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OUTCOME OF LAPAROSCOPIC-ASSISTED ORCHIDOPEXY IN PEDIATRIC POPULATION

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Abstract:
Objectives: To determine outcome of laparoscopic assisted orchidopexy in pediatric population with undescended testes.
Materials and Methods: Approval was obtained from CPSP, Karachi, and Saidu Group of Teaching Hospitals, Swat. Eligible children were enrolled after explaining the study, and written informed consent was obtained from parents/guardians. Demographic and clinical data were recorded on a structured proforma. Laparoscopic-assisted orchidopexy was performed under general anesthesia with endotracheal intubation and prophylactic intravenous antibiotics. A 5-mm umbilical camera port and two additional ports were used for intra-abdominal testes. Testicular position and mobility were assessed; testes located within 2 cm of the internal inguinal ring underwent one-stage orchidopexy, while those >2 cm underwent two-stage orchidopexy. The testis was mobilized and positioned in a subdartos pouch using the Prentiss maneuver. Surgical success and postoperative complications were documented under the supervision of an experienced pediatric surgeon.
Results: The mean age was 5.67±3.16 years, mean weight 19.25±6.20 kg, and mean operative time 71.75±5.39 minutes. Most patients were aged 1–5 years (58.1%), rural residents (51.6%), and had right-sided testes (62.9%). Testes were mainly located near the kidney (48.4%). Overall, surgical success was achieved in 79.0% of patients. Surgical success was significantly associated with residence ($p=0.03$), but not with age, socioeconomic status, testicular location, laterality, or operative time ($p>0.05$).
Conclusion: It was concluded that Laparoscopic-assisted orchidopexy (LAO) is a safe, effective, and reproducible procedure for pediatric intra-abdominal cryptorchidism, achieving a 79.0% success rate regardless of age, laterality, operative time, financial background, or testicular depth. While early referral remains crucial for optimal long-term testicular function, LAO provides versatile mobilization for high-positioned testes, though prospective multi-center studies with long-term follow-up are needed to assess fertility outcomes.

KEYWORDS: laparoscopic, orchidopexy, pediatric population

INTRODUCTION:

Cryptorchidism, commonly known as undescended testis (UDT), is one of the most common congenital anomalies in pediatric urology.(1, 2) It is classified as palpable or non-palpable, with more than 80% of cases being palpable.(3, 4) Cryptorchidism is associated with complications such as inguinal hernia, impaired fertility, and an increased risk of testicular malignancy, making timely treatment essential.(3, 5) Testicular descent occurs between 25 and 35 weeks of gestation through two hormone-regulated phases.(6) Failure of this process may result from genetic, hormonal, prematurity-related, or environmental factors. Spontaneous descent may occur during the first six months of life.

Orchidopexy can be performed using open or laparoscopic techniques. Open orchidopexy is commonly used for palpable inguinal testes, whereas laparoscopy is particularly useful for non-palpable or intra-abdominal testes. Laparoscopic orchidopexy provides effective visualization and mobilization of high undescended testes, with postoperative complication rates comparable to those of open surgery.(7) Current guidelines recommend orchidopexy between 6 and 18 months of age to optimize testicular function and reduce long-term complications.(5) The European Association of Urology recommends orchidopexy for undescended testes before 12 months of age; however, the optimal timing of surgery remains debated.(8)

Laparoscopic-assisted orchidopexy is increasingly preferred for managing non-palpable undescended testes because of its minimally invasive approach and favorable outcomes.(3, 9) However, regional evidence remains limited. This study therefore aims to evaluate the outcomes of laparoscopic-assisted orchidopexy in children at our hospital, providing local evidence to support evidence-based surgical practice and improve the management of cryptorchidism.

Objective: To determine outcome of laparoscopic assisted orchidopexy in pediatric population with undescended testes.

MATERIALS AND METHODS:

Study Design: Descriptive Study

Study setting: Pediatric Surgery Department of Saidu group of teaching hospital Swat.

Duration of the study: The study was conducted from Dec 2025 to March 2026.

Sampling Technique:

Non-probability Consecutive sampling.

Sample size: A sample size of 62 patients was calculated using the WHO sample size calculator, assuming an anticipated success rate of orchidopexy of 86.36%, an absolute precision of 8.2%, and a 95% confidence level.

Selection criteria:

Inclusion criteria:

- Patients of age range 01-18 Years.
- Male children with undescended testes.

Exclusion criteria

- Children with previously operated in other hospital.
- Children with palpable testes.

Methods: Approval was obtained from CPSP, Head Office, Karachi and Saidu group of teaching hospital Swat. All children fulfilling the selection criteria were enrolled after the objectives, benefits, and potential risks of the study were explained to their parents/attendants. Written informed consent was then obtained from the parents/guardians. Demographic information, including age, weight, residence, and socioeconomic status, was recorded.

Children diagnosed with undescended testes underwent laparoscopic-assisted orchidopexy under general anesthesia with endotracheal intubation. Intravenous antibiotics were administered during induction of anesthesia. The inguinoscrotal region was re-examined to assess the presence of the testis. A 5-mm camera port was introduced through the umbilicus. If both the vas deferens and testicular vessels were observed exiting through the internal inguinal ring, laparoscopy was concluded and inguinal exploration was performed.

When the testis was identified within the abdomen, its distance from the internal inguinal ring was measured. If the distance was less than 2 cm, a one-stage orchidopexy was performed. Two additional ports were inserted bilaterally along the mid-clavicular lines at the level of the umbilicus. The testis was carefully mobilized using hook cautery and blunt dissection until adequate mobility was achieved without tension on the vas deferens or testicular vessels. The length was reassessed by measuring the distance to the contralateral internal inguinal ring. A subdartos pouch was created, and the testis was brought down into the scrotum using the Prentiss maneuver.

If the distance from the internal inguinal ring was greater than 2 cm, a two-stage orchidopexy was performed. The surgical outcome, including procedural success and postoperative complications, was assessed according to the predefined operational definitions. All procedures and assessments were performed under the supervision of a pediatric surgeon with at least five years of post-fellowship experience. A predesigned structured proforma was used to record the relevant clinical, operative, and postoperative details of each patient.

RESULTS:

The mean age of the patients was 5.67±3.16 years, while the mean weight was 19.25±6.20 kg and the mean duration of surgery was 71.75 ± 5.39 minutes. Regarding age groups, 36 (58.1%) patients were aged 1–5 years, 19 (30.6%) were aged 6–10 years, and 7 (11.5%) were aged >10 years. Of the total patients, 30 (48.4%) were from urban areas and 32 (51.6%) were from rural areas. Regarding financial background, 24 (38.7%) belonged to the lower class, 22 (35.5%) to the middle class, and 16 (25.8%) to the higher class. Testicular laterality showed that 39 (62.9%) patients had right-sided involvement, while 23 (37.1%) had left-sided involvement. Regarding testicular location, 30 (48.4%) testes were located near the kidney, 15 (24.2%) were above the internal ring, and 17 (27.4%) were located near the iliac vessels (Table 1). Successful surgical outcome was achieved in 79 (79.0%) patients, while 13 (21.0%) patients were reported as unsuccessful (Table 2).

Table 1: Demographic and Clinical Characteristics of the enrolled Children (n=62)

Variables	
Age (Years)	5.67± 3.16
Age Groups	
01-05 years	36(58.1%)
6-10 years	19(30.6%)
>10 years	7(11.5%)
Weight (kg)	19.25±6.20
Duration of surgery (minutes)	71.75±5.39
Residence	

Urban	30(48.4%)
Rural	32(51.6%)
Financial background	
Lower-Class	24(38.7%)
Middle class	22(35.5%)
Higher class	16(25.8%)
Testes laterality	
Right	39(62.9%)
Left	23(37.1%)
Testes location	
Near kidney	30(48.4%)
Above Internal Ring	15(24.2%)
Near iliac vessels	17(27.4%)

Table 2: Frequency of Success (n=62)

Variables	**no (%)**
Success	
Yes	79(79.0%)
No	13(21.0%)

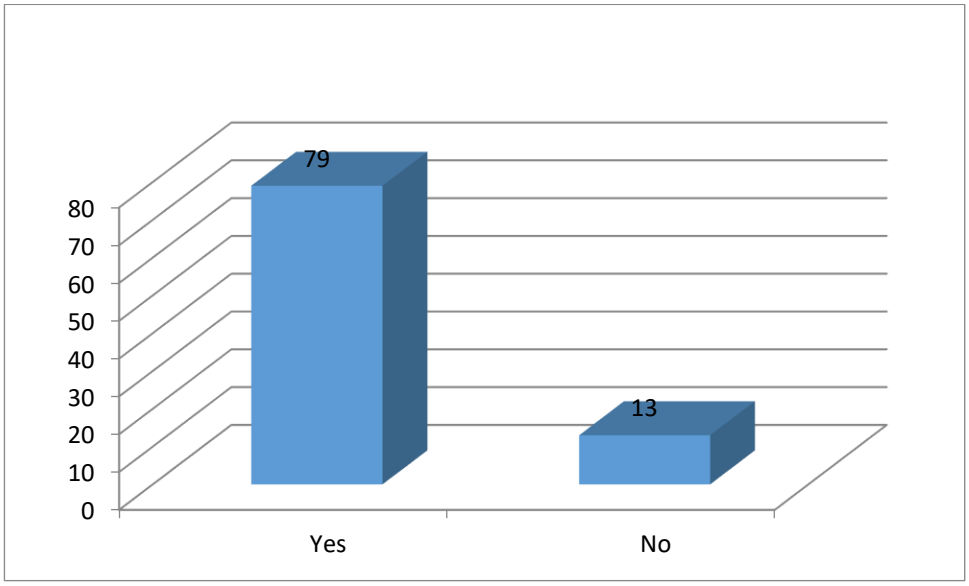


Fig 1: Frequency of patients on the basis of Success

The analysis showed that age group was not significantly associated with surgical success (p=0.64), with successful outcomes observed in 1 (3.7%), 8 (29.6%), and 10 (37.0%) patients aged 1–5, 6–10, and >10 years, respectively. Residence was significantly associated with surgical success (p=0.03), with urban and rural residents accounting for 19 (38.8%) and 30 (61.2%) of successful cases, respectively, compared with 11 (84.6%) and 2 (15.4%) among unsuccessful cases. Financial background showed no significant association with surgical success (p=0.21), with lower-, middle-, and higher-class patients comprising 17 (34.7%), 17 (34.7%), and 15 (30.6%) of successful cases, respectively. Similarly, testicular location was not significantly associated with surgical success (p=0.26), with successful cases involving testes located near the kidney, above the internal ring, and near the iliac vessels in 23 (46.9%), 14 (28.6%), and 12 (24.5%) cases, respectively. Testicular laterality was also not significantly associated with surgical success (p=0.90), with right-sided and left-sided involvement observed in 31 (63.3%) and 18 (36.7%) successful cases, respectively. Finally, duration of surgery

was not significantly associated with surgical success (p=0.63), with durations of <70 minutes and >70 minutes observed in 19 (38.8%) and 30 (61.2%) successful cases, respectively (Table 3).

Table 3: Stratification of Success on the basis of Demographic Characteristics (n=62)

Variables	Success		
	YES	NO	P-Value
Age Groups			
01-05 years	1(3.7%)	3(8.8%)	
6-10 years	8(29.6%)	7(20.6%)	
>10 years	10(37.0%)	16(47.1%)	0.64
Residence			
Urban	19(38.8%)	11(84.6%)	0.03
Rural	30(61.2%)	2(15.4%)	
Financial background			
Lower-Class	17(34.7%)	7(53.8%)	
Middle class	17(34.7%)	5(38.5%)	0.21
Higher class	15(30.6%)	1(7.7%)	
Testes location			
Near kidney	23(46.9%)	7(53.8%)	
Above Internal Ring	14(28.6%)	1(7.7%)	0.26
Near iliac vessels	12(24.5%)	5(38.5%)	
Testes laterality			
Right	31(63.3%)	8(61.5%)	
Left	18(36.7%)	5(38.5%)	0.90
Duration of surgery (minutes)			
<70	19(38.8%)	6(46.2%)	0.63
>70	30(61.2%)	7(53.8%)	

DISCUSSION:

Cryptorchidism, or undescended testicle, remains one of the most prevalent congenital pediatric urological anomalies.(1, 3, 9) Laparoscopic-assisted orchidopexy (LAO) has emerged as the definitive diagnostic and therapeutic gold standard for non-palpable or high intra-abdominal testes, providing direct visualization of spermatic vessels, testicular remnant evaluation, and minimal operative morbidity.(10) Undescended testes are a common finding in newborn males. While spontaneous descent reduces the prevalence from 2 to 8% at birth to 1–2% by 3 months of age , it rarely occurs after this time.(11) In our study, the overall surgical success rate, defined as stable scrotal position without atrophy or re-ascent was achieved in 79.0% of patients. Our study was supported by another study stated that the success rate was 89.46%.(12)

The mean age of presentation in our cohort was 5.67+3.16years, with the majority of patients (58.1%) presenting between 1 and 5 years of age. Current international guidelines (such as the EAU and AUA) advocate for early intervention between 6 and 18 months of age to prevent germ cell loss and Leydig cell degradation(13). The higher mean operative age observed in our study reflects delayed tertiary presentation, a common feature in developing surgical setups. The mean operative duration was 71.75+5.39 minutes, which aligns with operative times reported in international series evaluating laparoscopic approaches for non-palpable testes.(14) Furthermore, operative duration was not significantly associated with outcome (p = 0.63), suggesting that operative length in experienced hands does not compromise testicular viability.

Right-sided involvement predominated in our cohort (62.9%), mirroring the literature consensus on right-sided cryptorchidism secondary to delayed right testicular descent during fetal development .(15) Testicular depth varied across the study, with 48.4% located near the kidney, 24.2% above the internal ring, and 27.4% near the iliac vessels. Importantly, statistical analysis revealed no significant association between intra-abdominal testicular location and surgical success (p= 0.26). High intra-abdominal testes (near the kidney) achieved stable scrotal positioning without disproportionate surgical failure, underscoring the efficacy of laparoscopic retroperitoneal vessel mobilization.(16) Interestingly, patient residence demonstrated a statistically significant association with surgical outcome (p= 0.03). Rural residents constituted 61.2% of successful outcomes compared to 38.8% among urban cases, whereas unsuccessful outcomes were predominantly observed in urban patients (84.6%). Financial background showed no statistically significant association with outcomes (p =0.21). While financial standing did not directly affect technical success, variations in primary care referral patterns, regional hospital volume, and post-discharge compliance between urban and rural centers may contribute to disparities in follow-up and documented success rates.(17)

Conclusion: It was concluded that Laparoscopic-assisted orchidopexy (LAO) is a safe, effective, and highly reproducible technique for the management of pediatric intra-abdominal cryptorchidism, achieving an overall surgical success rate of 79.0%. Our findings demonstrate that surgical success is independent of patient age, testicular laterality, duration of surgery, financial background, or intra-abdominal testicular depth, highlighting the versatility of laparoscopic mobilization even for high-positioned testes. While delayed presentation remains common in our setting, early identification and referral are essential to optimize long-term testicular preservation and germ cell function. Future multi-center prospective studies with extended long-term follow-up into adolescence are recommended to further evaluate long-term fertility outcomes, testicular volume growth trajectories, and paternity rates in this patient population.

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