Laparoscopic management of impalpable undescended testes: 20 years’ experience

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Abstract

BACKGROUND:

Laparoscopy is the best available method to manage impalpable undescended testes. We performed our first laparoscopic orchiopexy in June 1992 and found good results in consecutive cases with laparoscopic orchiopexy over last 20 years.

MATERIALS AND METHODS:

From June 1992 to May 2012, 241 patients with 296 impalpable testes were operated upon by laparoscopic approach. One-stage laparoscopic orchiopexy was performed in 152 cases, while two-stage Fowler — Stephens laparoscopic orchiopexy was performed in 55 cases. Laparoscopic orchiectomy was required in 20, and in 21 patients testes were absent. One-sided laparoscopic orchiopexy was performed in a male pseudo hermaphrodite.

RESULTS:

None of the testis atrophied after two-stage Fowler — Stephens laparoscopic orchiopexy, while in 152 cases of single-stage orchiopexies one testes atrophied. One patient developed malignant change in the testis, 6 years after orchiopexy.

CONCLUSIONS:

Laparoscopy is the best way to diagnose impalpable undescended testes. No other imaging investigation was required. Single-stage laparoscopic orchiopexy for low level undescended testis has very good results. For high-level undescended testis and when one-stage mobilisation is difficult, two-stage Fowler — Stephens orchiopexy has excellent results. Minimum 4 months should separate first and second stage of laparoscopic
Fowler — Stephens procedure. Even when open orchiopexy is being done for intra-canalicular testes in a child, it is advisable to be ready with laparoscopy if necessary, at the same time, in case open surgery fails to mobilise the testicular vessels adequately.

**Keywords:** Abnormalities, cryptorchidism, laparoscopic surgical procedures, testis

**INTRODUCTION**

Laparoscopy has proved to be the best available procedure for diagnosis and management of impalpable undescended testes.[1,2,3,4,5,6] Since June 1992, every patient referred to us with impalpable undescended testis was treated by laparoscopy. This is an ongoing study and the present study is based on the analysis of cases treated over 20 years. The senior author was involved in the treatment of every patient. Initial experience was published in 1999.[2] Further experience with this technique and follow-up in the last 20 years has been instructive.

**MATERIALS AND METHODS**

From June 1992 to May 2012, 241 consecutive patients with 296 impalpable testes were treated by laparoscopic surgery. Two patients (aged 2 and 3 years) with palpable undescended testis in the inguinal region were operated upon for open orchiopexy by pediatric surgeon. The testes were intra-canalicular and could not be brought down to the scrotum due to undue tension on the cord structures. Later, both the patients were referred to us for laparoscopic management. These 2 cases have been included in the analysis. Age of the patients ranged from 14 months to 30 years (median age: 6 years). All patients were assessed by clinical examination and pre-operative ultrasonography (USG). Three patients came with computed tomography (CT) scans, which were done before the patients were referred to us. Genetic study was done in a 26-year-old male pseudohermaphrodite who was brought up as a female. He had unilateral intra-abdominal undescended testis. The other testis was in the ipsilateral hemiscrotum. Genotype was 46XY.

Technique that has been practiced since the last 14 years is as follows:

All the patients are operated under general anaesthesia in supine position with 30° Trendlenberg tilt. The first port for the telescope is placed through the umbilical tube by open technique by sub-umbilical transverse incision. Two 5-mm ports are used on either side in the lower quadrants at the level of umbilicus along the mid clavicular line.

Initially, diagnostic laparoscopy is performed to locate the testis, note its size, distance from the internal ring and iliac vessels, presence of hernia, if any, and the length of loop of vas deferens.

If the testis is absent in the peritoneal cavity, presence of vas deferens and testicular vessels are confirmed. Observation is made to know whether the vas deferens and testicular vessels are present but if they end blindly and whether vas deferens and vessels are entering the inguinal canal.

Presence of hernia sac on affected as well as unaffected side are looked for.

Further procedure is decided according to the finding of diagnostic laparoscopy. In an adult patient with unilateral undescended testis, if the affected testis is atrophic with contra lateral normal size testis in the scrotum, laparoscopic orchidectomy is performed. If the undescended testis is closer to the internal ring or is of peeping type, one-stage orchiopexy is carried out. If the testis is situated closer to the iliac vessels than the internal ring, two-stage Fowler — Stephens orchiopexy is planned.

**One-Stage Laparoscopic Orchiopexy**

Peritoneum over the testicular vessels is incised and dissected off the vessels from level of testis ascending as high as required. Below, caudal to the testis and vas deferens, the peritoneum is incised at the internal opening or around the internal opening of the hernia sac, if one is present. This effectively completes herniotomy.
Releasing the testicular vessels from the peritoneum and retroperitoneum increases the length of the testicular vessels. Peritoneum on the vas deferens is not dissected. Any electrocautery is avoided during the whole procedure.

After mobilisation of testicular vessels by stripping off the peritoneum, the testis now can be deposited in the scrotum. Peritoneum at the site of internal ring is incised lateral to the inferior epigastric vessels. A 5-mm laparoscopic dissector is introduced through the internal ring, directing it into the scrotum across the inguinal region with blunt dissection. The scrotal skin is incised at the bottom of scrotum over the dissector. Sub dartos pouch is created and the dissector tip is pushed out through the dartos. A haemostat is railroaded in to the peritoneal cavity through the internal ring. The testis is grasped at the gubernaculum by the haemostat and it is pulled down to the sub dartos pouch. If there is any tension on vessels, the peritoneum over the testicular vessels can be further dissected to higher level laparoscopically.

In techniques described by other authors, electrocautery is commonly used and a trocar and cannula is passed through scrotal base into the abdomen through neohiatus to grasp the testis to bring it down. We direct an instrument through the internal ring into scrotum. We have not made a neohiatus medial to the inferior epigastric vessels in any of the patients.

**First Stage of Two-Stage Fowler — Stephens Orchiopexy**

This is performed if the testis is closer to the iliac vessels. At the first stage of two-stage Fowler — Stephens orchiopexy, the testicular vessels are isolated by dissecting at a distance from the testis, leaving the retroperitoneum up to testis and vas deferens undisturbed to facilitate formation of collaterals. Peritoneum is incised at a point on the testicular vessels nearer to the iliac vessels. The vessels are encircled. The testicular artery and vein are clipped with two titanium clips at this point away from the testis. One of the 5-mm cannulae is exchanged for a 10-mm cannula for clip applicator if 5-mm clip applicator is not available.

Many workers either ligate or burn the vessels. We prefer to clip the vessels.

**Second Stage of Two-Stage Fowler — Stephens Orchiopexy**

This is performed a minimum of 4 months after the first stage.

At the second stage, laparoscopy is performed again. The vessels are divided below the level of previously applied clips. Finding the level to cut the vessels is easier in a clipped vessel as compared to a ligated or burnt vessel, as done in some techniques. The peritoneum is divided all around the vessels along their length up to the testis and also around it. The only structure that now holds the testis is the vas deferens. Now the testis can be brought down as low as the length of vas allows. The peritoneum is incised at the site of internal ring or around the opening of hernia sac if it is present. The testis is brought down and deposited in the sub dartos pouch in a similar manner as in single-stage laparoscopic orchiopexy.

If hernial sac is present on the normal side (testis present in the scrotum) in case of unilateral undescended testis only herniotomy is done by incising the peritoneum circumferentially around the internal hernial opening. We do not suture the herniotomy site.

Electrical cautery is not used during laparoscopy.

If orchiectomy is required, the vessels are clipped and the atrophied organ is extracted through one of the port sites.

**RESULTS**

End-point observations were for duration of surgery, correlation with USG findings, level to which testis was brought down, time to discharge from the hospital, immediate complications for wound, testicular viability as per size of the testis after orchiopexy and malignant change.
USG localisation was accurate in 58 cases (24.06%). Diagnostic laparoscopy was successful in localisation in each of the 241 patients. Out of 3 patients who came with CT scans only, one CT correctly gave the site of intra-abdominal testis.

Single-stage orchiopexy was successful in 156 cases, while two-stage Fowler–Stephens orchiopexy was performed in 55 cases. Among the patients with bilateral undescended testes, 7 cases required single-stage laparoscopic orchiopexy on one side and two-stage Fowler — Stephens orchiopexy on the other side. Single-stage orchiopexy for one testis and first-stage clipping for staged Fowler — Stephens procedure for the other testis were done simultaneously in these patients.

Bilateral two-stage Fowler — Stephens procedure was needed in 8 cases. Both the sides were treated simultaneously at both the stages. In 5 cases of unilateral undescended testis, laparoscopy revealed that there was a complete hernia sac on the normally descended side with testis residing in the congenital sac in the scrotum. During laparoscopic orchiopexy, herniotomy was done by incising the peritoneum around internal ring, without closing the ring. Two of these patients needed two-stage Fowler — Stephens orchiopexy. Laparoscopy at the second stage revealed that the internal opening on the herniotomy side had completely obliterated, although it was not sutured. Other 3 patients did not develop hernia clinically.

In two patients at initial stage, it was thought that single-stage laparoscopy would be possible. But after complete dissection of the testicular vessels for one-stage orchiopexy, there was undue tension on the vessels and the testis would not reach the bottom of the scrotum. Hence, the procedure was converted to two-stage Fowler — Stephens orchiopexy and the vessels were clipped at high level although the retroperitoneal dissection toward testis was complete. Till the second stage after 6 months clipping, the operated testis was viable.

Second stage of staged Fowler — Stephens orchiopexy was done between 4 months and 2 years after the first stage (median 6 months).

In the two patients who were previously operated by open surgery, one-stage laparoscopy was successful in one, while the other patient needed two-stage Fowler — Stephens procedure. Both the testes were viable after 5 months of follow-up.

Patients were followed-up for minimum 3 months up to 12 years. Twelve patients with one-stage orchiopexy and 1 patient after two-stage Fowler — Stephens orchiopexy were lost to follow-up. Follow-up was by physical examination and USG.

All patients were discharged on the 2nd post-operative day. None of the patients had wound infection.

None of the testis atrophied after two-stage Fowler–Stephens orchiopexy. One testis atrophied after single stage lap orchiopexy in a 17-year-old boy with unilateral undescended testis. There was only 1 patient with short loop vas deferens on one side. This was one of the bilaterally undescended testes in a 20-year-old man. Orchiectomy was performed on the testis with short vas deferens at the time of second-stage orchiopexy when the other testis was brought down successfully by two-stage Fowler — Stephens procedure.

One 15-month-old-child developed port site hernia after 3 months. He had absent testes and only diagnostic laparoscopy was required.

A 9-year-old boy underwent single stage laparoscopic orchiopexy on one side. Six years later, he developed yolk sac tumor of the testis that was brought down laparoscopically. He underwent high orchiectomy, chemotherapy, and laparoscopic retroperitoneal lymph node dissection for residual tumor. He is under surveillance and disease free for the last 8 years.

In a 17-year-old male pseudohermaphrodite, the right undescended testis was brought down to the hemiscrotum by one-stage laparoscopic orchiopexy. Later, the patient was treated by the plastic surgery unit for genital reconstruction [Tables 1 and 2].

DISCUSSION
Our results show that laparoscopy is the surest way to locate the site of impalpable testis. This has been corroborated by other studies.\[1, 2, 3, 4, 5, 6, 7\] Laparoscopy is most specific and sensitive diagnostic procedure for impalpable undescended testis. None of the imaging modalities gives such result. So, in case of impalpable undescended testis, there is no need to use any special imaging modality. We have used USG for its ease of access and economy.

Laparoscopy in a child is very useful in locating the intra-abdominal testis because of the minimally invasive approach and magnification. Mobilisation of the testicular vessels by dissecting the peritoneum off the testicular vessels is also easy, even in children who have small abdominal cavity, and laparoscopy avoids the need for long incision besides being more successful than open surgery.\[7\]

Amongst high intra-abdominal testes, at the second stage of Fowler — Stephens orchiopexy all the 55 testes were brought down to the bottom of scrotum. None of the testes atrophied from 5 months to 4 years. Fowler — Stephens orchiopexy failed in only one testis, which had a short vas deferens. Though additional procedure is required for second stage, it is a small price to achieve good outcomes. The results of one-stage Fowler — Stephens orchiopexy are not as good as two-stage Fowler — Stephens orchiopexy.\[1\] In two children who were referred to us after failed, open orchiopexy for inguinal type of testis, laparoscopic orchiopexy was successful. Shadpur \textit{et al.}, treated cases after initial open surgery had failed to locate the gonad. They succeeded in laparoscopic orchiopexy, while, at open surgery, even visualisation of the testis was not possible.\[8\]

At the first stage of Fowler — Stephens orchiopexy, we used titanium clips to occlude vessels. At the second stage with laparoscopy, the previously applied clip can be easily isolated. The vessels are divided below the previously applied clip. This is more convenient than ligature or use of bipolar cautery to burn the vessels.\[1, 9\] We avoided any form of thermal energy during laparoscopic orchiopexy.

Lindgren \textit{et al.}, clipped only one side vessels for the first-stage Fowler — Stephens procedure. They did not clip the other side lest it needed auto transplantation.\[10\] We had very good result with two-stage Fowler — Stephens procedure and auto transplantation has not been on our agenda. So even in bilateral undescended testes, if the need be, two-stage Fowler — Stephens procedure can be performed simultaneously on both the sides. In series where Fowler — Stephens procedure was done in single stage, the results were poor.\[1\] With two-stage Fowler — Stephens laparoscopic orchiopexy, results have been consistently better.\[5, 7, 11, 12, 13\]

Elder showed that staged Fowler — Stephens procedure by open surgery had better results than one-stage Fowler–Stephens orchiopexy.\[13\] When both the stages are performed by laparoscopy, surgery is easier and even second-stage laparoscopy is better than relaparotomy.

Not suturing the internal ring did not lead to hernia in 2 patients. Though this is anecdotal, Handa \textit{et al.}, showed that closure of the internal ring is not necessary.\[14\] We had only 1 patient with malignant change in testis after orchiopexy.

We had only one case of short vas deferens. None of the referred series had a case of short loop vas, preventing adequate descent of the testis.\[15, 16\]

We had one case of male pseudohermaphrodite with successful outcome of laproscopic orchiopexy. El-Moula \textit{et al.}, in their series had 5 male pseudohermaphrodites out of 103 cases of impalpable testes.\[17\]

**CONCLUSIONS**

Laparoscopy is the best way to diagnose impalpable undescended testes. No other imaging investigation is required. Laparoscopic orchiopexy is a logical extension of the diagnostic procedure. Single-stage laparoscopic orchiopexy for low-level undescended testis has very good results. For high level undescended testis and when one-stage mobilisation is difficult, two-stage Fowler — Stephens orchiopexy has excellent results. Minimum 4 months should separate first and second stage of laparoscopic Fowler — Stephens
procedure. Even when open orchiopexy is being done for intra-canalicular testes in a child, it is advisable to be ready with laparoscopy if necessary, at the same time, in case open surgery fails to mobilise the testicular vessels adequately.

Footnotes

Source of Support: Nil

Conflict of Interest: None declared.

REFERENCES


**Figures and Tables**
Table 1
Laterality of undescended testes

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Table 2

Types of procedures

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