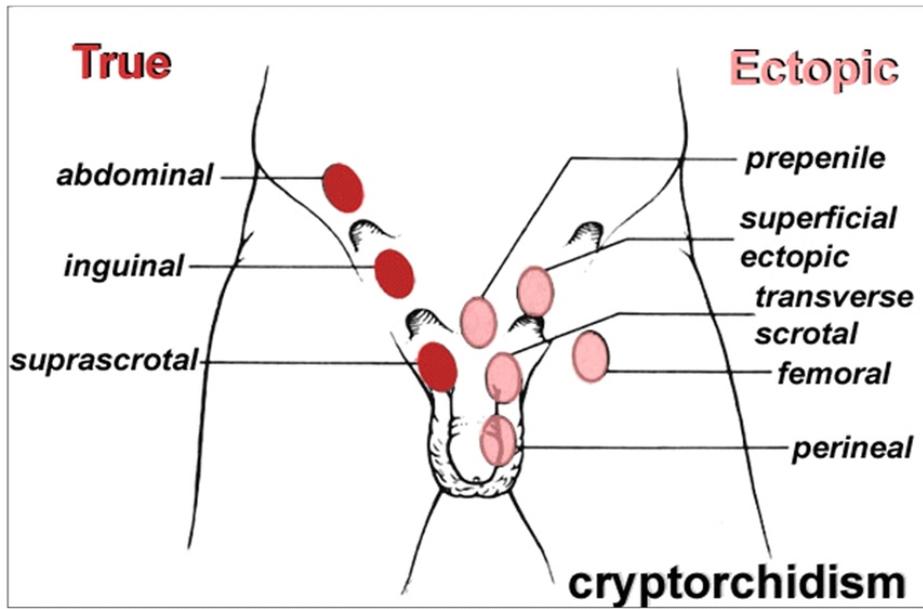


Fig.1 - Site of undescended and ectopic testes.

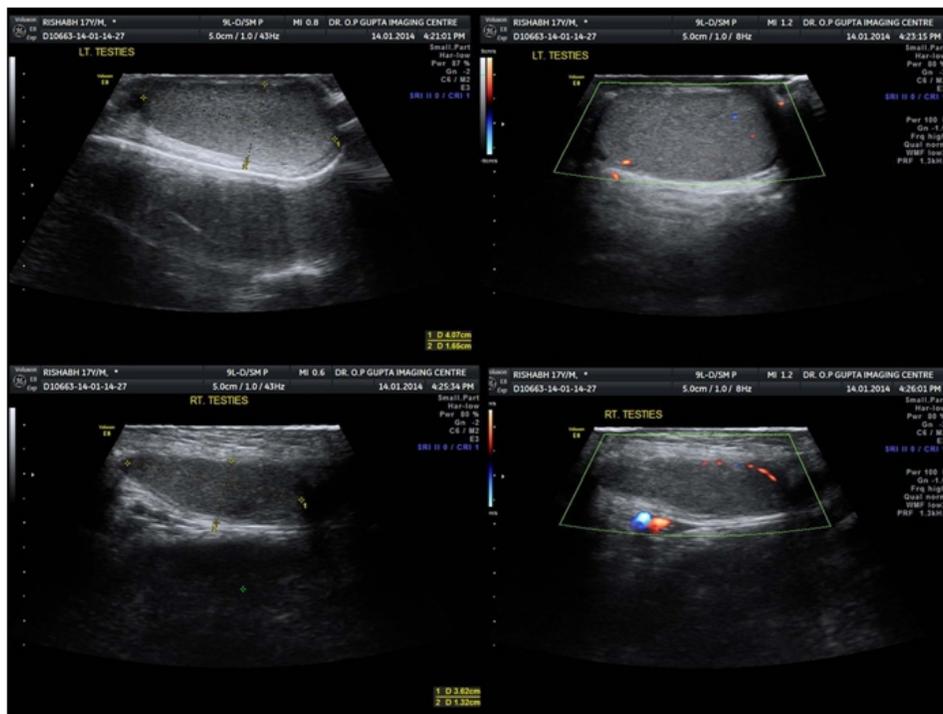


Fig.2 - Left testes normal in size and vascularity. Right undescended testes smaller in size and less vascular.

undescended testes and bilateral undescended testes are less in number. In the present study also maximum cases were of right sided undescended testes.

Onkar et al (2012)[12] out of 41, 25 had unilateral and 8 had bilateral undescended testis. Incidence was

observed more on right side. (60%). Unilateral undescended testis is more likely to occur because androgens act independently on each side via the ipsilateral genitofemoral nerve and defects in neuronal development of CGRP action could lead to unilateral undescended testis (Hutson & Hasthorpe)5.

Agrawal et al (2013)[13] studied, the side on which undescended testis get arrested during its descent, more frequently on right side. In 43 undescended testis 21 (48.8%) cases of right sided undescended testis, 16 (37.2%) cases of left sided undescended testis and 6 (14%) cases of bilateral undescended testis.

Nijs et al. (2007)[14] studied 103 non-palpable testes by high frequency ultrasound and out of 87, 85 (97%) inguinal.

Onkar et al[11] studied that out of 46 testes located by ultrasound 5(10%) were retractile, out of remaining 41, 26 (63%) were in inguinal canal, 15 (37%) were located in abdomen. Luciano (2003)[15] studied 133 cryptorchid testes and found 17 (12%) abdominal, 92 (69%) inguinal, 24 (18%) high scrotal.

In our study out of 46 undescended testis 22 (48%) on right side and 14 (31%) on left side and 10 (21.5%) bilateral. Out of 46, 40 was in inguinal canal (87%) and 4 in abdomen and 2 not located. As the fig. 2 showing the undescended testes is smaller in size and less vascular as compare to normal testes. Fig. 1 is showing the sites of undescended and ectopic testes.

In conclusion, a high frequency ultrasound was able to locate the position of undescended testes in majority (88%) of the cases. Undescended testes were more commonly found on right side in the inguinal canal region and its knowledge is very important for further decision on surgery (orchiopexy)

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