# The role of laparoscopy in the management of the impalpable testicle

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# Abstract

**Background** Laparoscopy can identify patients who would benefit from further surgical intervention. Most importantly it is 100% sensitive in identifying the vanishing testicle.

Aims To review the role of laparoscopy in the management of the undescended testis.

**Methods** Thirty-one patients underwent a laparoscopy for an impalpable testicle over a nine-year period at this institution.

**Results** There were 30 successful laparoscopies completed for 31 impalpable testes,13 of which were normal. All underwent groin exploration of which 11 were located. Seventeen had an abnormal laparoscopy. Of these, 11 were located in the abdomen and four were diagnosed as vanishing testes.

**Discussion** Sixteen per cent of patients had an absent testicle at laparoscopy and were spared any further surgical intervention. In the remaining 84%, over half had their surgical procedure altered as a result of the laparoscopic

findings. This experience, has led us to believe that laparoscopy is a safe, reliable and sensitive procedure crucial to the management of the impalpable testis.

## Introduction

The incidence of cryptorchidism is 1.8-4% at birth and this figure decreases to 0.7-1% at nine months of age.<sup>12</sup> Large adult series have a similar incidence, and hence we can conclude, that if a testis has not descended by the age of nine months of age, that it is unlikely to do so.<sup>3</sup> Approximately one in five (20%) undescended testis is impalpable.<sup>2</sup>

Traditionally, the management of the undescended testis has consisted of groin exploration and orchidopexy. Failure to locate an inguinal (also known as canalicular) testis necessitated extending the incision as described by Jones and Bagley and even proceeding to laparotomy.<sup>45</sup> On occasions, despite extensive exploration, no testicle is found.

Radiological attempts to localise the impalpable testis generally lack sensitivity." Ultrasound has a limited role in localising an impalpable testis where it is said to have a false negative rate of some 50%, and be less sensitive than an examination by an experienced urologist, but more sensitive than a less experienced one.<sup>1,5</sup> Ultrasound is particularly useful in the obese child where clinical examination may be difficult, but it is poor at localising an abdominal testis.<sup>2</sup> The use of computerised tomography (CT) and magnetic resonance imaging (MRI) are limited too, mainly by the fact that a general anaesthetic is usually necessary in young children.1 CT also involves exposure to large doses of radiation which is particularly undesirable in a child.<sup>2</sup> The sensitivity of both these modalities is poor (CT less sensitive than MRI). This is due firstly, to the size of the testis in a child which may be at the lower threshold for CT discrimination, and secondly, due to the reduced peri-testicular fat in a small child making the testicle more difficult to distinguish from surrounding tissues." Selective cannulation of the spermatic vein with contrast (venous spermatography) also requires a general anaesthetic but carries the risk of testicular ischaemia, a high false negative rate and a high technical failure rate.<sup>2</sup> The human chorionic

gonadotrophin (hCG) stimulation test to detect testosterone production is only used to detect the absence of testicular tissue and is therefore not of any benefit in the presence of a unilateral cryptorchidism or dysgenetic testicular tissue, and a laparoscopy or groin exploration may still be required.

Cortesi first advocated the use of laparoscopy in 1976 to locate bilateral impalpable testis in an 18-year-old boy.' Today, it is the most sensitive method of locating the impalpable testis, with a sensitivity of 95–98%.8 Most importantly, it has a 100% sensitivity in detecting the vanishing testis, making groin exploration unnecessary in such cases. Laparoscopy allows for accurate surgical planning with appropriate incisions. It also spares groin exploration in a significant subgroup.

## Methods

We conducted a review of our theatre records and located 31 laparoscopies for 32 impalpable testes since 1991. All were performed by a single consultant urologist (HB). A chart review on all 31 patients was then performed. While it is our practice to confirm an impalpable testis by examination under anaesthetic, followed by laparoscopy as our initial investigation, three patients were referred to us who had had previous groin exploration that did not reveal a testis.

#### Technique

Under general anaesthesia with full muscle relaxation, the patient lies supine with the bladder on catheter drainage. Clinical examination confirms an impalpable testis, fulfilling Lisias' criteria for laparoscopy.<sup>9</sup> A small subumbilical incision is made and the Verres' needle is introduced. The water drop test and aspiration confirm its intraperitoneal position. A pneumoperitoneum is created using 1.5-21 of  $CO_2$  and maintained at 15cm water. A 5mm trocar is introduced and a 30-degree adult cystoscope is passed into the peritoneum. Accessory trocars may be placed either side of the abdomen, at the level of the umbilicus, if needed. This would allow for reflection of overlying bowel and for procedures to be performed e.g. first stage of Fowler-

Aria Mon Rectos	Normal (n=0.)	Abnormal. (n∈18)
Inguinal canal	12	1.1.1
Abdominal		11
Procedure	1 1 1	
F-S orchidopexy	0	7
Routine orchidopexy	9	3.
Orchidectomy	3	1
Vanishing (abdominal)		4
Vanishing (canalicular)	2	1
Agenesis	111	1
Ectopic	an farmer and a far	1
Thirteen patients had norma had an abnormal laparosco three definitive surgical trea Stephens).	al laparoscopies (14 py. In the box marke tments are listed (F	testes) and 18 ed procedure, the -S, Fowlers

Table 1. This table details the outcomes of 31 laparoscopies for 32 impalpable testes

Stephens orchidopexy (see Figure 1).<sup>3</sup>

The entire peritoneum is inspected as described by Guiney et al.<sup>10</sup> In the case of unilateral impalpable testis, the unaffected side is inspected first. The internal inguinal ring is identified by its inner cresentric edge (see Figure 1). The external iliac artery and vein with their inferior epigastric branches are noted. Other pelvic landmarks include the median umbilical ligament and the ureter as it crosses the external iliac vessels and passes posterior to the vas deferens. Attention is then turned to the affected side. Most important is the identification of the testis (if present), the testicular artery and vein, and the vas as it enters the peritoneal cavity passing medially towards the seminal vesicles. The testicular vessels and vas form an inverted 'V' as they approach the testis and this must be identified.<sup>10</sup> Particular attention is paid to the size of the abdominal testicle or the calibre of the testicular vessels exiting the internal inguinal ring. Once this is completed the peritoneum is deflated. At the discretion of the consultant, a routine or Fowler-Stephens orchidopexy, if indicated, would be performed under the same anaesthetic or at a later date.

#### Results

In the nine year period there were 31 successful laparoscopies for 32 impalpable testes. There was one technical failure, in which a pneumopeitoneum could not be created in a particularly obese child. Previously, we have aimed to perform laparoscopy by the age of three, but there is a trend to perform corrective surgery as early as possible. Owing to late referrals and two patients, aged 38 and 27, we had an average age of referral of 6.5 years and an average age at laparoscopy of eight years. Although most patients were referred early, some boys were aged 10 and 12 years of age at referral. The involved side was right in 17 cases and left in 15 cases.

A normal laparoscopy is one in which both testicular vessels and vas deferens appeared normal and were seen exiting the internal inguinal ring. An abnormal laparoscopy is any other finding. In total there were 13 normal laparoscopies (for 14 testes), and all proceeded to groin exploration (see Table 1). Findings at groin exploration were as follows. A canalicular (in the inguinal canal) testis was located in 11 patients (12 testes). Of these 12 testes, nine were placed in the scrotum by orchidopexy. Three required orchidectomy as they appeared abnormal. Histology revealed one atrophic and two rudimentary testes. In two further patients only a fibrous nubbin was found at the distal ends of the testicular vessels and this was excised. Histology did not reveal any testicular tissue.



This can be explained by a vascular event occurring in utero (usually) as described by Abeyaratine, and is known as a vanishing testis."

In the other 18 patients (18 testes), the laparoscopic findings were abnormal. Eleven of the 18 patients had an abdominal testis, all of these being located distal to the external iliac vessels. Ten of these 11 testes could be placed in the scrotum, seven requiring a one stage Fowler-Stephens orchidopexy and three a routine orchidopexy. One testis was small and did not have sufficient length in the vas to reach the scrotum. An orchidectomy was performed and histology revealed an immature testicle. All others were palpable in the scrotum at review. A further study examining the long term outcome of these testes, including atrophy rates, is forthcoming.

Of the remaining seven patients who had an abnormal laparoscopy, four had a vanishing testis. This diagnosis was made on the absence of a testis in the presence of blind-ending abdominal testicular vessels." Two of these patients had prior groin exploration, which yielded no testis. Also, two of these four patients were aged 38 and 27-years-old and were being investigated for infertility.

In one further patient, there was no evidence of a testis, vas or testicular vessels at laparoscopy and a diagnosis of unilateral testicular agenesis was made. This same patient had bilateral ureterostomies performed at the age of four days for posterior urethral valves and had bilateral ureteric reimplantations later. He had previously had a left-sided orchidopexy. One further patient was noted to have small testicular vessels exiting the internal inguinal ring and underwent a groin exploration. A small nubbin of tissue was found at the distal end of the testicular vessels and was excised. Histology did not reveal any testicular tissue. The presence of testicular vessels confirms that a testicle was present at one stage. This is a vanishing testis, albeit canalicular. Finally, one further testis was ectopic and located in the pelvis. At groin exploration, an attempt was made to place the testis in the scrotum but this was unsuccessful due to a short vas. An orchidectomy was performed and histology revealed an atrophic testis.

#### Discussion

In this series, 16% of testes were absent at laparoscopy, and did not require any further intervention, and were thus spared groin exploration. Hence 84% proceeded to an open procedure, but of these, only 43% required a routine groin exploration. In the other 57%, the information obtained at laparoscopy allowed for surgical planning and the appropriate procedure to be performed, thus altering our management.

In this series, an impalpable testis has a 25% chance of being absent. Of the 75% of testes present, 80% of these were placed in the scrotum. This was achieved by routine orchidopexy in 63% of cases and required a Fowler-Stephens orchidopexy in 37% of cases. The remaining 20% of testes that were not placed in the scrotum underwent orchidectomy. Thus parents can be informed that there is approximately a 60% chance of placing an impalpable testes in the scrotum, similar to the findings of Guiney et al.<sup>10</sup>

There are a number of controversial issues with regards to the management of the impalpable testis. Firstly, there is evidence that pathological fibrosis of the intertubular tissues of the testis occurs in one-year-olds and may be significant by four years of age, affecting testicular function.12 Several authors recommend orchidopexy before the age of two years.13 Secondly, the laparoscopic finding of small calibre or hypoplastic testicular vessels seen exiting the internal inguinal ring. Guiney et al believe that groin exploration is not necessary and our experience of just one, would bear that out, although other larger series have found viable testicular issue in 6-10% of such patients at exploration.14,15 It is important that no dysgenetic testicular tissue is left behind, so we too would recommend groin exploration for all such cases, despite our experience. The finding too of a blind ending vas in the presence of testicular vessels requires an extensive search for a testis, but a blind ending vas in the absence of testicular vessels does not.1

#### Conclusion

Our experience, and that of others, has led us to believe that laparoscopy is a safe, reliable and sensitive procedure crucial to the management of the impalpable testis. Not only does it avoid unnecessary groin exploration in a significant subgroup, but for those who do require an exploratory procedure, we have shown that the information obtained at laparoscopy will alter that procedure in well over half of these patients. Laparoscopy is our initial investigation in the management of the impalpable testis.

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