Laparoscopic Management of Nonpalpable Testes

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Abstract:

Background. Cryptorchidism is one of the surgically correctable diseases which are replaced by laparoscopy. We report our results of this approach in patients with nonpalpable testes (NPT).

Patients and methods. This is a retrospective study included 41 children aged 2-8 years presented to Sohag university hospital, Surgery department with NPT in the period between January 2008 and June 2011 managed with laparoscopy for testes localization, size of the cord, internal ring and further treatment.

Results. The study revealed that 19.5% of the included children had blind-ending cord structures for which no further exploration was done. In 26.8% the vas and vessels were found passing through an open internal inguinal ring, in which testes were found hypoplastic and were left in place. In 14.3% the vessels and vas were found hypoplastic with closed internal ring, no further exploration was done. Still 39% had intra-abdominal testes, 62.5% of them were low and 37.5% were high for whom primary orchiopexy and two-step Fowler-Stephens procedures were performed, respectively. No complications encountered, with satisfactory results in relation to size and location of the testes, and good morphology by ultrasound.

Conclusion. Laparoscopic approach in management of NPT provides a safe, valid, and better option than the conventional inguinal exploration.

Keywords: *Cryptorchidism, Uundescended, Laparoscopy, Pediatrics*

Introduction

Cryptorchidism affects 3% of full-term and a quarter of premature male infants[1], about 20% of undescended testes are nonpalpable; they are either located in the abdomen, in the inguinal canal, or are completely absent[2], each of these conditions requires different treatment.

Localization of NPT is necessary before any corrective surgical approach to minimize the extent of exploration and anesthesia time.[3] The classic approach to NPT was open inguinal exploration followed by abdominal exploration if necessary which entails unneeded trauma, more operative time and more unwanted surgical morbidities. So there is a great need for accurate preoperative localization, to minimize such trauma, which was depending on preoperative investigations with unsatisfactory diagnostic rates ranging from 32.1–67.0% for ultrasonography[4], computed tomography[5] and magnetic resonance imaging.[6]

Laparoscopy is an effective technique for diagnosis and treatment of NPT[7], laparoscopic diagnosis and accurate localization of NPT has become more common since the late nineties of the last century, accompanying the progress in endoscopic techniques.[8] Also the laparoscopic evaluation of abdominal testes provides decision for the most suitable approach in management or even makes abdominal exploration unnecessary.[9]

Laparoscopy has both diagnostic and therapeutic role through primary

orchiopexy and the Fowler-Stephens procedure with vascular division; it clearly shows the anatomy and provides visual information accordingly the correct decision can be taken.[10] In contrast, opponents to laparoscopy argue that the clinical presentation of NPT requires routine surgical exploration for diagnosis and therapy and that laparoscopy adds unnecessary time, risk, and cost to the procedure.[11]

Aim of the work:

The aim of this study is to assess the safety, validity, complications of laparoscopy for management of NPT in our locality and its superiority over the classic inguinal exploration.

Patients and methods

Between January 2008 and June 2011, 41 children aged 2-8 years presented to Sohag university hospital, Surgery department with NPT were included in this study.

Preoperative investigations included mainly ultrasonography with negative results for localization in all cases; all cases with visualized testes or had associated other congenital anomalies were excluded from the study. No patient underwent computerized tomography scan or magnetic resonance imaging.

Each patient was carefully re-examined after anesthesia; children whose testes became palpable under anesthesia were submitted to an open inguinal exploration and orchiopexy and were excluded from the study.

The standard laparoscopic procedure was carried out with the patient in Trendelenburg's position; a 5-mm trocar was introduced by an open approach into the umbilicus, and CO_2 pneumoperitoneum was induced according to the patient's body weight. The inguinal ring was first examined to evaluate its patency, and then the iliac areas and the pelvis were inspected.

Potential laparoscopic findings include presence of gonad(s) in the abdomen, and spermatic cord structures that are intra-abdominal, blind ending, completely absent, or entering the internal inguinal ring.

If intra-abdominal blind-ending cord structures were found, no further exploration was performed and a diagnosis of intra-abdominal vanishing testis was made.

If an intra-abdominal testis was found, it was classified as high or low depending on its position (low, adjacent to the internal inguinal ring, and high, in the iliac fossa above the iliac vessels), and its mobility is assessed by hand pressure on the internal ring or by impressing movement with the scope.

Furthermore, when the diagnostic observation of an intra-abdominal testis was not sufficient, an additional trocar was inserted to better evaluate its position and the length of the spermatic vessels. The patient's age was also considered in deciding which of the following surgical approaches was most suitable; primary orchiopexy, or 2-step approach according to Fowler and Stephens.

The direction, size, and width of the spermatic vessels entering the internal inguinal ring were carefully considered and—in case of unilateral condition—compared with the normal side. In such cases, no further open groin exploration after laparoscopy was done; because the laparoscopic aspect of the hypoplastic vessels with a closed internal inguinal ring was considered the anatomical expression of atrophic testes. If spermatic cord structures were not found, a laparoscopic abdominal exploration was performed and the testis was considered completely absent as in testicular agenesis.

Follow up was conducted monthly for 6 months, in the form of monthly

clinical examination regarding the size and site of the testis and ultrasonography to assess the size and testicular tissue morphology.

Results

A total of 41 children aged 2 to 8 years (median age 3.5 years) with NPT underwent laparoscopy in Sohag university hospital for purposes met the inclusion criteria were included in the study.

NPT were located on the right side in 21 cases, on the left in 14 cases, and were bilateral in 6 cases.

Blind-ending cord structures above the internal inguinal ring were found in 8 cases (19.5%) in whom no further exploration was done.

Sixteen cases (39%) presented with intra-abdominal testes 10 patients (62.5%) were classified as low (Figure 1 and 2) for whom primary orchiopexy (Figure 3 and 4) was performed and 6 patients (37.5%) were classified as high, underwent two-step Fowler-Stephens procedures.

Seventeen patients (41.5%) were found to have spermatic cord structures entering the internal inguinal ring. In 11 patients (3 of whom with bilateral NPT) the vas and vessels found to be passing through an open internal inguinal ring (Figure 5 and 6) so, an inguinal exploration was performed in which the testis was found to be small sized so it is left in place without excision. In the other 6 patients there were laparoscopic evidences of hypoplastic vessels with closed internal inguinal ring as presenting with an anatomical expression of atrophic testes and so no further exploration was performed (Table 1).

There were no associated complications related to laparoscopy encountered within the studied group.

All patients were discharged from hospital during the first twenty four hours. All have had follow-up for more than 6 months with a median of 18 months, with satisfactory results in relation to size, location of the testes and with a good morphology by ultrasound examination. Except one case of those underwent 2-step Fowler-Stephens procedure in which we found the testis atrophic and fibrosed and was surgically removed.

Table 1. Laparoscopic findings and surgical procedure adopted

Laparoscopic finding	Total number	unilateral	Bilateral	Procedure
Vas and vessels entering internal ring	11	8	3	Inguinal exploration
Hypoplastic vessel entering internal ring	6	6	0	No further exploration
Blind end cord structure	8	8	0	No further exploration
Intra abdominal testes (low position)	10	7	3	Primary orchiopexy
Intra-abdominal testes (high position)	6	6	0	2- step Fowler-Stephens' procedure
Total	41	35	6	

Figure 1.Intra-abdominal low position

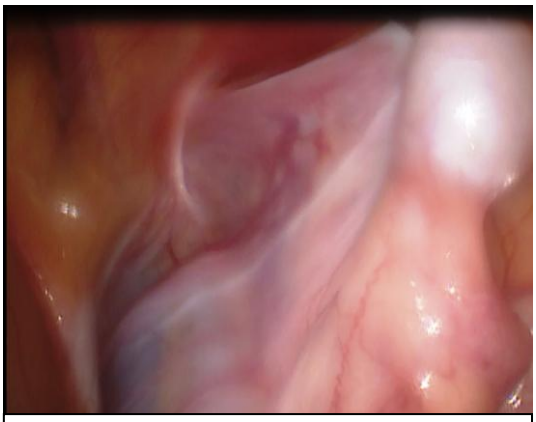

Figure 2. Check for mobility

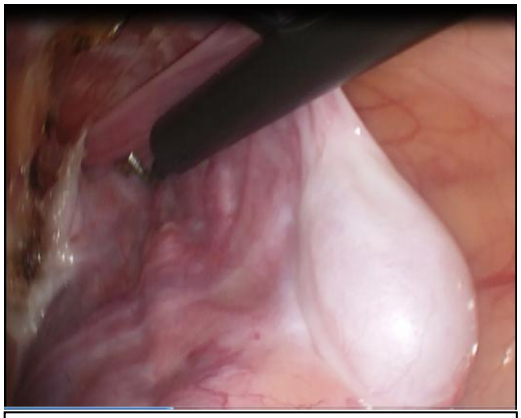

Figure 3. Release of gubernaculum

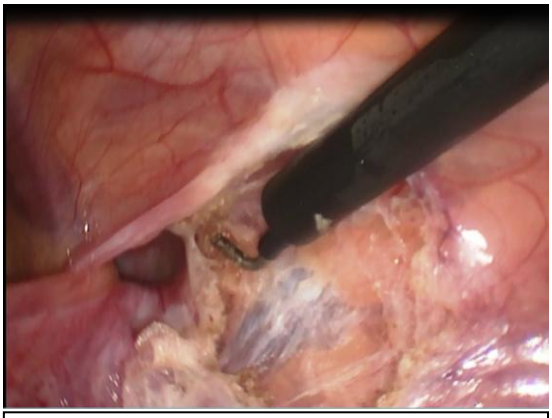

Figure 4. Complete orcheolysis

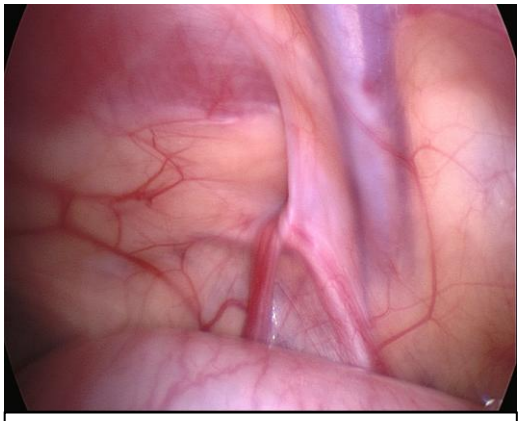

Figure 5. Vas and vessels passing through an opened internal ring

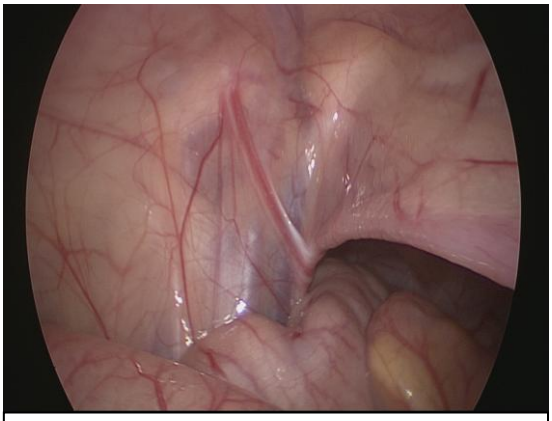

Figure 6. Hypoplastic vas only passed through a closed internal ring

Discussion

The treatment of undescended testes is necessary due to its associated expected complications; the increased risk of infertility and malignancy etc.[12] all the available tools of investigations proved to be inaccurate giving way to laparoscopy, to be the gold standard for localization of NPT.[9] In the past the last resort for testicular localization was open inguinal exploration but it has the disadvantage of requiring dissection of the inguinal region and when the testis is located in a high position, mobilization is performed with some difficulty, which is not the case with laparoscopy thanks to the magnified image and intra-abdominal approach.[13]

In this study, patients with agenesis of testes, intra-abdominal and blind-ending cord structures get the profits of laparoscopy as it provides an accurate diagnosis and definitive localization of the testis.

In our study, we adopted the strategy not to perform an inguinal exploration in case of hypoplastic vessels entering a closed internal inguinal ring; which is a matter of controversy by various authors.[10,15] Because, Some authors observed that if gonadal vessels and the vas deferens passed through a closed internal inguinal ring they are usually associated with an atrophic testis, but if they passed though an opened inguinal ring, a hypoplastic testicle is probably found.[17]

Advocators of inguinal exploration claim that there is risk of testicular malignant transformation in case of cryptogenic testis .[18] According to some reports [15-19], viable germ cells was found in only 10% of cases, accordingly the possibility of malignant changes incidence is very low. Also some authors have reported that testicular tissue is completely absent in specimens excised from patients after inguinal exploration.[17] This is the paramount we relied on during conduction of our work, not to perform inguinal exploration in case of hypoplastic vas and vessels entering through a closed inguinal ring because this means that the testis is completely passed through the inguinal canal with a probable intrauterine vascular accident resulting in its atrophy.

In our series, 24.3% had intra-abdominal testes found just proximal to the internal inguinal ring, and we considered it as low abdominal testes. In these patients, laparoscopy provided the diagnosis, defined the exact location of the testis, and planed the surgical approach which is based on the position of the testes, the distance from the internal inguinal ring and length of the spermatic vessels, the patient's age, and the condition of the internal inguinal ring.

Laparoscopic orchiopexy has a great advantage of the extensive retroperitoneal dissection of the spermatic vessels, which can add more length to help taking the testis down to the scrotum.[20]

In case of high abdominal testis, two-step Fowler-Stephens' procedure, and/or autotransplantation of the testis with microanastomosis of the vessels is the option of choice.[20,21] In our study one case (16%) of atrophied testis and was removed and this consistent with other reports.[22]

In some cases of abdominal testis, it is was difficult to expect which intra-abdominal testes should be treated by traditional primary or laparoscopic orchidopexy and which by Fowler-Stephens procedure or testicular autotransplantation.[22] In our series, if the intra-abdominal testes were somewhat away from the internal inguinal ring, as discussed before, many factors need to think about in deciding the appropriate technique like

position, distance from the internal inguinal ring, its patency, mobility and length of the spermatic vessels.

We attempted primary orchiopexy for testes located 2-3 cm proximal to an open internal inguinal ring, especially in younger children, whereas the laparoscopic Fowler-Stephens approach for testes located high in the abdomen, which warns a possible difficulty in performing primary orchiopexy.

In view of our results, we think laparoscopy is valuable as a diagnostic and therapeutic tool for NPT, which facilitated the choice of an optimal surgical strategy.

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علاج الخصية الغير محسوسة عن طريق منظار البطن الجراحى

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مقدمة

إختفاء الخصيتين هو واحد من الأمراض التي يمكن تصحيحها جراحيا وقد حل منظار البطن الجراحى محل الجراحة التقليدية فى علاج هذا المرض فى الوقت الحالى. نحن نقدم تقرير بنتائجنا فى هذا النهج على المرضى الذين يعانون من خصية أو أكثر غير محسوسة بالكشف الظاهرى.

المرضى وأساليب العلاج

هذه الدراسة هى دراسة مرتجعة و قد شملت جميع الأطفال الذين يعانون من خصية أو أكثر غير محسوسة بالكشف الظاهرى، و قد أجريت الدراسة فى قسم الجراحة العامة بمستشفى جامعة سوهاج في الفترة بين يناير 2008 ويونيو 2011 و قد تم إستخدام منظار البطن الجراحى فى تحديد موقع الخصية الغير محسوسة وحجم الحبل المنوى حال وجوده وحجم الفتحة الأربية الداخلية و توطين الخصيتين إذا أمكن ذلك.

النتائج

إشتملت الدراسة على 41 طفلا تتراوح أعمارهم بين 2-8 سنوات وكشفت الدراسة أنه فى 19.5٪ من الأطفال الذين شملتهم الدراسة كان الحبل المنوى مبتور النهاية وبناء على هذه النتيجة لم يتم عمل إستكشاف إربى لهم. و وجد فى 26.8٪ أن الحبل المنوى و الأوعية الدموية المغذية للخصية تدخل فى الفتحة الأربية الداخلية و هى مفتوحة و تم عمل استكشاف إربى ووجدت الخصية ضامرة وتركت في المكان. و وجد فى 14.3٪ من المرضى أن الحبل المنوى و الأوعية المنوية المغذية للخصية ضامرين و كانت الفتحة الأربية الداخلية مغلقة، ولم يتم عمل إستكشاف إربى لهم. ووجد فى 39٪ من المرضى أن الخصية داخل البطن و كانت فى 62.5٪ منهم فى وضع منخفض و قد تم عمل إنزال و تثبيت للخصية فى مرحلة واحدة، و فى 37.5٪ منهم كانت الخصية فى وضع مرتفع وتم إجراء عملية فاولر- ستيفنز فى خطوتين .و لم تواجه المرضى أي مضاعفات، وكانت النتائج مرضية بالنسبة لحجم وموقع الخصيتين، ومورفولوجية جيدة بواسطة الموجات فوق الصوتية.

الخاتمة

إستخدام منظار البطن الجراحى في العلاج الجراحى للخصية المعلقة الغير محسوسة يوفر خيارا آمنا و صالحا، وأفضل من الأستكشاف الأربى التقليدى.