



A COMPARATIVE STUDY OF TESTICULAR VOLUME TO ASSESS TESTICULAR ATROPHY IN PEDIATRIC AGE GROUP BY SERIAL ULTRASONOGRAPHY IN UNDESCENDED TESTIS BEFORE AND AFTER ORCHIDOPEXY

Medical Science

Dr. Mohammed Furqan M

3rd year Post Graduate, SIMS & RC.

Dr. Ramesh M Tambat

Prof & HOD, SIMS & RC.

Dr. P. Kuladeep Sai Third year PG, SIMS & RC.

ABSTRACT

Cryptorchidism is the absence of at least one testicle from the scrotum. It is the most common congenital anomaly in boys and occurs in 3% to 9% of all full-term male neonates.¹ In this study, we investigated post-orchidopexy testicular growth of UDTs at different primary locations and determined the risk factors for Testicular Atrophy (TA). This was a single center hospital based Prospective Observational Study conducted on patients with Undescended Testis (UDT) in the department of general surgery at SIMS & RC from April 2022 to February 2024. Ethical committee clearance was obtained prior to the study and a total of 50 patients were included in the study. Patient profile, age at operation, primary UDT location, and testicular volume were noted. TA was defined $\geq 50\%$ loss of volume after orchidopexy. The primary endpoints were testicular growth and TA after orchidopexy. **RESULTS:** Patients were distributed according to their age and majority were found to be in the age group of 1-3 years-28(56%) and mean $\pm$ SD is 5.18 $\pm$ 2.13. Distribution according to primary location was done and majority were found to be in Inguinal canal 74%, followed by at level of superficial ring 10%. Patients were distributed according to premature birth and majority 82% were >37 weeks gestational age who took oral iron therapy. Scrotal volumes were measured at 0 and 6 months post operatively and was found to have an increase in testicular volume with mean SD of 0.32. TA rates were 2%(1/50), 6%(3/50) and 16%(8/50) in primary suprascrotal, canalicular and above inguinal UDTs. Testicular rates were found to be higher in patients who had primary testicular location above the inguinal canal. Testicular growth was found to be more significant with early orchidopexy and with patients having suprascrotal and canalicular UDTs.

KEYWORDS

INTRODUCTION:

Cryptorchidism is the absence of at least one testicle from the scrotum. It is the most common congenital anomaly in boys and occurs in 3% to 9% of all full-term male neonates. The incidence of cryptorchidism decreases, due to spontaneous descent, to 1% to 2% by 6 months of age.¹ Cryptorchidism can result in infertility or even malignancy in adulthood. After the age of 2 years, the degenerative process in an undescended testis can be observed histologically. The undescended testis is often smaller in size than the intrascrotal one.² Orchiopexy is the standard intervention for congenital undescended testes (UDTs), which is recommended within the age of 6–12 months or in the first 18 months of life. Histological analyses reveal improvements in the number of germ cells per tubule and presence of Leydig cells during early orchiopexy.³ Early orchiopexy also decreases the risk of testicular cancer, preserves fertility and improves testicular growth. Furthermore, the complications of orchiopexy, including recurrence, scrotal hematoma, wound infection, and vasal injury, are relatively uncommon. However, testicular atrophy (TA) is a serious complication when orchiopexy is not performed at the recommended age.⁴

Orchidopexy is a surgical procedure to mobilise an undescended testis and fix it/ place it in the scrotum. Orchiopexy is also used to describe the surgical procedure performed for testicular torsion. There can be different approaches like- Scrotal, Inguinal and Laparoscopic approach and all three have been used in this study performed by 2 different surgeons.⁵ Scrotal Ultrasonography can be used to provide an accurate comparative assessment of growth and volume and vascularity (doppler) of the testis before and after orchidopexy.⁶

AIMS & OBJECTIVES:

- 1) To study the effect of orchidopexy on testicular growth by assessing the testicular volume at 0 and 6 months post operatively.
- 2) To determine the factors for Testicular Atrophy.

MATERIALS AND METHODS:

This was a single centred hospital based Prospective Observational study conducted on patients diagnosed with Undescended Testis belonging to the pediatric age group admitted in the Department of Pediatric Surgery or General Surgery. The surgeries were performed by 2 experienced surgeons with 10+ years of experience in the field of Pediatric Surgery.

Study Period: April 2022 to February 2024.

Study Design: Prospective Observational Study

Sample Size: 50

Inclusion Criteria: All patients diagnosed with UDT <16 years of age.

Exclusion Criteria: Patients with retractile testis and whose guardians did not consent for the study or had inadequate data were excluded from the study.

Surgical Technique:

When the primary location of the testicles is over the upper scrotum or external ring, orchiopexy with a scrotal approach is often selected. A single incision is made transversely at the lower scrotum. The overlying cremaster muscle is mobilised and then the testis can be drawn into the scrotum. When a major portion of the testicles is found in the inguinal canal or immediately above the internal ring, a standard inguinal approach is used. The spermatic cord is mobilised and the testis is dissected distally to the gubernacular remnant. Another transverse scrotal incision is made and the testicle is fixed within the subdartos pouch. For abdominal testes, the surgical method is decided by the surgeon based on surgeon's expertise and length of testicular cord; it can include open transabdominal orchiopexy, laparoscopic orchiopexy, or one- or two-stage Fowler–Stephens orchiopexy.⁷

Statistical Analysis:

The data collected was entered into Microsoft Excel Worksheet 2010 and data was taken into IBM SPSS Statistics for Windows, Version 24 software for calculation of frequency, percentage, mean, standard deviation and Probability value.

RESULTS:

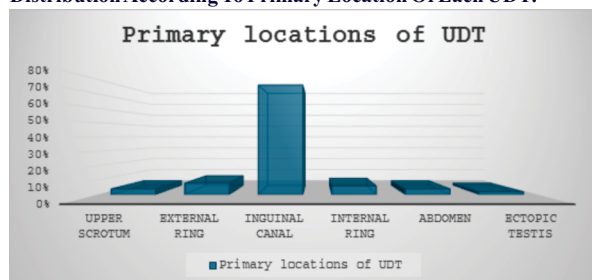
Distribution According To Age:

AGE GROUP	NO. OF PATIENTS N(%)
≤ 1 YEAR	3(6%)
1-3 YEARS	28(56%)
4-7 YEARS	14(28%)
8-12 YEARS	3(6%)
12-16 YEARS	2(4%)
Mean $\pm$ sd	5.18 $\pm$ 2.13

The patients were categorized into 5 groups and majority of the

patients were found to be in the age group of 1-3 years- 28(56%) followed by 14(28%) in the 4-7 age group and 8-12 years-3(6%) with mean $\pm$ SD of age is 5.18 $\pm$ 2.13 years. P-value >0.001 and hence the data is comparable.

Distribution According To Primary Location Of Each UDT:



Out of the 50 patients, majority 37(74%) have inguinal canal as their primary location followed by external ring 8% as their primary location.

Distribution According To Laterality:

Laterality	No. Of Patients (%)	P- Value
BILATERAL	14(28%)	0.64
RIGHT	16(32%)	0.64
LEFT	20(40%)	0.64
TOTAL	50	

20 patients had left UDT(40%), 16(32%) had right and 14(28%) had bilateral UDT. This yielded a P-value of 0.64 and hence the data was found to be comparable.

Distribution According To Surgical Approach:

Surgical Procedure (Each testicle)	Frequency N (%)
Scrotal Approach	12(18.75%)
Inguinal Approach	48(75%)
Laparoscopic Approach	4(6.25%)
Total	64

75% of the patients underwent orchidopexy with Inguinal approach and 18.75% underwent scrotal approach. P- value- 0.88.

Distribution According To Premature Birth Or Not:

Premature birth or not	Frequency	P-Value
Gestational age $\geq$ 37 weeks	41(82%)	
Gestational age <37 weeks	9(18%)	
Total	50	0.24

82% of the patients who were diagnosed with UDT had a Gestational age of 37 weeks or more and the mothers had taken oral iron supplements during pregnancy and 18% of the patients had premature birth with a P-Value of 0.24 which was not statistically significant.

Comparison Of The Suprascrotal Pre And Post Operative(6 months) Testicular Volume:

Suprascrotal testicular volume(in ml)	Mean	P- Value
Pre Operative	0.30 $\pm$ 0.15	
Post Operative(1 month)	0.41 $\pm$ 0.19	0.0001
Post Operative(6 month)	0.49 $\pm$ 0.22	0.0001

The suprascrotal testicular volume in the post operative period of 6 months had the mean SD of 0.49(0.22). P- value is calculated to be 0.0001 and hence considered to be statistically significant growth in Testicular Volume.

Comparison Of The Inguinal Pre And Post Operative(6 months) Testicular Volume:

Inguinal testicular volume(in ml)	Mean	P- Value
Pre operative	0.23 $\pm$ 0.13	
Post operative(1 month)	0.27 $\pm$ 0.14	0.0001
Post operative(6 month)	0.32 $\pm$ 0.16	0.0001

The majority of them at the Post Operative period of 6 months had a mean SD of 0.32(0.16). P- value is calculated to be statistically significant and the value is 0.0001.

Comparison Of The Above Inguinal Pre And Post Operative(6

months) Testicular Volume:

Above Inguinal testicular volume(in ml)	Mean	P- Value
Pre-Operative	0.14 $\pm$ 0.09	
Post- Operative(1 month)	0.16 $\pm$ 0.10	0.0001
Post-Operative(6 month)	0.19 $\pm$ 0.13	0.0001

Of the total 50 patients, the majority of them in the post operative period of 6 months had a mean standard deviation of 0.19(0.13) and a P- value of 0.0001 and hence considered to be statistically significant growth in testicular volume.

DISCUSSION:

The present study was a comprehensive analysis of the testicular growth in patients who had undergone paediatric orchidopexy. We defined TA as a volume loss of $\geq$ 50% after orchidopexy and assessed the testicular volume accurately through ultrasonography. The overall TA rate in this cohort was 7.8%. In most studies, TA refers to the reduction in testicular volume and is assessed through observation by clinical palpation. However, the atrophy rate was usually underestimated because of subjective appraisal of testicular size by a single surgeon. Durell *et al.* reported an overall atrophy rate of 2.6% with the same definition as that in the present study, but testicular volumes were measured through clinical palpation.⁸ Ein *et al.* reported relatively high rates of TA; 5% and 9% in the common and high UDT type, respectively, and the definition used was a decrease in size of the testicle by at least one-third.⁹ Several studies have reported various criteria with an atrophy rate of up to 32%.

In a study by Barthold *et al* majority of patients have a post operative testicular volume with a mean SD of 0.56(0.08) whereas in the current study it was 0.32(0.16).¹⁰

CONCLUSION:

Scrotal Ultrasonography can provide an accurate comparative assessment of the growth of testes before and after orchidopexy.

In this study there was a significant increase in the Testicular Volume 6 months post operatively in all the age groups with the data being statistically significant and on comparison Inguinal UDT showed a superior increase in the Testicular ratio pre and 6 months post operatively as compared to the other primary locations of the UDT.

Testicular Atrophy was noted mainly in the above inguinal type of UDT. Hence, early orchidopexy is better for the growth of the testicular volume and for the prevention of Testicular Atrophy.

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