Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI: 10.21474/IJAR01/5606
DOI URL: http://dx.doi.org/10.21474/IJAR01/5606

RESEARCH ARTICLE

ROLE OF LAPAROSCOPY IN NON PALPABLE UNDESCENDED TESTIS.

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Manuscript Info

Manuscript History

Received: 12 August 2017
Final Accepted: 14 September 2017
Published: October 2017

Abstract

Purpose: To Evaluate Laparoscopic Diagnostic Findings in Nonpalpable Undescended Testes and Analyze the Success Rate & Outcome of Laparoscopic Orchidopexy.

Methods: This was a prospective study carried out in the Department of Paediatric Surgery Sri Ramachandra Medical College and Research Institute from June 2006 to December 2008.We used diagnostic and operative laparoscopy in the management of 52 patients with 61 undescended testes. Boys with the palpable testis at any point were excluded from the study.

Results: Out of these patients 26(boys), 28 testes (45%) were palpable and 26(boys), 33 testes (54%) were Nonpalpable. Age range from 9 months to 17 years (median age 5.3 years) .Out of 33 Nonpalpable testes 7(21%) were on the right side, 12(36%) on the left and 14(42%) bilateral.

Diagnostic Laparoscopy Findings (n= 33)

1. Deep ring was open in 25(75.7%) and closed in 8(24.2%).
2. Vas and Vessels were seen entering the deep ring in 3 patients and thus inguinal exploration carried out
3. Morphology of testes were Hypoplastic 11(33.3%), Atrophic 3(9.09%), Normal 18(54.5%),
4. Blind ending vas and vessels 1(3.03%).

Operative Procedures: (n=33)

1. Diagnostic Laparoscopy only :1(blind ending vas and vessels)
2. Inguinal Exploration 3 cases: 2 Orchidopexy, 1 Orchidectomy.
3. Laparoscopic Orchidopexy : 24
4. Laparoscopic Orchidectomy : 5
5. Overall success for Laparoscopic Orchidopexy 24 (92.3%) and Atrophy in 2 (7.6%) testes.
6. Major associated procedure was Laparoscopic division of Persistant Mullerian Structure.
7. **Conclusion :**

1. Considering all our findings, we believe that laparoscopy conformed its value in the diagnostic and therapeutic approach of Nonpalpable testes, which facilitated the choice of an optimal surgical strategy

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2. Diagnostic Laparoscopy in our series provided 100% dependable direction for the definitive management of Nonpalpable testes...

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Introduction:-

Cryptorchidism or Undescended testes are the most common disorder of the male endocrine glands in children. Physical examination of the testes can be difficult and further evaluation should be considered if a normal testis cannot be definitely identified. Reasons for treatment of Cryptorchidism are increased infertility, testicular malignancy, testicular torsion, trauma and psychological stigma of an empty scrotum[1]

An incidence of Cryptorchidism of about 1% is reported by age 1 year and about 20% of children with Cryptorchidism may have one or both nonpalpable testes. The condition of nonpalpable testis may fall into one of the following categories: agenesis, vanishing testes, intraabdominal testes or inguinal testes. Although various imaging studies i.e. ultrasonography, CT and MRI have been used to locate impalpable testes in boys, none has been able to provide comparable accuracy to laparoscopy. In experienced hands laparoscopy is capable of providing nearly 100% accuracy in the diagnosis of the intraabdominal testis with minimal morbidity. With the advancements in laparoscopic techniques and instruments Laparoscopy Orchidopexy has become standard procedure in the management of nonpalpable undescended testes. In the subsequent management of nonpalpable testis conventional laparoscopic orchidopexy is preferable to any form of Fowler-Stephens procedure as it has lower rate of testicular atrophy[2].The present study is based on this finding.

Materials and Methods:-

This was a prospective study carried out in the Department of Pediatric Surgery Sri Ramachandra Medical College and Research Institute from June 2006 to December 2008. All patients who presented to the out patient department with complaints of absent testes were examined and boys with nonpalpable testes were included in the study. Patients with nonpalpable testes were subjected to diagnostic and operative laparoscopy. These boys were examined as outpatients, at the time of admission and after general anesthesia to exclude palpable testes.

A day before the surgery soft diet was started and 4-6 hours of fasting was required according to the age of the patient on the day of surgery. Older children were asked to empty the bladder and Injection cefotaxim 100mg/kg was given at the time of induction of anaesthesia in the operation theatre. The patients were placed in the supine position with both arms along the sides. Inguinal examination was performed in each child under anesthesia to confirm the preoperative diagnosis. All procedures were done by using general anesthesia and caudal block. Children were premedicated with syrup triclofas (pedichloryl) 50 mg/kg given 2 hours before shifting to operation theatre.

Diagnostic Laparoscopy:-

Using a no 11 scalpel, a 5 mm stab incision was made in the inferior rim of the umbilicus on its internal surface. The primary 5 mm camera port was introduced by open technique and pneumoperitoneum was established (10mmHg) with the patient in a 30^{o} head down Trendelenburg position, the area of the internal inguinal ring was inspected bilaterally and subsequent trocars all 5mm were placed under laparoscopic visualization into the right and left lumbar region in line with the umbilical port. Subsequent surgery was planned according to the laparoscopic findings following the algorithm for the management of Non-palpable testis. A diagnostic laparoscopy was done for rest of the abdominal quadrants in all cases. Inguinal ring was first examined to evaluate its patency, and then the iliac areas and pelvis were inspected.

If intraabdominal blind ending cord structures were found, no further exploration was performed and a diagnosis of intraabdominal vanishing testes was made. If an intraabdominal testis was found it was classified as high and low depending on its position to the internal ring. High i.e. in the iliac fossa or pelvic inlet or pelvis (>2cm from the internal ring) .Low i.e. adjacent to the internal ring/emergent testis (< 2cm from the internal ring).

With gentle traction on the testis, the most distal gubernacular attachment was divided with electric hook cautery and gubernaculum forming a handle for mobilizing the testis. Stretch maneouver was performed to see the mobility of the testis.

Dissection was started lateral to the spermatic vessels and continued in cephalad direction over the iliac vessels. Once the testis has been adequately mobilized which was confirmed by performing stretch maneuver where the testes is stretched to the contralateral inguinal ring.

The dissection was further carried out medially all around the ring to complete the herniotomy . Peritoneal coverage between the vas deferens and urinary bladder was dissected. A triangular area of peritoneum between vas deferens and testicular vessels was left intact to preserve blood supply of testis in case of stage 1 Stephan Fowlers was planned for.

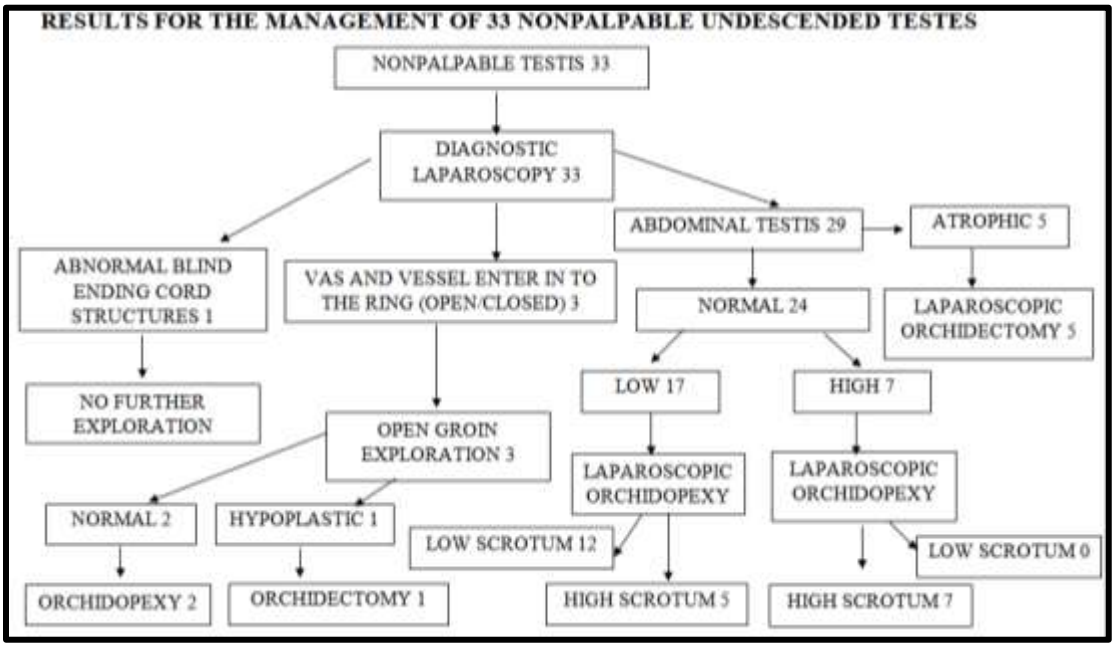
The pathway to the ipsilateral hemiscrotum was created. Usually a neotunnel was created between the medial umbilical ligament and the inferior epigastric artery (Prentiss maneuver) to gain extra length for reaching the scrotum..

A blunt tip of the laparoscopic dissector was passed over the pubic bone into the ipsilateral hemiscrotum thus creating a pathway. A dartos pouch was prepared in the hemiscrotum .A suction cannula was passed along the passage which was created transabdominally by laparoscopic dissector and grasping the tip of the suction cannula a long curved clamp was passed into the abdominal cavity and stretched in all directions to create adequate paasage for bringing the testes down. The testes was grasped, ensuring that only gubernacular tissue is grasped. The testes was brought out into the scrotum and the length checked by deflating the abdomen. Releasing the pneumoperitoneum gave additional length. Any tension found on the pedicle was released by further mobilization of the peritoneal flaps. Testes was fixed in scrotum using 5-0 chromic catgut suture. Testes with a long mesoorchium were found to have more mobility and were mobilized easily compared to testes which were attached to the retroperitoneum by a narrow stalk or embedded in the retroperitoneum.

At the end of the procedure abdomen was examined for any bleeding, the pneumoperitoneum was released, trocars were removed. Trocar sites were closed. Children were discharged home next day. All the patients were followed at 6 weeks, 6 months, and 1 year thereafter as necessary on a yearly basis

Results:

From June 2006 to December 2008 we used diagnostic and operative laparoscopy in the management of 52 patients with 61 undescended testes. Out of these patients 26(boys), 28 testes (45%) were palpable and 26(boys), 33 testes (54%) were nonpalpable .
Age range from 9 months to 17 years (median age 5.3 years)



Boys with the palpable testis at any point were excluded from the study. Laparoscopic orchidopexy was done in 24(72.7%) testes and Open orchidopexy was done in 2(6.06%) testes where vas and vessels were seen entering the closed internal ring.

Laparoscopic orchidectomy was done in 5(15.1%) patients and Open orchidectomy was done in 1(3.03%) testes where hypoplastic vas and vessels were entering the internal ring and ending on a nubbin of tissue in the inguinal canal .

Associated procedure Laparoscopic division of the Mullerian structure with bilateral laparoscopic orchidopexy was done in 1 case of Persistent Mullerian Duct syndrome .No crossed testicular ectopia was found in our study.

The operative time including associated procedures was mean 90 minutes (range 40-140). A definite learning curve was identified

Time from surgery to the most recent examination ranged from 2 weeks to 2 years which showed that 24 testes (92.3%) were in a satisfactory scrotal position with average size. Atrophic changes developed in 2(7.6%) testes which were high abdominal and were managed by one stage laparoscopic orchidopexy.

Only intraoperative complication in our series was a child who had a high intraabdominal testicle with testicular pedicle avulsion which led to laparoscopic orchidectomy.

Postoperative complications included scrotal wound separation in one, ileus in one and umbilical port site infection, all were managed conservatively and there were no sequelae following these complications.

Imaging techniques were unreliable especially when the testis was intraabdominal or were too atrophic to be visualized in the inguinal canal. All patients had prior ultrasound to attempt to localize nonpalpable testes with success of 13cases (42.4%) in our series.

Discussion:-

Although numerous strategies exist for the treatment of boys with nonpalpable testes, controversy remains concerning the most effective treatment. Traditionally, an open inguinal exploration would have been undertaken to locate the missing testis, followed by a conventional orchidopexy or orchidectomy. Laparoscopy has been established as the most reliable diagnostic modality for the management of impalpable testis. It clearly demonstrates the anatomy and provides visual information upon which a definitive decision can be made.[3]

None of the imaging techniques USG, CT, MRI has proved 100% reliable in predicting presence or absence of the testes.Comparative study between USG, MRI and laparoscopy recommended laparoscopic evaluation as the preferable method in cases of nonpalpable testes, as leaving a probable atrophic or viable intraabdominal testes missed by these investigation may expose the child to the risk of future malignancy[4]. In our study USG was accurate in 42 % of patients for localizing the testes and thus is unnecessary in boys with nonpalpable testis because it rarely localizes a true nonpalpable testes and it does not alter the surgical approach in the patients. It is however useful for picking up other intraabdominal anomalies.

Diagnostic Laparoscopy and Laparoscopic orchidopexy has begun to surpass surgical exploration as the primary treatment in boys with impalpable testes, gaining wide acceptance in the pediatric surgery community as the most effective means of relocating an intraabdominal testes to a dependent position. Our study showed that patients with intraabdominal testes and intraabdominal blind ending cord structures benefited from laparoscopy for the fact that this technique provided them with a definitive diagnosis, direct surgical approach according to the location of testes and avoidance of unnecessary abdominal exploration in cases of vanishing testes.

A multicentre analysis of 310 testes in the United States showed that the single-stage Fowler Stephens Laparoscopic Orchidopexy resulted in a higher failure rate than the staged procedure, and both had a higher failure rate than the Primary Laparoscopic Orchidopexy. The overall success (i.e., scrotal position without testicular atrophy) for the three groups was 93% (97% for the Primary Laparoscopic Orchidopexy group; 74% for the one-stage Fowler Stephens Laparoscopic Orchidopexy group and 88% for the staged Fowler-Stephens Laparoscopic Orchidopexy group. The results of this study suggest that Primary Laparoscopic Orchidopexy can be performed safely and

efficiently in children with intraabdominal testis.[5] Laparoscopic Orchidopexy provided an acceptable overall success rate of close to 92.3% in our study, our success rates were well in the range of previous studies. We started to perform a primary laparoscopic orchidopexy in all patients with intraabdominal testes after we had gained more experience with laparoscopic surgery

The success of the primary laparoscopic orchidopexy in children with high intraabdominal testes may be related to the actual age of the patient, because it has been shown that older the child, higher the failure rates. The relative distance from the iliac vessels to the dependent scrotum is shorter in younger age group. Both atrophic testes in our series belonged to older age groups.

Whereas undescended testes are more common on the right side, review of the literature shows great variability in laterality of salvageable nonpalpable testes and nubbin remnants with a slight preponderance of left sided lesions [6,] Similar pattern was seen in our study with 7(21%) were on the right side, 12(36%) on the left and 14(42%) bilateral.

The two unsatisfactory results following laparoscopic orchidopexy were detected in children with high intraabdominal testes. Laparoscopic single staged bilateral orchidopexy with division of the Mullerian structure with preservation of the vas deferens was attempted in a case of Persistant Mullerian duct syndrome with bilateral high intrabdominal testes and both the testes were mobilized to high scrotal positions.There was notable tension on the pedicle to the left testicle and the testis had atrophied in follow-up period. Second patient with atrophy was high intraabdominal and was fixed and palpable in the upper scrotum, extensive dissection was necessary to free the testes from the surrounding structures thus further compromising vasculature around vas.
We were unable to quantify postoperative pain and discomfort, because majority of our patients were too young, however no obvious differences in analgesic use or return to activity was identified between patients who had laparoscopy alone and those who had a nubbin removed through an inguinal incision..

The most feared complication in laparoscopy is that of the iatrogenic trauma to the intraabdominal viscera. The children's peritoneum seems more elastic and does not puncture readily. In addition; the abdominal anterior-posterior diameter is smaller and makes the child more prone to visceral injury during the introduction of the laparoscope [7.] The open Hasson blunt trocar insertion technique has its documented advantages over the blind insertion Veress needle. The insertion of the trocar must be done under direct vision and with ease. we had no complication from this technique.

Persistent Mullerian duct syndrome should be taken into consideration in all cases of bilateral cryptorchidism, is a rare entity and controversy remains as to the ideal surgical treatment. Persistence of Mullerian duct structures is characterized by the presence of uterus, cervix, upper vagina and fallopian tubes in otherwise normally differentiated 46xy male. Persistent Mullerian Duct Syndrome (PMDS) is characteristically associated with unilateral or bilateral cryptoorchidism. Like other undescended testis, these gonads are at an increased risk of malignant transformation, risk of testicular neoplasia approximates the risk of neoplasia in other intra-abdominal gonads. No malignant degeneration of persistent müllerian structures has been reported. Fertility has rarely been reported. [8]

Surgical excision of the infantile uterus and fallopian tubes risks damage to vas deferens and blood supply to the testis. Optimal surgical management is laparoscopic orchidopexy leaving the uterus and fallopian tubes in situ. Meticulous proximal salpingectomy and hysterectomy is indicated only in patients whose müllerian structures limit intrascrotal placement of the testes. Orchiectomy is indicated for testes that cannot be mobilized to a palpable location. MIS levels/Karyotyping is recommended in any case of bilateral undescended testes. Laparoscopy is the elective procedure for diagnosis of this disease.[9] In our case both testes were intraabdominal and more than 2cms from deep ring ,mullerian structure was thus divided in the middle using endoscissors and safeguarding the vas running on either side of the structure and thus permitting high intrascrotal placement of both the testes.

A simple test determining testicular mobility assessed during laparoscopic evaluation of intraabdominal testes provided information of significant importance upon which correct surgical approach was based. The contralateral internal ring was the optimal anatomical landmark used and assessment of the cord mobility and length by displacing the testes inside the abdomen was an indicator of success for Laparoscopic Orchidopexy[10]. Laparoscopic orchidopexy was possible in all testes in which stretch test predicted adequate cord length. Two failed orchidopexies where the stretch test was not successful provided further supportive clinical proof.

In nonpalpable testes without abdominal location of testes and hypoplastic cord structures entering the internal ring, the groin exploration is the method of choice and resection of remnant or atrophic nubbins is necessary because 10% of such remnants may contain viable germ cells with a risk of malignant transformation.

Conclusion:-

1. Considering all our findings, we believe that Laparoscopy conformed its value in the diagnostic and therapeutic approach of nonpalpable testes, which facilitated the choice of an optimal surgical strategy
2. Diagnostic Laparoscopy in our series provided 100% dependable direction for the definitive management of nonpalpable testes.
3. Primary Laparoscopic Orchidopexy appears to be a feasible, effective technique for the management of low intraabdominal testes.
4. Primary Laparoscopic Orchidopexy provided an acceptable overall success rate of 91.3% and can be done without a higher complication rate.
5. Testing Testicular Mobility in cases of intraabdominal testes can be used as a predictive guide to a successful outcome following a Laparoscopic Orchidopexy procedure.
6. Laparoscopic Orchidopexy is minimally invasive, decreases postoperative pain and trauma, allows the child to be discharged home quickly and leads to satisfactory long term results.
7. Imaging modalities like USG, CT, MRI has limited role in the diagnosis of Nonpalpable Undescended Testes.

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