



Laparoscopic orchiopexy for non-palpable testes: outcome of two techniques

Essam E. Moursy*, Wael Gamal, Mohammad M. Hussein

Department of Urology, Sohag Faculty of Medicine, Sohag University, Sohag, Egypt

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KEYWORDS

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Abstract *Objective:* To assess the outcome of laparoscopic orchiopexy and the two-stage Fowler Stephens technique for managing patients with impalpable testis in terms of safety, feasibility and efficacy.

Patients and methods: This study included 78 patients who presented with 88 non-palpable testes to the outpatient clinic of Sohag university hospital in 2005–2009, and underwent laparoscopy by the same surgeon. Intra-abdominal testes were managed by laparoscopic orchiopexy if low, two-stage Fowler–Stephens technique if high, and orchiectomy if atrophic. Children were evaluated postoperatively to check the location and size of the testicle and to exclude any other complication.

Results: Median age at presentation was 16 months (range 11–42 months). Four testes were absent while inguinal exploration was necessary for six testes with the vas entering the internal ring. Of the 78 intra-abdominal testes, 45 were identified as high (Fowler–Stephens in 43; orchiectomy in two atrophic testes) and 33 as low (orchiopexy). Follow up was 3–55 months (mean 34 months). Twelve patients (12 testes) were lost to follow up (7 Fowler–Stephens; 5 orchiopexy). On follow up, the testes were normal sized and well positioned in the scrotum in 28/28 and 32/36 testes in the orchiopexy and Fowler–Stephens groups with an overall success rate of 100% and 88.8%, respectively. Two testes showed testicular displacement and two showed testicular atrophy in patients of the Fowler–Stephens group.

Conclusion: Laparoscopy provides a safe and accurate modality for diagnosing and managing patients with non-palpable testes, with excellent outcomes.

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Introduction

Un-descended testis is a relatively common congenital anomaly, being recorded in around 3% of full-term newborns and up to 30% of pre-term infants, with an

incidence of 1–2% by the age of 6 months [1]. Cryptorchidism should be managed before the age of 12 months to avoid the ongoing testicular degenerative changes and subsequent subfertility [2]. Most un-descended testes are palpable, but around 20% of cases [3] are reported as non-palpable, and these represent a major challenge as regards determining the most effective strategy for diagnosis and treatment.

* Corresponding author. Tel.: +002 101 077 907.
E-mail address: esalem2008@gmail.com (E.E. Moursy).

Clinical evaluation, sonography, CT and MRI can all be used (with variable accuracy) for locating an impalpable testis; however, no imaging modality has been shown to be 100% sensitive for identification of intra-abdominal testes. The overall accuracy of radiological investigations is estimated to be 44% [4–6]. This is why laparoscopy is widely used nowadays in evaluating these cases.

Laparoscopic technique was first used to identify the location of a non-palpable testis in 1976 by Cortesi et al. [7] and remained a diagnostic modality for many urologists until the report of spermatic vessel clipping for a first-stage Fowler–Stephens operation by Bloom in 1991 [8]. Three years later, laparoscopic orchiopexy was first performed by Jordan and Winslow [9].

The aim of this work was to assess the outcome of laparoscopic orchiopexy in managing patients with impalpable testis in terms of safety, feasibility and efficacy.

Patients and methods

Seventy-eight patients presented with non-palpable testes to the outpatient clinic of Sohag University Hospital between January 2005 and June 2009. All patients underwent laparoscopy by the same surgeon in the same center.

Surgical strategy

Diagnostic laparoscopy was initially performed using a 10 mm 0-degree laparoscope through a 10 mm port placed just inferior to the umbilicus with the child in the Trendelenburg position. For intestinal retraction or therapeutic purposes, one or two 5 mm additional ports were placed lateral to the rectus abdominis muscle, near to McBurney's point. Initially, the vas deferens was identified crossing the obliterated umbilical artery and traced laterally so that the internal ring could be identified. Further management varied according to the laparoscopic findings:

- if the vas deferens and spermatic vessels entered the ring, inguinal exploration was performed with standard orchiopexy if a normal testicle was missed on examination or an orchiectomy if a testicular nubbin was found;
- if the spermatic vessels and vas deferens were blind ending, the procedure was terminated;
- if an intra-abdominal testis was found, it was identified as low or high according to whether or not the testis could be pulled over to reach the contralateral internal inguinal ring [10].

The low intra-abdominal testis was managed by laparoscopic orchiopexy, with mobilization of the testicle to the scrotum via a scrotal port passed trans-peritoneally through a neohiatus medial to the medial umbilical ligament, to be placed in a subdartos pouch. The high intra-abdominal testis was managed by a two-stage Fowler–Stephens technique [11–12] with laparoscopic low clipping of the testicular vessels during the first stage, followed 6 months later by laparoscopic division of the testicular vessels and mobilization of the testicle on its vasal pedicle flap. In the case of a unilateral high intra-abdominal atrophic testis,

Table 1 Laparoscopic findings in patients with non-palpable testes

		Patients (n)	Procedure
Vas and vessels enter the ring		6	Inguinal exploration
Blind-ending vas and vessels		4	Terminate the procedure
Intra-abdominal testis	Low	33	Laparoscopic orchiopexy
	High	43	Laparoscopic two-stage
	Atrophic	2	Laparoscopic orchiectomy

laparoscopic orchiectomy was performed. In boys with bilateral intra-abdominal testes, preoperative karyotype estimation and a human chorionic gonadotropin stimulation test were routinely performed, and each side was managed laparoscopically at a separate session with a 3-month interval between.

Postoperative care and follow up

Children were evaluated 3 months postoperatively and then every 6 months for 3 years to check the location (scrotal or displaced) and size (atrophic or unchanged) of the testicle, and to exclude any other postoperative complication with both clinical and radiological evaluation.

Results

This prospective study included 78 patients (68 unilateral and 10 bilateral) with 88 impalpable testes. At presentation, the median age of the boys was 16 months (range 11–42 months) with 52 between the age of 11 and 20 months. Diagnostic laparoscopy showed that four testes were absent as evidenced by blind-ending vas and vessels. Inguinal exploration was necessary in six testes with the vas entering the internal ring, to perform standard orchiopexy in three patients and removal of a nubbin in three patients. Of the rest of the cases (78 testes), intra-abdominal testes could be identified as being high in 45 and low in 33 cases. The low intra-abdominal testes were managed by laparoscopic orchiopexy, while high intra-abdominal testes were managed by the laparoscopic two-stage Fowler–Stephens technique in 43 cases and by laparoscopic orchiectomy in two unilateral atrophic cases (Table 1).

Follow up ranged from 3 to 55 months (mean 34 months). Twelve patients (12 testes) were lost to follow up (7 out of Fowler–Stephens group and 5 out of orchiopexy group) and were excluded from the study. On follow up, the testes were normal sized and well positioned in the scrotum in 28/28 and 32/36 testes in the orchiopexy and Fowler–Stephens groups, with an overall success of 100% and 88.8%, respectively. Among patients of the Fowler–Stephens group, testicular displacement with proximal migration at the superficial inguinal ring occurred in two testes that were successfully managed by testicular mobilization down

Table 2 Outcome of laparoscopic orchiopexy

Procedure (no. of patients)	Testicular displacement	Testicular atrophy	Overall success
Two-stage technique [36]	2 (5.6%)	2 (5.6%)	32/36 (88.8%)
Orchiopexy [28]	-----	-----	28/28 (100%)

to the scrotum, while testicular atrophy was found in two testes (Table 2). Three patients reported port hernias that necessitated repair.

Discussion

The main goal of surgical treatment of cryptorchidism is to mobilize the testis down to the scrotum without inducing iatrogenic testicular atrophy. Success is influenced by multiple factors, such as the age of the patient and preoperative testicular size and position, with better outcomes reported if orchiopexy is performed before the age of 1 year [13] and in boys with canalicular testes [14–15].

In our series, the median age was 16 months with most of the children aged between 11 and 20 months. This is in accordance with the recommendation of the Action Committee of the American Academy of Pediatrics to perform orchiopexy before the age of 1 year so as to preserve spermatogenesis [16]. In their large series of 916 children following 12 years' experience, Canavese et al. concluded that cryptorchidism is best managed in the first year of life. Testicular histology was normal in the boys treated at this age but not in those treated later [13].

Orchiopexy can be performed as an open or laparoscopic approach in a single or two-stage procedure. In patients with intra-abdominal testes, laparoscopy is considered the standard of care for both diagnosis and treatment. As a diagnostic modality, laparoscopy provides the most accurate tool for identification and localization of impalpable testes, and may prevent unnecessary exploration in children with anorchia as evidenced by blind-ending vas deferens and spermatic vessels [17–19].

In their comparative study between MRI and laparoscopy, Siemer et al. recommended laparoscopic evaluation as preferable in cases of non-palpable testes [20]. As

Table 3 Two-stage Fowler–Stephens orchiopexy

Procedure	Series	Patients (n)	Success rate
Laparoscopic	Baker et al. [22]	58	51/58 (87.9%)
	Radmayr et al. [23]	29	27/29 (93%)
	El-Gohary [24]	31	24/31 (77.4%)
	This series	36	33/36 (88.8%)
Open	Docimo [25]	56	43/56 (76.8%)
	Law et al. [26]	20	19/20 (95%)
	Dhanani et al. [19]	55	48/49 (98%)

a therapeutic option, laparoscopy provides a magnified view and allows extensive retroperitoneal dissection and high mobilization of the spermatic vessels in a meticulous and atraumatic manner. In our study, laparoscopic orchiopexy was performed in patients with low intra-abdominal testes (33 testes) while the two-stage Fowler–Stephens procedure was preferred in high intra-abdominal cases (43 testes). The Fowler–Stephens orchiopexy was originally described as a one-stage procedure for boys with abdominal testis and a long-looping vas deferens in whom the testicular artery and vein are too short to allow the testis to reach the scrotum [11]. Then, the technique was modified by Ransley et al. by dividing the procedure into two stages aimed at avoiding testicular atrophy [12].

Up to now, the best operative intervention for high intra-abdominal testes has not been standardized. In their series of laparoscopic management of non-palpable testes, Denes et al. reported an overall 88% success rate with the two-stage Fowler–Stephens approach and only 33% success using one-stage Fowler–Stephens surgery with primary vascular ligation [21]. Baker et al. reported a series of one-stage laparoscopic Fowler–Stephens orchiopexies, with a success rate of 74% [22]. On the other hand, El-Anany et al. recommended to perform a laparoscopically staged Fowler–Stephens orchiopexy when the testis is located 1 inch or more cephalic to the internal ring [17].

We are in agreement with the authors who prefer two-stage laparoscopic orchiopexy with proximal clipping of the testicular artery and vein, leaving the testis in situ, followed by mobilization of the testis and orchiopexy 6 months later. This interval allows the development of collateral blood flow through the deferential artery [23].

Similar to other series of laparoscopic and open orchiopexy, the overall success rate in our series was 100% and 88.8% for laparoscopic orchiopexy and laparoscopic two-stage Fowler–Stephens technique, respectively (Tables 3 and 4). Despite our encouraging results, a comparative study is still needed between one- and two-stage laparoscopic orchiopexy, to standardize the best management for high intra-abdominal testes.

Table 4 Single-stage orchiopexy (without division of the testicular vessels)

Procedure	Series	Patients (n)	Success rate
Laparoscopic orchiopexy	Esposito et al. [27]	20	20/20 (100%)
	Baker et al. [22]	178	173/178 (97.2%)
	Radmayr et al. [23]	28	28/28 (100%)
	This series	28	28/28 (100%)
Open orchiopexy	Docimo [25]	80	65/80 (81.3%)
	Gheiler et al. [28]	18	18/18 (100%)
	Dhanani et al. [19]	28	28/28 (100%)

Conclusion

Laparoscopy is the standard of care for diagnosis and management of patients with impalpable testes, providing an accurate and safe diagnostic and therapeutic modality for testicular localization and mobilization.

Conflict of Interest

None

Funding

None

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