Laparoscopic - Assisted Orchidopexy in Non-Palpable Testes in Adult Population

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Abstract

Objectives: To present our experience of managing impalpable undescended testes in post-pubertal patients with intention of testicular preservation using laparoscopic assisted orchidopexy.

Methods: It was a descriptive study conducted at Department of Urology, Jinnah Postgraduate Medical Center (JPMC) Karachi, between Jan 2015 to Dec 2020 with minimal 6 months follow-up. We included all patients with clinically impalpable testes with aged 12 and above. All patients had ultrasound abdomen performed as initial screening test followed by laparoscopic assessment and definite procedure. Patients with normal or hypo-plastic testes were underwent single staged orchidopexy while patients with testicular atrophy were planned for orchiectomy.

Results: Total 36 patients with 41 impalpable testes underwent laparoscopic localization and management. Mean age of patients was 20.75 + 5.98 years. 50% of testes were on the right side, 36.1% on left sided while 3.88% were bilateral. 5 (12.1%) patients had clinical inguinal hernia. Diagnostic yield of ultrasound was (75.6%) and 100% in laparoscopy. 33 testes were true intra-abdominal while 4 were inguinal and 4 were vanishing testes Normal looking testes were observed in 24 testes (64.86%) followed by hypoplastic in 11 (29.72%) while 2 testes (5.40%) were atrophic. Two intra-operative complications included urinary bladder injuryand vas deferens injury in one patient each. Postoperatively testicular ischemic necrosis in one (2.4%) and wound infection in 2 (4.8%) patients were noted. Late follow up revealed one port site hernia (2.4%) and one testicular atrophy (2.4%). Success rate of orchidopexy in our study was 94.6%.

Conclusions: Laparoscopic has been proved as excellent diagnostic and therapeutic tool for the management of intra- abdominal undescended testes inadult patients.

Keywords: Impalpable testes, Laparoscopic-assisted orchidopexy, Adolescent, Adult.

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Introduction

Undescended testes is most frequent congenital urological disorder with an overall incidence of 1.8% to 4% in full term male newborns and decrease to 1% at the age of 1 year, and about 20% of children with cryptorchidism may have one or both non-palpabletestes[1]. Cryptorchidism should betreated due to increased risk of infertility, testicular torsion, malignancy, trauma and psychological impact of empty scrotum[2]. The non-palpable testes may present as agenesis, vanishing testes, intra-abdominal testes,or inguinaltestes[3]. There are various imaging techniques to localize the non-palpable testes such as, ultrasonography, MRI, CT scan, but the accuracy of laparoscopy is superior to all other investigations[4]. In developed countries, cryptorchidism is usually diagnosed early in childhood and

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managed by orchidopexy, whereas in developing countries, mostly patients present in adult life and their management remains controversial[5]. Most of studies recommended orchiectomy in adult life due to risk of malignancy, deterioration of spermatogenesis and loss of endocrine functions[6]. But few studies recommended testicular preservation to save residual endocrine testicular function, this required placement of testes in a place where regular surveillance can be done[7]. Orchidectomy can be done later if there was any evidence of malignancy. Orchidopexy can be performed either open or laparoscopic technique. Laparoscopy was initially demonstrated by Cortesi et al. for localization of an undescended testis[8]. With time it became favorable technique because of its minimally invasiveness, less morbidity and ability to perform laparoscopic assisted orchidopexy in intra-abdominal testes[9]. During diagnostic laparoscopy, the morphology and location of testis are the important parameters to decide about testicular preservation and to make a decision for bringing down the testis in the scrotum either in single stage or two stage orchidopexy[10].

The aim of our study is to present our experience of single stage laparoscopic assisted orchidopexy in post-pubertal patients and evaluate the usefulness of laparoscopy in localization and fixation of testes at accessible place and also observe the surgical outcome in terms ofperi-operative complicationsand longer follow up to see testicular atrophy and malignant transformation.

Patients and Methods

This was a prospective descriptive study performed in urology department of Jinnah Postgraduate Medical Centre Karachi, between Jan 2015 to Dec 2020, with minimal 6 months follow-up. We included 45 patients with clinically impalpable testes aged 12 and above. Ultrasound abdomen, pelvis and inguinoscrotal area was performed in all patients as initial screening test to labeled as non-palpable testes. All patients were carefully examined in outpatient department (OPD), in ward and in operation theatre under general anesthesia. Four patients were excluded from study as the testes became palpable under general anesthesia examination. Another 5 patients lost follow-up, so we analyzed 36 patients with 41 undescended testes. All patients with normal or hypo-plastic testes were underwent single staged orchidopexy. Testicular atrophy defined as testicular size <2 cm diameter were planned for laparoscopic orchiectomy. Permission from institutional ethical review committee was taken. Informed written consent for proposed surgery was taken from patients and from their parents if they were less than 18 years. Patients with less than 12 years and previous history of inguinal surgery were excluded. Our plan was to perform straightforward laparoscopy after ultrasound, but few patients already had MRI for testicular localization.

Laparoscopic Surgical technique; three port technique was used, 10mm infra-umblical port for camera telescope while two 5mm working ports were used around midpoint between umbilicus and anterior superior iliac spine in midclavicular line. Pneumo-peritoneum was created by Hassan technique, and pressure maintained 12cm of H_2O. Head down position with elevation of effected side help out for localization of testis. Mostly it was located around deep ring. Dissection was started by incising the peritoneum over lateral side of deep ring. Testis was hold lightly by atraumatic grasper and slightly pulls out. This help in identification and cauterization of gubernaculums from distal attachment. The vas deferens was mobilized towards the medial side by incising the peritoneum both above and below its course leaving a strip of peritoneum. This technique helped in preservation of vascularity of vas deference. Further mobilization of testicular vessels was made as proximal as possible. This may need mobilization of sigmoid colon in some cases. Adequate mobilization of testis was confirmed by putting the mobilized testis toward the opposite deep ring (stretch maneuver). Exact laparoscopic identification of medial and lateral umbilical ligament made. The site of re-routing (prints maneuver) was located between medial and lateral umbilical ligament lateral to inferior epigastric vessels. Impulse was given from inner side by laparoscopic

Table 1. Diagnostic Accuracy of ultrasound and laparoscopy for testicular localization

Site	Ultrasound (75.6%)	Laparoscopy (100%)
Intra-abdominal	29	33
Inguinal canal	02	04
Not Localized	10	04 (vanishing)

Table 2. Localization of testis on Diagnostic laparoscopy (n=41)

S.No	Location of testes	No. of Patient	%
01	Low intra-abdominal testes (<2cm from deep ring)	28	68.29
02	High intra-abdominal testis (>2cm from deep ring)	05	12.19
03	Vessels and vas entering the deep ring	04	9.75
04	Blind ended vas and vessels (Vanishing)	04	9.75
	Total	41	100

Table 3. Complications of Procedure

Intra-operative complications	Post-operative complications
Surgical emphysema 01(2.4%)	Early
Urinary Bladder injury 01 (2.4%)	
Vas deferens injury 01 (2.4%)	Surgical site hematoma 01(2.4%)
	Testicular ischemic necrosis 01(2.4%)
	Wound infection 02(4.8%)
	Late
	Port site hernia 01(2.4%)
	Testicular atrophy 01(2.4%)

laheyforceps to locate the site of inguinal incision. About 2cm transverse incision was made near the superficial ring by another surgeon. Incision was deepened and laparoscopic lahey forceps was delivered through it. The jaws of lahey forceps were opened and grasped the glove of finger and introduce the finger by rail road technique into the peritoneal cavity. After finger tract dilatation the bibcock forceps was introduced, grasp and delivered the testes with laparoscopic guidance avoiding twisting of cord. Care should be taken to avoid the leakage of gas by putting the moist gauze over the incision area. Further laparoscopic mobilization of pedicle can be performed at this stage to get extra length. Testis was fixed to sub-dartos pouch as lower as possible in scrotum. Laparoscopic orchiectomy was performed by simply applying clips to testicular vessels and vas deference after adequate mobilization and removal of testis through 10mm camera port site after putting it in modified surgical glove pouch.

Intra-abdominal vanishing testis was labeled when a blind ended vas deferens was located away from the deep ring without any evidence of presence of testis. If both vas and testicular vessels were entering into deep ring, then inguinal incision was made. If normal looking testis was identified inguinal Orchidopexy was performed. Atrophic testis or testicular nubbin needed excision (orchiectomy). Testicular fixation sites were arbitrarily described and recorded as superior scrotal, upper scrotal, mid-scrotum and lower scrotum.

Post-operative follow-up was made after one week, monthly for 3 months and then 6 monthly, with careful examination of testicular location, size and turgity was performed with comparison with previous record. Testicular atrophy was labeled when there was a loss of 50% of testicular size. Operative Success was declared when testis stay well at the site of placement without pain or atrophy during follow-up. Minimal follow-up was 6 months but average follow-up was 13.75 ± 6.23 months. All pertinent details were carefully recorded and put in SPSS version 20. Categorical variables like laterality, testicular location, success rate was recorded as percentage or frequency. Continuous variables like age, operation time, hospital stay was measured in mean + standard deviation.

Results

Total 36 patients with 41 impalpable testes underwent laparoscopic localization and management. Age ranged from 13 to 34 years, with the mean age of 20.75 + 5.98 years. Out of 36 patients, 18 (50%) had impalpable testis on the right side, while 13

(36.1%) were left sided and 5 (13.88%) were bilateral. Clinically detected inguinal hernias were noticed in 5 patients (12.1%), 3 were on right side while 2 left sided.

Regarding testicular localization, Ultrasound was able to locate 31 impalpable testes (75.6%). Among the remaining 10 non-localized testis only one testis was located by MRI. Our Laparoscopicintra-abdominal testicular localization was successful in 33 testes, while in four testes the vas and testicular vessels were entering inside the deep ring so labeled as inguinal testes.The remaining 4 (9.75%) testes were not located even by careful laparoscopic examination up to the renal area but blind ended vas deferens was found below the deep ring they were labeled as intra-abdominal vanishing testis. Laparoscopic localization of testes revealed low intra-abdominal as the most common site seen in 28 patients (68.29%), followed by high intra-abdominal in 5 testes (12.19%). Regarding testicular morphology normal looking testes were observed in 24 testes (64.86%) followed by hypoplastic in 11 (29.72%) while 2 testes (5.40%) were atrophic.The diagnostic accuracy between ultrasound and laparoscopy for testicular localization are shown in Table 1. and location of testes in Table 2.

Out of 37 localized testes, 33 were intra-abdominal. Single-stage Laparoscopic assisted orchidopexy was performed in 31 (93.9%) testis, while remaining 2 (6.06%) testis required laparoscopic orchiectomy due to testicular atrophy (<2cm). Specimens sent for histopathology and none had malignancy. We do not perform routine testicular biopsy before orchidopexy. Four inguinal testes diagnosed on laparoscopy,where vas deferens and vessels were entering the deep inguinal ring. Two of them having widely opened deep ring and testis were easily retrieved back into abdominal cavity (peeping testis) and laparoscopic orchidopexy was performed. Remaining 2 were true inguinal and needed inguinal exploration and fixation. Laparoscopic detected wide open deep ring was noted in 10 patients but clinically detected inguinal hernia was seen only in 5 patients. All open deep rings were closed anatomically with proline 2/0 running suturing without mesh placement at the same time with satisfactory postoperative result. All bilateral undescended testes were operated in same setting. Regarding testicular location after fixation, 23 out of 35 (65.7%) were placed at superior scrotal, while 8 (22.8%) were at upper scrotal position. Only 4 (11.42%) were able to reach at mid-scrotum. Mean operative time for unilateral cases was 75.25 + 19.4 minutes, and for bilateral cases 107 + 6.70 minutes. Mean hospital stay was 2.30 + 0.57 days.

Three major complications occurred, 2 were per-operative including one urinary bladder injury and one vas deferens transection and 1 was early postoperative testicular ischemic necrosis. Urinary Bladder injury was managed with abdominal exploration and primary bladder repair with prolonged catheterization. Vas injury was stapled intra-operatively. Testicular necrosis was dealt with orchiectomy. Minor complications were noted in 5 patients: subcutaneous emphysema in 1 patient, wound infection with low grade fever in 2 patients, Hematoma at testicular fixation site in 1 patient and late port site hernia in 1 patient. Subcutaneous emphysema and mild scrotal hematoma was managed conservatively. Inguinal wound infection required removal of stitches and regular dressing. Port site hernia required proper surgical repair. Peri-operative complications were shown in Table-3.

Success rate of orchidopexy in our study was 94.6% i.e., 33 out of 35 testes remain normal in follow up period. One patient developed earlytesticular necrosis and needed orchiectomy while another developed testicular atrophy. No patient reported clinical evidence of testicular malignancy on follow-up.

Discussion

Cryptorchidism is one of the most common genitourinary problems in children. It is usually diagnosed and treated in early childhood in developed countries because of better health care system and parental awareness. But in developing countries we still found undescended testis in post-pubertal age

group. This fact was also seen in our study where age group ranged between 13-34 years with the mean age of 20.75 + 5.98. Similar result was also seen by Sangrasi et al. showing age ranged 11-37 years with mean age of 19.3 + 6.98 years[11]. Regarding laterality our study showed 56% right sided undescended testis. Similar result shown by Viljoen.J.T et al. and Sangrasi et al. with 47.2% and 56.2% right sided undescended testes respectively[11,12]. But another study revealed 63% left sided testes[13]. In our study 13.8% patients have bilateral undescended testes, which was comparable to the studies by Ismail et al and Hassan showing 13.5% and 21% bilateral cases[14,15]. Ultrasound was able to locate 31 impalpable testis (75.6%) in our study. This was comparable to other study where the ultrasound localized 78.78% of non- palpable testes[16]. The diagnostic yield of laparoscopy in our study was 100% which was comparable to other studies. Similar 100% yield were reported by Dar SA et al. and El-Gohary[16,17].

In our study during laparoscopic localization, the low intra-abdominal testes (68.2%) were the most common site of impalpable testes. Similar results were shown in another study where the incidence of low intra-abdominal testis was 51.5%[16]. Normal testicular morphology in our study was observed in 64.8% of patients, with hypoplastic testes seen in 29.72%. This was comparable to the other study where they found normal testes in 54.5% and hypoplastic testes in 33.3% of cases[16]. Vanishing testes were seen in 4 patients (9.75%) in our study, while other studies also showed similar results of 19% and 9% of vanishing testes[14,18]. This reflects careful diagnostic laparoscopic examination and prevents our patients from unnecessary groin or abdominal exploration. In our study we had 5 cases of clinically detected indirect inguinal hernia. But during diagnostic laparoscopy we found 5 more patients with wide deep inguinal ring. In these patients the testes were physically occluding the deep ring so hiding the hernia. Overall associated inguinal hernias were seen in 24.3% of patients, another study also showed 26% of patients with associated hernia[13]. We closed all deep rings trans-abdominal with proline 2/0 continuous suturing (herniotomy) with satisfactory postoperative results. Mesh reinforcement was not required in any of our patient as they had good strength of anterior abdominal wall muscles. Peeping testis was noted laparoscopically in 2 patients. We managed both cases laparoscopically, while other studies have experience of managing them by inguinal approach[19]. Both laparoscopic and inguinal approaches are equally effective in the management of peeping testes[20].

Regarding location of testes after orchidopexy, we were able to fix testes mostly at superior scrotal (65.7%) and upper scrotum (22.8%) positions. Very few reached at mid-scrotum. This finding was exactly opposite to the studies of pediatric age group where they were able to place the testis at lower and mid-scrotal positions in 94.5% during orchidopexy of bilateral undescended testes[21]. The laxity of tissue in younger age group with easy testicular vessels mobilization makes it easy to bring the testis further down in the scrotum. The comparatively older age group and single stage surgery in our study keep the testes mostlyin superior scrotal position.

According to EAU guidelines treatment recommendation for undescended testis in post pubertal patient with normal contralateral testis is orchiectomy because of the theoretical risk of later malignancy. Few publications reported the risk of malignancy to be 40 times is higher in undescended testis[22]. But few recent studies showed much lower rate ofabout 2.7 to 8.09 times risk of malignancy[23]. Furthermore, two studies by Kona A et al. and Rogers.E reported histopathological reports of orchiectomy specimen in post pubertal man with unilateral cryptorchidism showed germ cells at different levels of maturation in 51% and 31% of patients respectively[24,25]. Two morecase reports of improvement of spermatogenesis and pregnancy in patients with adult surgical correction[26,27]. These evidences strongly favor the proposal of testis preservation in some post pubertal patients. A decision should be made on individual cases rather

than strictly following the recommendation. Similar observation also made by other study which suggested testicular preservation in majority of cases (68.4%) with cryptorchidism[28]. We preserved all normal looking and hypoplastic testes in our study. Orchiectomy was reserved only for atrophic testis. This approach was also supported by anotherstudy wherethey didorchidopexy of normal looking testis in adults[28].

Success rate of laparoscopicorchidopexy in our study was 94.28%. Similar result was shown by another study where the success rate was 96.9%[16]. No patient reported any clinical evidence of testicular malignancy on close follow-up.

Conclusions

Laparoscopy has been proved as excellent diagnostic and therapeutic tool for the management of intra-abdominal undescended testes in adolescent and post-pubertal patients. Minimal invasiveness and excellent imaging make better testicular evaluation and eventual preservation and avoiding unnecessary abdominal exploration in cases of vanishing testes. Testicular preservation is possible in single stage surgery in judiciously selected patients. Further studies may provide new guidance for optimal treatment of post-pubertal patients with intra-abdominal undescended testes.

Conflict of Interest

Authors have no conflict of interest and no grant/funding from any organization.

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Answer of Picture Quiz

Gangrene of foot due to vascular disease.