"CLINICAL STUDY AND MANAGEMENT OF CHILDREN WITH IMPERFECT DESCENT OF TESTIS"

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ABSTRACT: OBJECTIVES: a) To study the different location of the testis in children with imperfect descent of testis, b) To study associated anomalies and complications of imperfect descent of testis, c)To study the various modalities of management of imperfect descent of testis.**BACKGROUND DATA**: Since the testis originally develops in the abdominal region, its descent may be inhibited anywhere along its normal pathway or it may be diverted from this route in to an ectopic location. This apparently simple developmental anomaly represents one of the more common disorders of the childhood.It affects all races, and there does not seem to be a geographic propensity. undescended testis may be associated with a number of chromosomal and hereditary disorders in which a specific defect can be identified, and complications which are infertility, hernia, trauma are more if left untreated and also interestingis that till today relatively little is known about what cause the testis to migrate from the abdomen in to the scrotum, inspite of research which is going on till now.**METHOD**: Present study was conducted on 50 patients who presented with complaints of undescended testis and its complications within the age of day 1 of birth to 18 years. It was prospective study and study was done at department of pediatric surgery, Kempegowda institute of medical sciences, Bangalore during study period of December 2011 to May 2013.**RESULTS:** 1. Imperfect descent of testis is more common in2-5 years of age, 2. Right side is more common followed by left side followed by bilateral, 3. Absence of testis in scrotum with underdeveloped scrotum is the most common complaint, 4. In palpable testis superficial pouch is the most common site where the testis is found. 5. In ectopic femoral is the most common. 6. In impalpable testis most common is canalicular. 6. Gubernacular abnormalities were most common followed by presence of processusvaginalis and hernia sacs. 7. Open orchidopexy for palpable and lap orchidopexy for impalpable testis is the operation performed.**CONCLUSION:** Many of undescended testis descend within one year of age, hence we should wait till one year of age. Orchidopexy for undescended testis should be done within 2 years of age as histopathological change start from 2 years of age till 16 years where irreversible histopathological changes take place. Retractile testis has no role in surgery and only assurance should be given. Routine preoperative imaging for undescended testis is neither necessary nor helpful. Ultrasound or MRI do not localizes a truenon palpable testis and hence does not alter surgical management. So laparoscopy should be used directly for evaluation of children with impalpable undescended testis.

KEY WORDS: Superficial pouch, Orchidopexy, Histopathological changes.

INTRODUCTION: The testis are specialized paired organs that produces spermatozoa and androgenic hormones. By the 35th to 40th week of gestation they descend into its normal postnatal anatomical location, the scrotum where they function optimally at 33 degree Celsius, a 3-4 degree

Celsius less than core body temperature. The testis located in inguinal canal or abdomen is exposed continuously to 35 degree Celsius and 37 degree Celsius respectively with consequent progressive alteration in morphology and physiological functions as well as an increased risk of complications.Since the testis originally develops in the abdominal region, its descent may be inhibited anywhere along its normal pathway or it may be diverted from this route in to an ectopic location. This apparently simple developmental anomaly represents one of the most common disordersof childhood.

It affect all races, and there does not seem to be a geographic propensity, although undescended testis may be associated with a number of chromosomal and hereditary disorders in which specific defect can be identified, at the present time the majority of the cases appear to be isolated. This is probably due to the fact that relatively little is known about what causes the testis to migrate from the abdomen in to the scrotum.

At age 2 years, a testis residing outside the scrotum and in the high temperature zones in the abdomen or inguinal canal would start to deteriorate and this becomes established at age of 5 years.

Early surgical correction helps to avert this and reduce the risk of complication. The undescended testis has greater risk of leading to infertility and tumerogenesis.

Thus it is important to follow mobilization, cord dissection, isolation of patent processes vaginalis and relocation of the testis to the scrotum.

Many terms including cryptorchidism, undescended testis, imperfect descent of testis, maldescent of testis are used. But all terms refer to any testis which is deviated from the normal path of descent from abdomen to scrotum.

We have studied the different locations presented, its associated anomalies and complications and management of imperfect descent of testis.

MATERIAL AND METHODS: children admitted in to the pediatric surgery wardswith the history of absence of testis in the scrotumare included in this study.

This Hospital equipped with the facilities to carry out all necessary investigations to arrive at an accurate pre-operative clinical diagnosis.

Study design: Descriptive study

Sample size: 50

Sample design: Purposive sampling

Study period: Dec 2011 to May 2013

INCUSION CRITERIA: Children of age from day 1 of birth to 18 years who presented with absent testis in scrotum since birth.

EXCLUSION CRITERIA: Children who had intersex disorder and retractile testis.

In thisstudy patient's, detailed history was taken, routine investigations like TC, DC, Hb and systemic examination were done in all patients.Ultrasound examination of the abdomen was done in all cases.

All patients were treated surgically after taking proper consent from the patient's parents, open and lap orchidopexy were the surgeries performed.

If the cases are bilateral, patients were advised to undergo surgery later for the other side,every patient was advised for follow upregularly once a month at the time discharge from the hospital.

RESULTS:

1. AGE INCIDENCE

Age in years	NO. Of cases	Percentage
< 2 years	7	14%
2-5 years	28	56%
5- 10 years	11	22%
10 -18 years	4	8%

Table.1 shows the age incidence of imperfect descent of testis.

The average age of presentation in the study is 6 years.

2. SIDE OF INVOLVEMENT

Side of involvement	NO. of cases	Percentage
Right side	21	42%
Left side	18	36%
bilateral	11	22%

Table. 2 shows the side of involvement

Right side is the most common side of involvement i.e 21 cases,

3. Symptoms

Symptom	**No of cases**	**Percentage**
Absence of testis in scrotum with underdeveloped scrotum	39	78%
Groin swelling	8	16%
Pain in the swelling	3	6%

Table.3showing symptoms

The commonest symptom in all cases was absence of testis in the scrotum.

Groin swelling was present in 8 cases (16%). Pain in the swelling was also present in 3(06%).

4. Palpable Testis

Position	**Patients**	**Percentage**
Mid-Scrotal	7	17.07%
Root of scrotum	5	12.19%
Superficial pouch	12	29.26%
External ring	6	16.63%
Inguinal canal	11	26.82%
Total	41	100.00%

Table 4:Location of the palpable testis

Most common site where testis was found is superficial pouch 12(29.26%) followed by inguinal region 11(26.82%).

5. Ectopic testis

Site	No of cases
Transverse scrotal	0
Femoral	0
Perineal	0
Prepenileectopia	1
Total	1

Table 5: Showing location of the Ectopic testis

6. Impalpable Testis

Site	No of cases	Percentage
Canalicular	5	62.50%
Intra-abdominal	2	25.00%
Absent	1	12.50%
Total	8	100.00%

Table 6:Showing location of the impalpable testis

Most common siteof impalpable testis was canalicular 5(62.5%) followed by intra-abdominal 2(25%).

7. Location of improper descent of testis

Location	n	Percentage
Mid-Scrotal	7	14.58%
External Ring	6	12.50%
Superficial Pouch	12	25.00%
Root of Scrotum	5	10.42%
Inguinal Canal	11	22.92%
Canalicular	5	10.42%
Intra-Abdominal	2	4.17%
Absent	1	2.00%
Pre-penile	1	2.00%
Total	50	100.00%

Table 7: location of improper descent of testis

Most common site found was in superficial pouch.

8. Anomalies associated

8.1. Anomalies associated with imperfect descend of testis with respect to age

Anomalies	Age group				Total
	<2 Yrs	2-5 yrs	>5-10 yrs	>10yrs	
Hernia	2	10	3	1	16
Epididymal	2	6	2	0	10
Gubernaculum	3	17	8	0	28
Vas Deferns	1	2	0	0	3
ProcessusVaginalis	3	12	6	1	22
Total	6	24	9	1	40

Table 8.1: Anomalies associated with respect to age.

Most abnormalities found were of gubernaculums

8.2 Anomalies associated with imperfect descent of testis with respect to location of the testis

Anomalies	Location					Total
	Mid-Scrotal	External ring	Superficial Pouch	Root of Scrotum	Inguinal canal	
Hernia	0	2	3	2	7	14
Epididymal	2	2	2	1	2	9
Gubernaculum	7	6	6	5	2	26
Vas Deferns	0	0	2	0	0	2
ProcessusVaginalis	6	5	4	4	2	21
Total	7	6	10	5	8	36

Table 8.2: Anomalies associated with respect to location of the testis

Most common abnormality was of gubernaculum in mid-scrotal region

9. Surgery:

1. Ultrasound of abdomen was done in 50 cases. In 5 cases testis was present in the root of scrotum, 6 patients external ring, 12 patients in the superficial pouch, 11 patients inguinal canal, 8 cases are intra-abdominal (in 8 intra-abdominal cases) one case testis was present in the lumbar region, in one case it was present in right iliac fossa. One case in the pelvis and 5 are canalicular absent testis in 1 case.
2. Blood and urine examination was done routinely in all the cases for preoperative assessment of the patient.
3. Screening chest was also done in all the patients. Other relevant investigations were also done.

SURGERY	No of patients	percentage
Orchidopexy	49	98%
Orchidectomy	0	0%
success	49	98%

Table 9.1: Results of surgery

SURGERY	N	percentage
OPEN ORCHIDOPEXY	41	82%
LAP ORCHIDOPEXY	8	16%
None*	1	2%
Total	50	100%

Table 9.2: Type of surgery underwent (*As testis is absent just diagnostic laparoscopy was done).

We did 41 cases of open orchidopexy and 8 cases of lap orchidopexy and for 1 absent testis in abdomen, only diagnostic lap was done.

Post-operative period: Was uneventful.

FOLLOW UP: we only followed up for any ascent of testis after orchidopexy, any atrophy of testis, and wound infection. But due to lack of time in our study, we were not able to study regarding fertility of patients

ASSOCIATED SYNDROMES: We got 2 cases of beck with- Weidman syndrome

ASSOCIATED COMPLICATIONS:2 cases with obstructed hernia

DISCUSSION:

1. PRESENTING AGE GROUP:

In the present study of 50 patients

- 7 patients were below 2 years of age (14%).
- 28 patients were between 2 to 5 years of age (56%).
- 11 Patients were between 5 to 10 years of age (33.34%).
- 4 patients were between 10 to 18 years of age (36.67%).

This series is compared with M.B. Jackson et al series in which 60 boys were included in the study, as shown in below.

Study	M.B.Jackson et al N-60	Present series N-50
Age in years	No of patients(%)	No of patients(%)
<2 yrs	9(15%)	7(14%)
>2-5 yrs	24(40%)	28(56%)
>5-10 yrs	25(41.7%)	11(22%)
>10-18 yrs	11(18.3%)	4(8%)

Table.10: Comparison of age Distribution between two studies.

The present series has shown that the majority of the patients were detected in 2-5 yrs age group, compared to Jackson et al series. Few of the patients were detected in the school health check up and were referred to our hospital.

2. SIDE OF INVOLVEMENT

Author	Right	Left	Bilateral
M.B.Jackson et al	38.30%	43.30%	18.30%
Lange	45%	30%	25%
Present series	42%	36%	22%

Table.11: Comparison of side of involvement between two studies

Right is the most common side of involvement in our study.

3. FAMILY HISTORY

Author	Percentage
Bishop	15
Brimblecom	15
Whniles	15
Present series	4

Table.12: Family history of undescended testis in different studies.

4 patients had family history of imperfect descent of testis in our study.

4. TYPES OF UNDESCENDED TESTIS

Kaplan(1993) proposed the most popular system, which categorizes imperfect descent of testes as either palpable or impalpable.

The subject nature of the physical examination confounds the accurate classification of testicular position. A more accurate assessment occurs at the time of surgery.

Author	Palpable	Impalpable
M.B.Jackson	86.80%	13.20%
Jacks S Elder	80%	20%
Present series	82%(42)	18%(8)
Hutson& Baker	80%	20%

Table.13.1: Number of palpable and impalpable testis in different studies.

PALPABLE TESTIS

Palpable testis	Hutson& Baker	Present series
Superficial pouch	30%	29.26%
Inguinal	20%	26.82%
Upper scrotum	45%	30%

Table.13.2: Location of palpable testis in different studies.

We have got less cases in upper scrotum compared to Hutson& Baker studies (57a, 57b)

IMPALPABLE TESTIS

Author	Absent testis	Canalicular	Intra abdominal
Jacks S Elder	10%	65%	25%
Hutson& Baker	0%	0%	20%
Present series	1.1%(1)	77.77%(5)	22.22%(2)

Table.13.3: Location of impalpable testis in different studies

(Found intra operatively)

5. ASSOCIATED ABNORMALITY

Abnormality	M.B.Jackson	Scorer	Present series
Abnormality of gubernaculums	79%		56%(28)
Patency of processusvaginalis	44%		46%(23)
Epididymal abnormality	14.70%	46%	20%(10)
Abnormal position of vas deferense	5.90%		06%(3)
Hernia sac	51.50%	55%	33%(16)

Table.14: Associated abnormalities in different studies.

6. ASSOCIATION OF NEOPLASIA WITH UNDESCENDED TESTIS

Name of author	percentage
Canadian series	16
American series	6.6 to 13.4
Taylor and wydham	13
present series	0

Table.15: Association of neoplasia with undescended testis in different studies.

7. FERTILITY AND UNDESCENDED TESTIS

Orchidopexy was done before reproductive age group in many of our patients. Long term follow-up could not be done because of lack of time in the study period.

8. RESULTS OF SURGERY

Study	Stanley Kogan	Present series
Orchidopexy	90%	98%
Orchidectomy	10%	0%
Success	90%	98%

Table.16: results of surgery.

We didn't do orchidectomy for any cases.

CONCLUSION: Undescended testis is most common in right side.In palpable Undescended testis, superficial pouch is the most common site where the testis is found. In ectopic, femoral is the most common site. In impalpable testis most common is canalicular.

Open orchidopexy for palpable and lap orchidopexy for impalpable testis is most common operation performed.

Many of the undescended testis descend within one year of age, hence we should wait till one year of age.

Orchidopexy for undescended testis should be done within 2 years of age as histopathological changes start around 2 years of age till 16 years where irreversible histopathological changes takes place.

Routine pre-operative imaging for undescended testis is neither necessary nor helpful. Ultrasound or MRI do not accurately localizes a true non palpable testis and hence does not alter the surgical management. Laparoscopy directly should be used for evaluation of children with impalpable undescended testis.

SUMMURY: Imperfect descent of testis is the most common problem encountered in pediatric surgery OPD. Many theories have been proposed for imperfect descent of testis, but till today the exact etiology still unknown.

In this descriptive study 50 children of age from day 1 of birth to 18 years, who presented with the complaints of absent testis were selected on the basis of purposive sampling.

This study was conducted between Dec 2011 to May 2013,all of the 50 children fulfilling the inclusion and exclusion criteria after detailed examination underwent abdominal and scrotal

scanning. And for palpable testis open orchidopexy was done and for impalpable testis lap orchidopexy was done.

In our study:

- 56% incidence is present in 2-5 years of age.
- 42% of undescended testis were present on right side
- 82% cases are palpable in undescended testis
- In palpable testis 30% cases are present in superficial pouch followed by inguinal canal(26%)
- In impalpable testis 77% of cases present in canalicular region followed by intra abdominal(22%).
- 2 children who presented with impalpable testis were found to have of Beck-with weidmann syndrome.
- We got 2 cases presented with obstructed inguinal hernia and on examination were found to have undescended testis
- We did 41 cases of open orchidopexy and 8 cases of lap orchidopexy and for 1 absent in abdomen, only diagnostic laparoscopy was done.
- Orchidopexy carries 98% of success rate
- Follow up was done for any ascent, atrophy of testis and wound infection.
- We did not get any complications, but due to lack of time in our study we were not able to study regarding the fertility of the patient.

BIBILOGRAPHY:

1. Human embryology, 8th edition, 2009, Inderbersingh.G.P. pal, page 257:263.
2. Clinically oriented anatomy, 4th edition, keith L Moore, page 193-202.
3. Hunter, 1762. Hunter J: Observation on the state of the testis in the foetus and on the hernia congenital. In: Hunter W, ed. Medical commentaries, Part I, London:A Hamilton:1762.
4. Gier and Marion, 1969. Gier HT, Marion GB: development of mammalian tests and genital ducts. Biolreprod 1969: 1(Suppl 1):1-23.
5. Toppari and kaleva, 1999. Toppari J, Kaleva M: Maldescendus testis. Horm res 1999: 51:261-269.
6. Hutson et al., 1994. Hutson JM, Baker M, Terada M, et al: Hormonal control of testicular descent and the cause of cryptorchidism. Reprod fertile Dev 1994:6;151-156.
7. Hutson and Donahoe, 1986. Hutson JM, Donahoe PK: the hormonal control of testicular descent. Endocr Rev 1986;7:270-283.
8. Shono et al., 1994. Shono T, Ramm-Anderson S, Goh DW, Hutson JM: The effect of flutamide on testicular descent in rats examined by scanning electron microscopy. J pediatrsurg 1994;29:839-844.
9. Geller et al., 1997. Geller DH, Auchus RJ, Mendoca BB, Miller WL:The genetic and functional basis of isolated 17, 20-Iyase deficiency. Nat Genet 1997;17:201-205.
10. Yamanaka et al., 1991. YamanakaJ, Baker M, Metcalfe S, Hutson JM: Serum levels of mullerian inhibiting substance in boys with cryptorchidism. J pediatrsurg 1991;26:621-623.

11. Stillman, 1982. Stillman RJ: In utero exposure to diethylstilbestrol: Adverse effects on the reproductive tract and reproductive performance and male and female offspring.Am J ObstetGynecol 1982; 142:905-921.
12. Hosie et al., 1999. Hosie S, Wessel L, Waag KL: could testicular descent in humans be promoted by direct androgen stimulation of the gebernaculum testis?.Eur J Pediatorsurg 1999:9:37-41.
13. Heyns and Pape, 1991. Heyns CF, Pape VC: presence of a low capacity androgen receptor in the gubernaculum of the pig fetus, J Urol 1991;145:161-167.
14. Fentener van Vlissingen et al., 1988. Fentener van Vlissingen JM, van Zoelen EJ, Ursem PJ, Wensing CJ1: In vitro model of the first phase of testicular descent: Identification of a low molecular weight factor from fetal testis involved in proliferation of gubernaculum testis cells and distinct from specified polypeptide growth factors and fetal gonadal hormones. Endocrinology 1988;123:2868-2877.
15. Fentener van Vlissingen et al., 1989. Fentener van Vliddingen JM, Koch CA, Delpech B, Wensing CJ: Growth and differentiation of the gubernaculum testis during testicular descent in the pig: changes in the extracellular matrix, DNA content, and hyaluronidase, beta-glucuronidase, and beta-N- acetylglucosaminidase activities. J Urol 1989;142:837-845.
16. Heyns, 1987. Heyns CF: The gubernaculum during testicular descent in the human fetus. J anat 1987;153:93-112.
17. Wensing, 1988. Wensing CJ: The embryology of testicular descent. Horm res 1988;30:144-152.
18. Backhouse, 1966. BackhouseKM: The natural history of testicular descent and maldescent. Proc R Soc Med 1966;59:357-360.
19. Fallat et al., 1992. Fallat ME, Wiliams MPL, Farmer PJ, Hutson JM: Histologic evaluation of inguinoscrotal migration of the gubernaculum in rodents during testicular descent and its relationship to the genitifemoral nerve. PediatrsurgInt 1992;7:265-270.
20. Hutson and Beasley, 1987. Hutson JM, Beasley SW: The mechanisms of testicular descent. AUST Paediatr J 1987;23:215-216.
21. Larkins et al., 1991. Larkins SL, Hutson JM, Williams MPL: Localization of calcitonin gene-related peptide immunoreactivity within the spinal nucleus of the genitofemoral nerve. PediatrSurgInt 1991; 6: 176-179.
22. Park and Hutson, 1991. Park WH, HutsonJm: The gubernaculums shows rhythmic contractility and active movement during testicular descent. J PediatrSurg 1991; 26: 615-617.
23. Cain et al., 1994. Cain MP, Kramer SA, Tindall DJ, Husmann DA: Expression of androgen receptor protein within the lumbar spinal cord during ontologic development and following antiandrogen induced cryptorchidism. Urol1994; 152: 766-769.
24. Merksz, 1998. Merksz M: Fusional anomalies of the testis and epididymis. ActaChir Hung 1998: 37:153-170.
25. Abe et al., 1996. Abe T, Aoyama K, Gotoh T, et al: Cranial attachment of the gubernaculam associated with undescended testes. J PediatrSurg 1996; 31: 652-655.
26. Mollaeian et al., 1994. Mollaeian M, Mehrabi V, Elahi B: Significance of epididymal and ductal anomalies associated with undesecded testis: Study in 652 cases. Urology 1994: 43:857-860
27. Gill et al., 1989. Gill B, Kogan S, Starr S, et al: Significance of epididymal and ductal anomalies associated with testicular maldescent. J Urol 1989: 142: 556- 558. Discussion 572.

28. Koivusalo et al., 1998. Koivusalo A, Taskinen S, Rintala RJ: Cryptorchidism in boys with congenital abdominal wall defects. PeduatrSurgInt 1998: 13: 143-145.
29. Quinlan et al., 1988. Quinlan DM, Gearhart JP, Jeffs RD: Abdominal wall defects and cryptorchidism: An animal model. J Urol 1988: 140: 1141-1144
30. Hadziselimovic et al., 1987b. Hadziselimovic F, Herzog B, Buser M: Development of cryptorchid testes. Eur J Pediatr 1987: 146(Suppl 2): S8-S12.
31. Rune et al., 1992. Rune GM, Mayr J, Neugebauer H, et al: Pattern of Sertoli cell degeneration in cryptorchidprepubertal testes. Int J Androl 1992; 15: 19-31
32. Huff et a'.,1991. Huff DS, Hadziselimovic F, Snyder 3rd HM, et al: Early postnatal testicular maldevelopment in cryptorchidism. J Urol 1991: 146: 624-626.
33. Meninberg et al., 1982. Mininberg DT, Rodger JC, Bedford JM: Ultrastructural evidence of the onset of testicular pathological conditions in the cryptorchid human testis within the first year of life. J Urol 1982; 128:782-784.
34. Huff et al., 1991. Huff DS, Hadziselimovic F, Snyder 3rd HM, et al: Early postnatal testicular maldevelopment in cryptorchidism. J Urol 1991: 146: 624-626.
35. McAleer et al., 1995. McAleer IM, Packer MG, Kaplan GW, et al: Fertility index analysis in cryptorchidism. J Urol 1995; 153:1255-1258.
36. Hadziselimovic et al., 1987c. Hadziselimovic F, Herzog B, Hocht B, et al: Screening for cryptorchid boys risking sterility and results of long term buserelin treatment after successful orchiopexy. Eur J Pediatr 1987; 146 (Suppl2): S59-S62
37. Anatomical findings at orchiopexy, M.BJackson, M. H Gouch and Dudley, British journal of urology (1987), 59.568-571
38. McAleer et al., McAleer IM, Packer MG, Kaplan GW, et al: Fertility index analysis in cryptorchidism. J Urol 1995: 153: 1255-1258
39. Tzvetkova and Tzvetkov, 1996. Tzvetkova P, Tzvetkov D: Etiopathogenesis of cryptorchidism and male infertility. Arch Androl 1996; 37:117-125
40. Grasso et al., 1991. Grasso M, Buonaguidi A, Lania C, et al: Postpubertal cryptorchidism: Review and evaluation of the fertility. EurUrol 1991; 20:126-128.
41. Rogers et al., 1998. Rogers E, Teahan S, Gallagher H, et al: The role of orchiectomy in the management of postpubertal cryptorchidism. J Urol 1998; 159:851-854
42. Chilvers et al., 1986. Chilvers C, Dudley NE, Gough MH, et al: Undescended testis: The effect of treatment on subsequent risk of subfertility and malignancy. J PediatrSurg 1986; 21:691-696.
43. Lugg et al., 1996. Lugg JA, Penson DF, Sadeghi F, et al: Prevention of seminiferous tubular atrophy in a naturally cryptorchid rat model by early surgical intervention. J Androl 1996;17:726-732.
44. Lee et al., 1998. Lee PA, Bellinger MF, Coughlin MT: Correlations among hormone levels, sperm parameters and paternity in formely unilaterally cryptorchid men. J Urol 1998; 160:1155-1157. Discussion 1178
45. Abratt et al., 1992. Abratt RP, Reddi VB, Saremboch LA: Testicular cancer and cryptorchidism. Br J Urol 1992;70:656-659.
46. Farrer et al., 1985. Farrer JH, Walker AH, Rajfer J: Management of the postpubertalcryptorchid testis: A statistical review. J Urol 1985;134:1071-1076

47. Martin, 1982. Martin DC: Malignancy in the cryptorchid testis. UrolClin North Am 1982; 9:371-376.
48. Batata et al., 1980, Batata MA, Whitmore Jr WF, Chu FC, et al: Cryptorchidism and testicular cancer. J Urol 1980; 124:382-387
49. Elder, 1992a. Elder JS: Epididymal anomalies associated with hydrocele/hernia and cryptorchidism: Implications regarding testicular descent. J Urol 1992; 148: 624-626.
50. Varela Cives et al., 1996. Varela Cives R, Bautista Casasnovas A, Alonso Martin A, Pombo Arias M: The influence of patency of the vaginal process on the efficacy of hormonal treatment of cryptorchidism. Eur J Pedoatr 1996; 155: 932-936.
51. Scorer and Farrington, 1971. Scorer CG, Farrington GH:Congenital Deformities of the Testies and Epididymis, New York, Appleton-Century-Crofts, 1971.
52. Riegler, 1972, Riegler HC: Torsion of intra-abdominal testis: An unusual problem in diagnosis of the acute surgical abdomen. SurgClinNirth Am 1972; 52:371-374.
53. Campbell-Walsh urology, 9th edition
54. Anotomical findings at orchiopexy, M.B.JACKSON, M.H.GOUCH & N.E.DUDLEY British journal of urology (1997), 59, 568-571.
55. Kaplan, 1993.KApplan GW: Nomenclature of cryptorchidism. Eur J Pediastr 1993; 152 (Suppl2): S17-S19.
56. The undescended testes, hormonal & surgical management JCKS.S. ELDER, M.D. Surgical clinics of north America- vol.68, no.5, oct-1988.
57. A. Hutson JM. Undescended testes. In Pediatric Surgery and Urology: Long –Term Outcomes, edn 2, pp. 652-663. Eds. MD Stringer, KT Oldham & PDEMouriquand, Cambridge: Cambridge Univercity Press, 2006 ch.51.
58. Baker LA, Silver RI &Docimo SG. Cryptorchidism. In Pediatric Urology, edn 1, pp. 738-753. Eds. J Gearhart, R Rink & PDE Mouriquand, Philadelphia: W.B. Saunders, 2001ch.46.
59. The anatomy of testicular descent-normal & incomplete SCORER C.G.(1956), Archives of diseases in children, 31, 198.
60. Kogan SJ, Gill B, et al: Human monochrism; Aclinico-pathological study of unilateral absent testes in 65 boys. J U ro 135:758, 1986.

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