

Use of Laparoscopy in the Management of Impalpable Testis in Children

PMY TANG, MWY LEUNG, NSY CHAO, BPY WONG, WK KWOK, KKW LIU

Abstract

Purpose: To review the use of laparoscopy in the management of impalpable testes in children. **Methods:** The hospital records of boys who had laparoscopic procedures for impalpable testes were reviewed. **Results:** From 2000 to 2006, 447 boys presented with undescended testes to our centre. Sixty-five testes in 51 boys were impalpable both clinically and during examination under general anaesthesia. Under laparoscopy, 24 testes were found within the abdominal cavity, 23 testes in the inguinal canal and 18 testes vanished. According to the different location and morphology of testes, various options of operative procedures were performed. In 45 testes with orchidopexy done, all except one had satisfactory position in the scrotum. The sizes of 3 testes were found to be smaller than the contralateral ones during post-operative follow-up. **Conclusions:** 12.9% of the undescended testes in our series were impalpable. Laparoscopy locates the position of impalpable testes and decides treatment options for them.

Key words Laparoscopy; Undescended testes

Introduction

Undescended testis is one of the most common conditions in paediatric surgery. 3-5% of all newborn are born with either unilateral or bilateral undescended testes.

The prevalence drops to 1-2% by three months of age and 0.8% will still have cryptorchidism at end of 12 months.¹ Smolko et al reported that 20% of undescended testes are clinically impalpable.² The use of pre-operative imaging for the localisation of impalpable testis has doubtful benefits. After Cortesi et al first described the laparoscopic evaluation in a boy with abdominal testes,³ various workers reported the application of laparoscopy in the management of impalpable testis.⁴⁻⁷ Currently, laparoscopy has become a popular tool both in diagnosis and treatment in clinically impalpable testis.

In this study, we review our experience of laparoscopy in the management of impalpable testis.

Division of Paediatric Surgery, Department of Surgery, Queen Elizabeth Hospital, 30 Gascoigne Road, Kowloon, Hong Kong, China

PMY TANG (鄧敏儀) *MRCSEd*
MWY LEUNG (梁偉業) *FHKAM(Surg)*
NSY CHAO (趙式言) *FHKAM(Surg)*
WK KWOK (郭永堅) *FHKAM(Surg)*

Division of Paediatric Surgery, Department of Surgery, United Christian Hospital, 130 Hip Wo Street, Kwun Tong, Kowloon, Hong Kong, China

BPY WONG (王珮瑤) *FHKAM(Surg)*
KKW LIU (廖鑑榮) *FHKAM(Surg)*

Correspondence to: Dr MWY LEUNG

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Patients and Methods

Between January 2000 and February 2006, a total of 447 boys with 503 undescended testes were operated in our centre. Sixty-five testes (12.9%) in 51 patients (aged 9 months to 16 years, median 20 months) were impalpable preoperatively. There were 21 right-sided (41.2%), 16 left-

sided (31.4%) and 14 bilateral cases (27.4%). All patients did not have any pre-operative imaging study for testicular localisation purpose. Pre-operative karyotyping was done for patients with bilateral impalpable testes. With the patient under general anaesthesia, examination of the groin region was performed. Laparoscopic procedure was begun if the testis was still not palpable under anaesthesia.

With the patient in supine position, a 5 mm umbilical port was inserted by open Hassan technique. After creation of pneumo-peritoneum pressure of 6 to 10 mmHg, a 30-degree laparoscope was inserted. A complete and thorough laparoscopic examination from the lower pole of ipsilateral kidney to the deep inguinal ring was performed for all the patients with impalpable testes. The location and morphology of testis; presence of vas deferens and testicular vessels; and state of processus vaginalis at deep ring were assessed under laparoscopy. Subsequent surgical procedure was individualised according to the laparoscopic findings.

Results

In 23 cases (35.4%), a patent processus vaginalis was evident at deep inguinal ring such that normal vas and testicular vessels entered the inguinal canal through the ring. A normal sized testis was situated in the inguinal canal. This condition was known as canalicular testis. The laparoscopic examination was followed by conventional inguinal orchidopexy which brought the testis to scrotum.

Intra-abdominal testes were found in 24 cases. In 2 cases (3.1%), the testis was found atrophic and laparoscopic orchidectomy was performed. Under laparoscopy, normal-sized intra-abdominal testes were arbitrary categorised into high and low lesions with different surgical treatments. High intra-abdominal testis referred to testis more than 2 cm proximal to the deep ring. Mobilization of testis is usually difficult because of the short course of testicular vessels. In 8 cases (12.3%) of high intra-abdominal testes, two-stage Fowler-Stephens procedure was performed. It involved a first-stage laparoscopic division of testicular vessels, followed by second-stage laparoscopic orchidopexy 6 to 9 months later (Figure 1).⁸

In 14 cases (21.5%), low intra-abdominal testis (also known as peeping testis) was evident within 2 cm proximity from the deep inguinal ring (Figure 2). A patent processus vaginalis was usually found in this condition. Laparoscopic mobilization of testicular vessels together with inguinal orchidopexy was performed (Figure 3).⁹

In 18 cases (27.7%), the vas and testicular vessels were

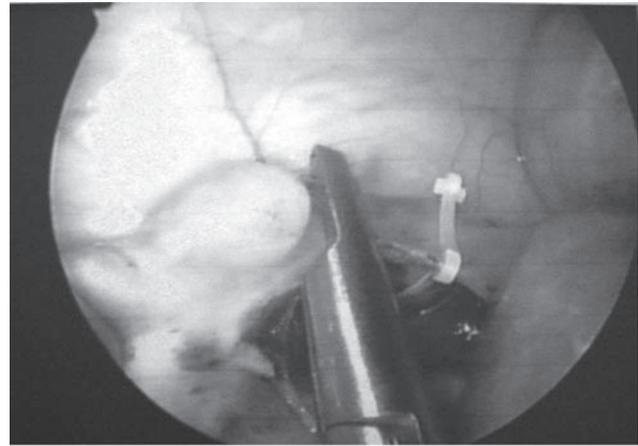


Figure 1 Laparoscopic ligation of testicular vessels: 1st stage Fowler-Stephens procedure.

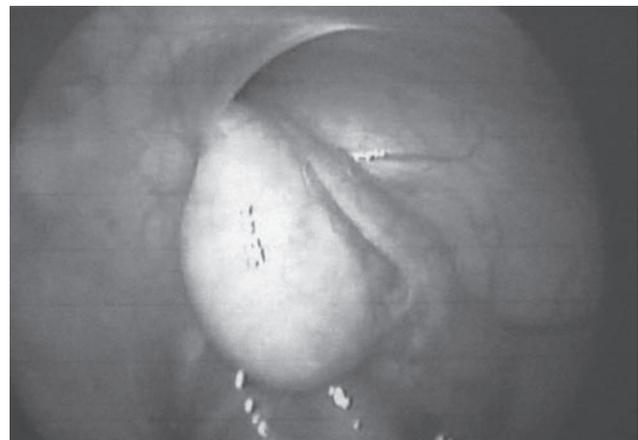


Figure 2 Low intra-abdominal (peeping) testis.

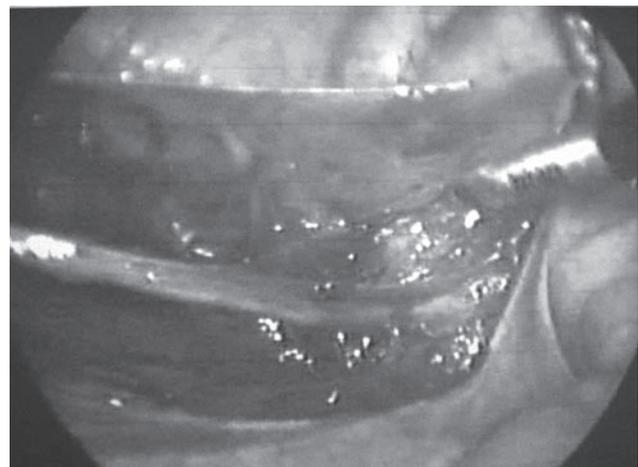


Figure 3 Laparoscopic mobilization of testicular vessels.

found entering a closed deep ring. Thus, the testis had descended beyond the inguinal canal but vanished in the pre-natal period. Inguinal exploration was performed in this condition. Usually a nubbin or blind-ending vessels/vas deferens representing the vanishing testis, could be found and was removed.

There was no operative mortality and morbidity in our series. A total of 45 orchidopexies were performed with a follow up period of 42 months. 44 testes remained in the scrotum and one was found at the scrotal neck despite having laparoscopic mobilization of testicular vessels during the procedure. 42 (93.3%) had symmetrical testicular growth. One intra-abdominal testis with Fowler-Stephens procedure performed and two canalicular testis which were labeled "slightly smaller in size" intra-operatively with inguinal orchidopexy done had smaller size compared to the contralateral side 6 months post-operatively.

Discussion

Before the era of minimal invasive surgery, management of impalpable testis was challenging and controversial. Different imaging techniques, including ultrasonography,¹⁰ computed tomography¹¹ and magnetic resonance arteriography/venography,¹² had been described for pre-operative localisation of testis. However, none of them had 100% accuracy.^{13,14} Also, they were often expensive, required sedation and had potential radiation hazard. Laparoscopy not only provides a solution for diagnosis in localisation of impalpable testis, but also is an essential therapeutic procedure for intra-abdominal testis.

A testis may become impalpable when it is in the inguinal canal, in the abdomen or when it is absent. The prevalence of clinically impalpable testes in our series was 12.9%, which was lower than that described in other reports. We believe that careful examination on a relaxed, non-excited child in a warm environment can help palpation of testis. Also, maneuvers including frog-leg position in infants and squatting position in older boys can relax the groin muscles, hence getting the testicles more easily palpable. In some cases, examination under general anaesthesia would facilitate the palpation of some canalicular testes, which were difficult to palpate clinically in an uncooperative patient.

The median age of operation of patients in our series was 20 months, which was higher than the suggested age for orchidopexy in most literatures. It was found that post-natal testicular descent was rarely possible beyond

3 months.¹⁵ The incidence of cryptorchidism remains relatively constant from 1 year old until adulthood.¹⁶ Beyond second year of life, non-operated undescended testes will show histological changes in the seminiferous tubules.^{17,18} Late referral of patients to our surgical clinic was the main cause of delay in operation in our series. It is our current policy that all boys with undescended testes should have operation performed before 12 months of age.

The use of laparoscopy is essential in the management of impalpable testis, both in diagnosis and treatment. It provides direct vision to intra-peritoneal structures with magnified view. The location and morphology of testis can be accurately determined, and further surgical procedures can be planned. In our series, 41 testes (63.1%) were found descended beyond the deep inguinal ring. After laparoscopic diagnosis, inguinal exploration was performed. Orchidopexy was done on normal sized canalicular testis whereas orchidectomy was done on vanishing testis.

Laparoscopic intervention plays key role in the treatment for intra-abdominal testes. In our series, two intra-abdominal atrophic testes were removed laparoscopically. Laparoscopic mobilization of testicular vessels (LMTV) was performed in 14 cases of lower intra-abdominal (peeping) testis followed by inguinal orchidopexy. LMTV allows dissection of the short-length testicular vessels from retroperitoneum, which facilitates further mobilization of testis in subsequent inguinal orchidopexy.⁹

In 8 cases with high intra-abdominal testis, the testicular vessels were too short such that one stage mobilization of testis to scrotum was impossible. Laparoscopic division of testicular vessels was performed. The concept of ligation of testicular artery in orchidopexy was first described by Fowler and Stephens in 1959.¹⁹ The principle of this procedure is based on the anatomical fact that the testis has a triple blood supply; namely testicular artery, cremasteric artery and the vasal artery. Ligation of one vessel will not result in testicular ischaemia; instead it can promote the development of collateral circulation of testis. Two stage laparoscopic Fowler-Stephens orchidopexy was further popularised by Caldamone and Amaral.⁸ The testicular artery is ligated in stage one operation, and the testis will be mobilized laparoscopically to scrotal position based on the vasal artery in second stage operation, which was performed 6 to 9 months later.

Routine inguinal exploration with or without pre-operative imaging studies for impalpable testis has been suggested by some authors.²⁰ We do not agree with this approach. With laparoscopy, 2 cases of intra-abdominal

atrophic testes and 8 cases of high intra-abdominal testes (15.4%) in our series could be managed without inguinal exploration. Moreover, fruitless inguinal exploration for high intra-abdominal testis may compromise the cremasteric or vasal blood supply to the testis, and hinder future Fowler-Stephens procedure.

In successful orchidopexy, the testis was brought to scrotum without post-operative atrophy. The success rate of operation in our series was 91.1%. One testis had higher position and 3 testes had smaller size than the opposite side during post-operative follow-up. In a review of 8425 patients, Docimo reported the success rate of orchidopexy in canalicular, peeping (low abdominal) and high abdominal testes to be 87.1%, 82.2% and 74.0% respectively.²¹ At operation, it is not only important to protect the vasculature of testis, but also to obtain sufficient length for orchidopexy. We believe that judicious use of laparoscopy and meticulous surgical techniques are the cornerstone of success in operations for impalpable testes.

Conclusions

With careful clinical examination, 87.1% of undescended testes were palpable and could be brought to the scrotum by inguinal orchidopexy. 12.9% of the undescended testes were impalpable. Diagnostic laparoscopy obviates the need for preoperative imaging studies, locates the position of testes accurately and decides treatment options for them (Figure 4). Laparoscopy has therapeutic roles on mobilization of testicular vessels and staged Fowler-Stephens procedures, bringing intra-abdominal testes to scrotum effectively.

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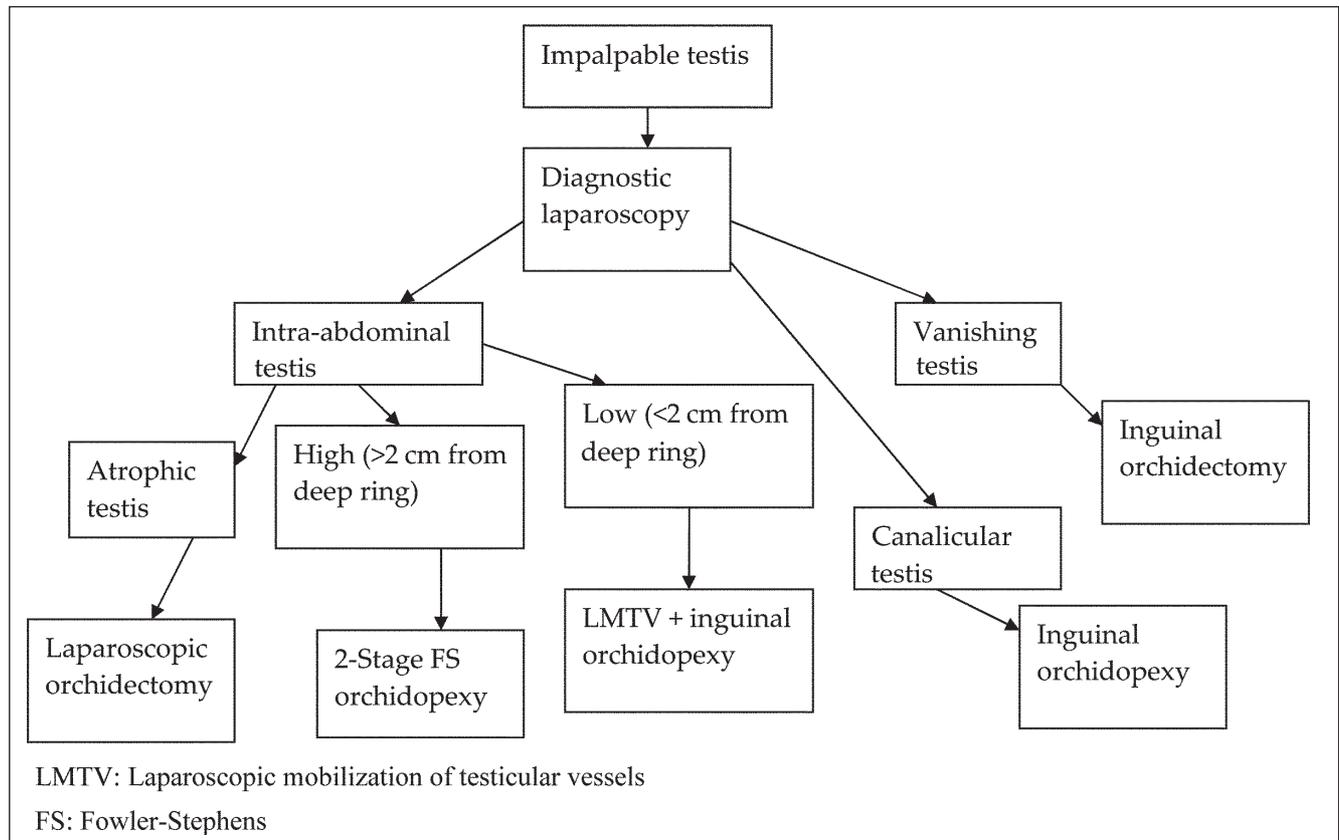


Figure 4 Algorithm for laparoscopic management of impalpable testis.

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