

*Original Article***Laparoscopy for the management of impalpable testis**

Basem El-Nabulsi*, Samer Karadsheh, Mohamad Dajja, Wasim Mofleh and
Mohamad Zaid Abu Risha

Abstract

Background: Cryptorchidism is encountered in 21% of preterm infants, 2-4% of all full term boys and 1% of one year old boys.

Objectives: To present our experience in the utilization of diagnostic laparoscopy for the management of children with impalpable testes.

Method: This is a retrospective study conducted between March 2010 and December 2011. The medical records of boys with impalpable testis were reviewed. Diagnostic laparoscopic findings regarding presence, morphological state, and location of testis were analyzed. Special attention to how initial laparoscopy influenced subsequent surgical procedures and management.

Results: Fifty four boys underwent laparoscopy with 76 impalpable testes. Forty testes were unilateral impalpable testes, two third of them were left sided. Thirty seven testes were intraabdominal, eight of them were atrophied and excised laparoscopically. Twenty nine of them were viable, 90% of them underwent first stage Fowler-Stephens procedure, while the rest underwent primary laparoscopic orchidopexy. Vas and spermatic vessels were seen entering inguinal canal in 25 testes. This group had immediate inguinal exploration, 22 of testes underwent orchidopexy and three orchidectomy. Fourteen boys found to blind end vas and vessels with no further treatment needed.

Conclusions: Laparoscopic exploration should be performed because it accurately identifies and localizes the missing testis. In addition, it facilitates the planning of definitive surgical management of orchidopexy, staged orchidopexy or orchidectomy. So we recommend that initial laparoscopic exploration should be performed for patient with impalpable testis.

Keywords: Impalpable testis, Laparoscopy, Orchidopexy, Jordan.

Cryptorchidism means a hidden or obscure testis, and is synonymous with undescended testis¹⁻³. Cryptorchidism is a common finding in pediatric practice. It is encountered in 21% of preterm infants, 2-4% of all full term boys and 1% of 1 year old boys. The proportion of cryptorchid boys with impalpable testes has been reported up to be 20%⁴⁻⁸. A none palpable testis is defined as a testis not palpated by any examination technique, including pre-operatively under general anesthesia^{7,9,10}. Traditionally, the diagnosis of impalpable undescended testis was combined with definite surgical treatment involving groin exploration, followed by either laparotomy or extraperitoneal

exploration^{1,4,8,10,11}. Laparoscopic identification of intraabdominal testis in patients subjected to previous negative groin exploration question the validity of considering open surgery to be the diagnostic gold standard for impalpable testis^{1, 12}. With the recent advancement in pediatric laparoscopic equipment and technique, therapeutic laparoscopy has been well established option in the treatment of impalpable testis^{5-7,9}. In this study we present our diagnostic laparoscopic experience and result in the management of boys with impalpable testis.

Objectives:

To present our experience in the utilization of diagnostic laparoscopy for the management of children with impalpable testes.

*Correspondence :Basem El-Nabulsi TLA-ALI Post Office P.O. Box 2613, Zip Code 11953
Email: basemranda@yahoo.com

Method:

This is a retrospective study conducted at Queen Rania Albdallah Hospital for Children at Amman –Jordan between March 2010 and December 2011. The diagnosis of impalpable testis was established by physical examination and ultrasound scan performed by pediatric surgeon and pediatric radiologist respectively. Before surgery, patients were reexamined under general anesthesia to confirm the diagnosis of impalpable testis, if testis was palpated, patients would be excluded from the study.

The procedure was performed as day case surgery under general anesthesia. Third generation cephalosporin was given at induction as prophylactic antibiotics. Nasogastric tube was inserted to decompress the stomach and the abdomen was palpated to ensure that the bladder was empty, otherwise it was drained.

A supraumbilical incision was made and a 5-mm port placed using Hasson cut down technique or Veress needle insertion to achieve pneumoperitonum. This port has been used for the introduction of zero degree 5 mm Telescope. An exploration of the abdominal cavity in Trendelenberg position, with or without lateral tilt was performed, for thorough search for the testis, vas deferens, testicular vessels and the opening of the inguinal canal. An additional 5mm and 3mm ports were inserted under direct vision depending on the laparoscopic finding and type of procedure required. If the testis is identified in the abdomen, its size, location, mobility, distance between the testis and inguinal canal, and the length of the vas deferens and testicular vessels were all assessed and decision either to proceed to primary orchidopexy or first stage Fowler-Stephen's procedure was performed with laparoscopic ligation and division of the testicular vessels. Subsequently a second stage procedure (mobilization of the testis and orchidopexy) was done six months later either laparoscopically or through open inguinal approach. If the testis was found to be atrophied, or the presence of gonadal remnants at the end of the vas was seen,

laparoscopic orchidectomy was performed. If the vas deferens and testicular vessel seen entering the internal inguinal ring, the diagnosis of impalpable testis was excluded and inguinal exploration was performed followed either by orchidopexy or orchidectomy depending on state of the testis. The data collected regarding the laparoscopic findings, procedures performed, and outcome was analyzed to examine the role of initial laparoscopic surgery in boys with impalpable testis. The study was approved by the ethical committee at the Royal Medical Services.

Results:

During the study period 62 patients underwent laparoscopic surgery for impalpable testis. Four patients were excluded from the study due to inability to trace medical records. The average age was 36 months with a range of 15-88 months. Unilateral impalpable testis was seen in 40(69%) patients with 27(68%) of them were left sided. Bilateral impalpable testes were seen in 18(31%) patients. The overall number of impalpable testes in this study was 76 testes.

Diagnostic laparoscopy identified 37 intrabdominal testes. Twenty six of them were managed by first stage Fowler-Stevens approach, eight testes by orchidectomy, and three by laparoscopic complete orchidopexy. In fourteen impalpable testes blind end vas deferens was seen and the diagnosis of vanishing testes was established. In 25 impalpable testes vas deferens and testicular artery were seen entering the inguinal canal and inguinal exploration was performed. Following exploration 22 testes underwent inguinal orchidopexy and three orchidectomy due to atrophy (table1).

All patients were discharged home within 24 hours. There was no operative morbidity or mortality in our study.

Discussion:

An impalpable testis may be ectopic, inguinal, canalicular, intraabdomial or atrophic (vanishing) rarely, if ever is the testis found to be congenitally absent (agenesis)^{3,5}.

The aim of surgical management of impalpable testis is to determine its presence. If the testis is identified the ultimate goal is to bring it to a scrotal position, where it can function in an endocrine capacity, and where any malignant changes should readily be detected. Any testis that cannot be positioned in the scrotum or has morphologically abnormal to function, it should be removed^{3, 8, 10, 11,13}. A variety of diagnostic imaging modalities have been used to predict the presence of the testis and its location

including ultrasonography, computed tomography, magnetic resonance imaging as well as more invasive procedures such as arteriography and venography. Many studies have reported that these modalities to be associated with high false-negative and low sensitivity rate in locating the testicle or proving its absence especially in boys under five years. In addition invasive procedures proved to be demanding, expensive and potentially unsafe in boys less than six years^{1, 4, 5, 7, 9, 12}.

Table1: Summary of laparoscopic findings and procedures performed.

| Diagnostic laparoscopy findings | No. of testes | Procedure performed |
|---------------------------------|---------------|---|
| Intra-abdominal viable testes | 29(38%) | laparoscopic 1 st stage fowler-stevens:26 laparoscopic complete orchidopexy:3 |
| Atrophied testes | 8(11%) | Laparoscopic orchidectomy |
| Vanishing testes(blind end vas) | 14(18%) | None |
| Vas entering inguinal canal | 25(33%) | Inguinal orchidopexy:22 Inguinal orchidectomy:3 |

In cases of bilateral impalpable testes, endocrine investigations have been utilized to detect functioning testicular tissue by measuring the level of testosterone in response to human gonadotropine stimulation. Positive results indicate the presence of functioning testicular tissue, on the other hand, a negative result does not rule out the absence of testicle⁴.

Laparoscopy was introduced as a diagnostic technique for the impalpable testis by Cortesi in 1976, and Scott reported the first series in children in 1982^{4, 7- 9}. Boddy et al. first described laparoscopy as a useful minimally invasive tool in the evaluation of patient with undescended testis who had undergone negative groin exploration in 1985^{3,5}. We started to utilize laparoscopy as a primary modality in managing impalpable testis in 1993.

In our series we found that laparoscopy allowed accurate visualization of the intra-abdominal testis to assess its presence or absence and its morphological features in all of our patients, which is similar to reported series by others^{4,6,7,8,10,14}. Siemer et al, had reported that diagnostic laparoscopy has a

sensitivity and specificity up to 90% in identifying the presence of testes⁶. In our series 14(18%) testes had a vanishing testis syndrome by identifying blind vas and blind ending spermatic vessels intra-abdominally. Satar et al, and More et al, reported in their series vanishing testis syndrome in 14% and 7% of testes respectively, while park et al, had reported 21%.^{4,6} In our study eight testes (11%) had either intra-abdominal atrophied or morphologically abnormal testis, which were excised laparoscopically. This is similar to what reported by Satar et al, and Tang et al. They reported a prevalence of 10% and 8% of atrophied testes which were removed laparoscopically as well^{4,7}. These two groups count for 29% of all impalpable testes in our series where no further surgical treatment or investigational techniques will be needed. In such circumstances the traditional approach has been extensive inguinal exploration with intraperitoneal extension or extraperitoneal exploration until a blind end vas, hypoplastic spermatic vessels, and atrophied or abnormal testis were identified. This approach would be time consuming, difficult and fruitless^{3-11,15}. It is clear that surgical exploration, which is a

major invasive procedure can be avoided in these groups of patients by performing initial laparoscopy^{1,4,8,10,13}.

The other advantage of diagnostic laparoscopy is observed in patients who had previous negative inguinal exploration for impalpable testes. The critical issue of missing an intraabdominal testis with groin exploration is the widely recognized to increase risk of malignant transformation in the missed impalpable testis^{8, 13}. It is known that 10% of all testicular tumours arise in patient with history of cryptorchidism with the highest incidence of malignancy of intraabdominal testis^{2,3,5,9,10,14,15}. Barqawi reported in his series the laparoscopic identification of 18 testis out of 24 previously had inguinal exploration in children and adults. Orchidectomy was done for nine of them. One showed the presence of multifocal seminoma⁵. Brothers et al reported 13 cases of testicular tumours in cryptorchid intraabdominal testis. Five of them had previously undergone negative inguinal exploration. Hence it can not be over emphasized as to the importance to utilize diagnostic laparoscopy in this group of patients⁵.

The accurate preoperative laparoscopic localization and whether high or low intraabdominal testis, and the relative length of the vas and gonadal vessels permit the planning of optimal surgical strategy for orchidopexy^{3,4,9,11,12}. This include surgical incisions and the choice of operative technique either primary orchidopexy or staged Fowler-Stephens^{6-8,10}. In our series all of the viable intra-abdominal testes, the twenty nine testes (38%) were accurately localized. It was reported that laparoscopy can accurately localize intra-abdominal testes in more than 95%⁴. In our series ninety percent of these intra-abdominal testes underwent first stage Fowler-Stephens approach while 10% underwent primary orchidopexy. Tang et al, performed laparoscopic mobilization of testicular vessel followed by inguinal orchidopexy in 14 low abdominal testes and first stage Fowler-Stephens on eight high abdominal testes⁷. We found by performing

first stage Fowler-Stephen laparoscopically, the decision to transect the testicular vessels for intraabdominal testis was made early in the exploration so that a wide peritoneal strip can be left attached to the vas deferens and testis distally to preserve the vassal collateral vessels based peritoneal flap. In traditional approach which include negative inguinal exploration followed by exrtaperitoneal exploration or laparotomy. Disruption of these collateral blood supplies occur during dissection, especially if the vas and vessels loop down into the groin. This hinder future Fowler-Stephens procedure and adversely affecting the outcome (for example post operative testicular atrophy)⁷⁻¹¹.

The overall success rate of staged laparoscopic orchidopexy is more than 90%. Humphrey et al, reported in their series a success rate of 19 out of 20 testes with two stages laparoscopic Fowler-Stephens orchidopexy¹⁴. Similarly, good results were reported by Bloom in six out of seven patients and by Elder in 11 out of 12 boys¹¹. Chung et al, reported an overall success rate of 96% with laparoscopic orchidopexy for impalpable testis⁵, compared to a success rate of 74% with open surgical orchidopexy and 77% for open staged Fowler- Stephens approach as reported by Docimo⁷. On the other hand, Abolyosr, reported that open and laparoscopic orchidopexy are comparable. However laparoscopy provides less morbidity⁸.

In our series 25(33%) testes, had vas and vessels were seen entering inguinal canal. Eighty eight percent of these testes were viable and inguinal orchidopexy performed but 12% were non-viable testes and inguinal orchidectomy was done. This is similar to Satar et al series⁴. Park et al and More et al, reported in their series around 60% of impalpable testes had vessel and vas entering inguinal canal only half of them were viable and inguinal orchidopexy was performed and the other half were excised^{4,6,7}. Many surgeons continue to regard inguinal surgical exploration as a definitive investigation. Snodgrass et al, reported that initial scrotal exploration for unilateral impalpable testis may be definitive management when

extraperitoneal testes and nubbin are identified⁶. This approach is considered to be successful when a testis can be positively identified or when a blind ending vas and vessels are encountered within the inguinal canal. A diagnostic dilemma arises however, when no evidence can be found of either testis or the vas and vessels^{3, 5}. Initial laparoscopy gives accurate information which helps to make definitive decision⁶. Overall 33% of testes in our series needed no further surgical intervention after initial laparoscopy and 34% of testes had first stage Fowler-Stephens procedure. Therefore, 67% of testes in our series laparoscopy were helpful. Angaus and Forrest reported that overall diagnostic laparoscopy was helpful in 44.2% of their series. This is similar to the report series by Park et al⁶.

We had no post laparoscopic morbidity and mortality in our series. This is similar to other reports^{6,7,8,9}.

Hence, laparoscopy provides less invasive therapeutic modality with all of the benefits of minimal surgery.

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