

Original Article

Role of Laparoscopy in Management of Non-palpable testes : Our Experience

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Background and Objective: In 2003 we have published our series on the same subject. The subject is revisited again in present study. We would like to share our experience and changes which have taken place in these 15 years with literature support.

Patients and Methods: Between March 2017 and April 2018, 26 patients with 31 non-palpable testes underwent laparoscopy. Based on the intraoperative findings they were divided into absent, intra-abdominal or inguinal/scrotal testes. In cases of absent testes, the procedure was terminated. In cases of Intra-abdominal testes laparoscopic orchidopexy or orchidectomy were performed and in cases of inguinal/scrotal testes, inguinal canal were explored by small incision and laparoscopy assisted orchidopexy or orchidectomy were carried out.

Results: 4 testes (12.90%) were absent. Extensive inguinal exploration and/or laparotomy were avoided in these cases. 19 testes (61.30%) were intra-abdominal. Out of these, 4 testes (12.90%) were atrophic and were removed laparoscopically. The remaining 15 (48.40%) underwent single stage laparoscopic orchidopexy. 8 testes (25.90%) were found in the inguinal/scrotal region. 3 (9.67%) were removed and orchidopexy performed in remaining 5 (16.31%). All the laparoscopic procedure concluded successfully, especially orchidopexy, which were tension free.

Conclusion: In management of non-palpable testes, laparoscopy is an excellent dual purpose diagnostic and therapeutic tool. Diagnostically, it can replace all imaging study. Therapeutically, it helps to do tension free orchidopexy or orchidectomy without large incision.

The demand for doing laparoscopy from patient's parents/guardian can be an important factor in selecting its use in management of non-palpable testis.

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Key words : Laparoscopy, non-palpable testis, Orchidopexy, Orchidectomy.

Undescended testis or Cryptorchidism, is one of the most common pediatric disorder of the male endocrinal gland and the most common genital disorder found at the birth¹. Its incidence varies from 1% to 4.6% in full-term baby and in preterm neonates its incidence may be as high as 45%². Correction of cryptorchidism is required to optimize testicular function, potentially reduce and/or facilitate diagnosis of testicular malignancy, provide cosmetic benefits and prevent complication such as clinical hernia or torsion³.

Out of all Undescended testes, nearly 20-25% are non-palpable⁴⁻⁶. Various reasons for failure to locate the Non-Palpable Testis (NPT) could be due to vanishing testis syndrome, intra-abdominal position, examination obscured due to obesity or scar tissue, and rarely due to testicular agenesis⁷.

NPT pose diagnostic and therapeutic challenge to the surgeon. Its presence or absence must be

Editor's Comment :

- Laparoscopy is very useful & effective method in management of NPT & can replace all other diagnostic & therapeutic modalities.

established and appropriate therapy should be applied to either make it palpable or to remove it. Laparoscopy is the tool which can be used to locate and treat this disease.

First diagnostic laparoscopy to locate NPT was performed by Cortesi *et al*⁸ in 1976 and first laparoscopic single stage orchidopexy was performed by Jordan *et al*⁹ in 1991. With dissemination of use of laparoscopy in treating other diseases and refinement in technique and instrumentation, laparoscopy is considered as preferred method to locate and treat NPT. In the present study we have tried to evaluate its role in NPT.

MATERIALS AND METHODS

This study was carried out between March 2017 and April 2018 in a single surgical unit of 1200 bedded state government funded multispecialty teaching hospital. Before starting this study approval was

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obtained from the Institutional Ethics Committee. The study was carried out on 26 boys with 31 NPT. Parents/guardian of the patients was explained regarding nature of disease and application of laparoscopy procedure in the disease and written informed consent obtained.

All the procedures were performed under general anesthesia. Abdomen was insufflated with carbon dioxide through veress needle and pressure kept at 8-10 mm Hg. We use 5mm zero degree telescope which was passed through the port placed at superior edge of umbilicus. Two additional 3mm/5mm working ports were put in mid-clavicular line on both sides at the level of umbilicus. Patient was given trendelenburg position to deflect bowel upward from lower abdominal cavity. Then both the inguinal region, pelvic cavity and paracolic gutter were visualized and the status of spermatic vessels, vas deferens, internal inguinal ring and testes were noted. Based on these findings the testes were classified into 3 groups:

Group 1 : Absent or vanishing testes

Here the testes were not visualized. Spermatic vessels were ending blindly inside the abdomen with closed internal inguinal ring (Fig 1). In these cases the procedure were terminated.

Group 2 : Intra-abdominal testes

In this group of patients, the testes were found lying within the abdominal cavity (Fig 2). 'Peeping testes', where part of testis was projected in abdominal cavity through internal inguinal ring, were also included in this group. Here the decision to perform orchidopexy or orchidectomy was taken based on the age of the patient, size of the testis and whether the condition was unilateral or bilateral. Laparoscopic orchidectomy was accomplished by ligating the spermatic vessels and vas deferens and removal of testis through one of the working port.

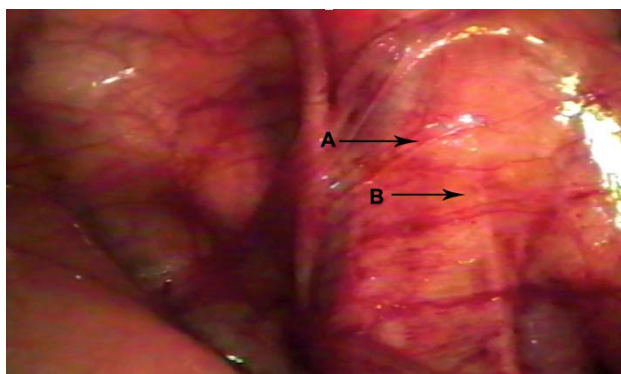


Fig 1 — Absent Testis. Blindly ended vas (A) and spermatic vessels (B)



Fig 2 — Intraabdominal Testis

Single stage laparoscopic orchidopexy was carried out by first mobilizing the testicular vessels and vas deferens by incising the peritoneum covering them. The testis was freed up by dividing gubernaculum from its distal attachment. Extra care was taken to prevent injury to looping of vas around gubernaculum. The adequacy of mobilization of the testis was tested intra-abdominally by ensuring that it reached the opposite internal inguinal ring. Then a scroto-peritoneal port was created as follows:

A grasper was passed from the internal inguinal ring and made to traverse through inguinal canal into the upper part of the scrotum, and its tip was palpated. A small transverse skin incision was made over the tip of the grasper and then the tip of the grasper was pushed and made to emerge through the incision. A cannula was then passed in a retrograde manner over this grasper into the abdominal cavity under direct vision. This scroto-peritoneal port has one end lying outside and other end projecting inside peritoneal cavity through the internal inguinal ring. A grasper was next introduced into the peritoneal cavity from the scrotal side of the port. The dissected testis was grasped from its bottom and drawn into the scrotum by pulling grasper out along with cannula. The testis was then put in subdartos pouch and anchored there with two intermittent 3-0 polyglactin 910 stitches. The internal ring was closed from inside with 1 or 2 stitches of same suture material.

Group 3 : Inguinal/Scrotal testes

In this group of patients, the spermatic vessels and vas deferens were seen entering the internal inguinal ring (Fig 3). This finding indicates inguinal testis or scrotal nubbin. Here the inguinal canal was explored by a small groin incision. Laparoscopic assisted Orchidopexy or orchidectomy was done based on the same criteria applied for intra-abdominal testis.

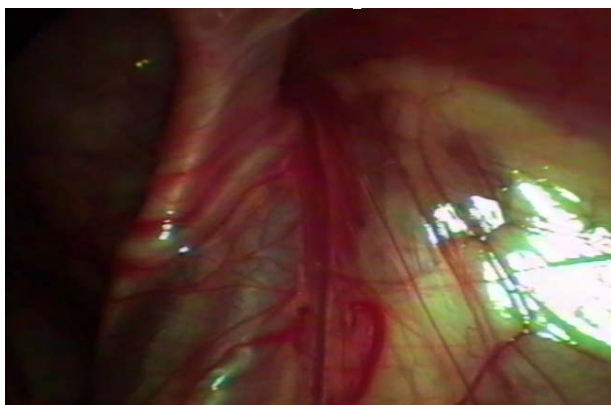


Fig 3 — Inguinal/Scrotal Testis. Vas and spermatic vessels are seen entering the internal inguinal ring

RESULTS

The study was carried out on 26 boys (age group 9 month to 12 year) with 31 NPT. 21 boys had unilateral (11 left-sided, 10 right-sided) and 5 had bilateral NPT. Out of 31 NPT 4 testes (12.90%) were absent, 19 testes (61.30%) were intra-abdominal and 8 testes (25.80%) were inguinal/scrotal.

In cases of absent testis, as the procedure was terminated, these patients were spared from extensive inguinal exploration and/or laparotomy.

In case of 19 intra-abdominal testes, 4 (12.90%) had atrophic or dysmorphic testes which underwent laparoscopic orchidectomy and 15 (48.40%) had healthy looking testes which underwent laparoscopic orchidopexy. All the procedures were concluded successfully, without any undue tension over the cord structures and testes. Laparoscopic procedure allowed us the advantage of wide mobilization of cord structures under a magnified view.

8 NPT (25.90%) were found in the inguinal canal/scrotum. 3 (1 inguinal and 2 scrotal) atrophic testes (9.67%) were removed and laparoscopic assisted orchidopexy performed in remaining 5 (16.31%). Use of laparoscopic in mobilization of spermatic vessels and vas has allowed us to do tension free orchidopexy.

There were no mortality and all patients were discharged on the second day of operation.

DISCUSSION

The two important issue involved in overall management of NPT are locating the testis and its surgical correction.

Locating NPT : Various imaging modalities and laparoscopy are used to locate NPT.

Ultrasonography (US) remains the most commonly used radiological investigation to locate NPT. Advantages of US include easy availability, non-invasive

nature, no risk of radiation exposure and no need of anesthesia in young children. US found to have a sensitivity of 45-88% and specificity of 78-100% in the diagnosis of NPT in various study^{10,11,12}. The wide variation in accuracy of US is likely due to its operator dependency and obstruction of view of intra abdominal testes by intestinal gas. And that is its main drawback. In recent years routine use of US in evaluation of NPT is questioned. US not only drain resources, but its findings do not obviate the need of surgical exploration. Tasian GE and Copp HL in recent metaanalysis conclude that eliminating the use of ultrasound will not change management of NPT but will decrease health care expenditures¹⁰. Pekkaali et al stated that US does not exclude the necessity for laparoscopy, and it is not superior to physical examination in detection of the inguinal atrophic testes or testicular nubbin¹³. Elder JS found US to be unnecessary in boys with a NPT, because it rarely if ever localizes a true NPT, and it does not alter the surgical approach in these patients¹⁴. Shah and Shah showed the overall diagnostic agreement of US with laparoscopy in only 19% of cases¹⁵.

CT scan may be useful in documenting the location of the NPT but it is expensive, exposes child to radiation and, sometimes is difficult to perform in a young child. Wolverson et al reported that sensitivity of CT and USG are same in the evaluation of NPT¹².

MRI may be more helpful in locating NPT than CT, but like CT scan it may be difficult to perform in a young child. It is very expensive and is not widely available.

European Association of Urology and European Society for Pediatric Urology guidelines¹⁶ state that physical examination is the only way of differentiating between palpable or non-palpable testes. There is no benefit in performing ultrasound, computed tomography (CT), magnetic resonance imaging (MRI) or angiography.

It seems that there is paradigm shift taking place in recent time regarding common use of imaging modality to its avoidance in locating NPT. And this seems to be happening due to widespread use of laparoscopy in management of NPT.

Laparoscopy is a powerful diagnostic tool and it can replace all imaging modality for locating NPT. The real diagnostic superiority that exists with laparoscopy for NPT is its ability to accurately characterize the location and quality of testicle, testicular vessels and vas deference. This is a valuable asset that laparoscopy brings to the diagnosis of the NPT¹⁷.

Surgical correction : It includes orchidopexy or

orchidectomy. There are two way to accomplish it; by open surgery and laparoscopy.

The traditional open surgery involves an exploration of the inguinal canal by inguinal incision followed by retroperitoneal or peritoneal exploration, if no testis or cord structures could be found in the inguinal canal. This approach often involves extensive dissection and bigger incision.

Therapeutic use of laparoscopy allowed a minimally invasive approach for correcting NPT. Laparoscopic findings helps surgeon to precisely define further operative plan.

In patients where blind ending cord structures are visualized with closed inguinal ring, no further action is required. The most likely cause of absent testis is prenatal or perinatal vascular accident.

Intra-abdominal testis can be managed by either laparoscopic orchidopexy or orchiectomy, though the decision regarding salvage or removal of a testis is a difficult one. A small hypoplastic testis, a testis with significant ductal system abnormality or unilateral abdominal cryptorchidism in a post pubertal patient is a poor candidate for salvage.

Most intra abdominal testes are usually found lying close to internal inguinal ring. They can be mobilized with laparoscopic dissection of the spermatic vessels and vas deferens and delivered to a scrotal position without dividing the spermatic vessels as a single-stage procedure. High intra-abdominal testis can be managed either by laparoscopy assisted one or two-stage Fowler Stephen orchidopexy or laparoscopy-assisted testicular microsurgical auto transplantation. The choice of procedure depends on individual preference and availability of expertise.

If spermatic vessels and vas traverse the internal inguinal ring, there may be blind ending cord structures in the canal, a hypoplastic or dysplastic testis in the canal, a normal sized testis in canal that was not palpable preoperatively because of obesity, operative scar etc. or testicular nubbin in scrotum. It is probable that some of these inguinal gonads that were non palpable preoperatively may have indeed been intra-abdominal. However with insufflation and increased intra-abdominal pressure, they may have been forced through an open internal inguinal ring into the inguinal canal. These situation warrants inguinal exploration which can be expeditiously performed through a small inguinal incision. When orchidopexy is required, laparoscopy can help surgeon by intraabdominal dissection of spermatic vessels and vas (laparoscopy assisted orchidopexy), thus avoiding bigger incision. This is particularly important in

performing tension free orchidopexy in older children in which inguinal canal is little longer than the younger ones.

Inguinal exploration or laparoscopy ?

Choice between inguinal exploration and laparoscopy as an initial surgical approach has been a matter of debate with proponents of each claiming the superiority of one over the other. However, laparoscopy has emerged as the modality of choice and is currently regarded as the gold standard for the diagnosis of NPT^{18,19,20}. The morbidity of an abdominal exploration in the era of laparoscopy is seen as unacceptable from standpoints of both recovery and cosmetic outcome by many surgeons¹⁷. Numerous groups have reported cases of missed intra-abdominal testes on inguinal exploration alone²¹. Laparoscopy has the advantage of 1) high magnification and improved visualization 2) capability of extensive vascular dissection up to the origin of gonadal vessels, 3) minimal morbidity, and 4) the ability of creating a new internal ring medial to inferior epigastric vessels to achieve the straight vascular course to the scrotum¹⁹. Lorenzo *et al*²¹ has found cost saving advantage of initial laparoscopic evaluation of clinically NPT over initial inguinal-scrotal exploration.

One interesting thing emerged in our present study is demand from patient's parents/guardian for doing laparoscopy. Out of 26 patient's parents/gurdian, 15 (57.69%) had good knowledge of use of laparoscopy in the disease and were came to us for laparoscopy management only. This is a significant change occurred since we published our first series²³ on the same subject in 2003. We believe that this can be one of the major driving forces in future, in selecting laparoscopy for treating this disease.

CONCLUSION

In our experience, we found laparoscopy to be an excellent diagnostic and therapeutic tool in management of NPT. From diagnostic point of view it is very reliable and accurate in locating NPT. It gives a clear picture of anatomy of spermatic vessels, vas, internal inguinal ring and testis. It has potential to replace all diagnostic imaging modality. Therapeutically, it is very safe and effective tool. Tension free orchidopexy or orchidectomy can be carried out without large scar.

As new generation of surgeons and people are more inclined towards minimal access surgery and profound benefits offered by laparoscopy, we are not far away from the era where laparoscopy will be considered as the single and preferred, diagnostic and therapeutic

modality for management for NPT.

Support : Nil

Conflicts of interest : None

Permissions : Nil

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