

EVALUATION OF STAGED FOWLER-STEPHENS ORCHIOPEXY FOR THE HIGH ABDOMINAL TESTIS

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Objective: To evaluate staged Fowler – Stephens orchiopexy for the high intra-abdominal testis.

Patients and Methods: The study included 78 patients with laparoscopically diagnosed high intra-abdominal testes. Their age ranged from 2 –16 years. All cases underwent staged Fowler – Stephens orchiopexy. The first stage was done during diagnostic laparoscopy by clipping the internal spermatic artery and vein 2-3 cm superior to the intra-abdominal testis. Six months later the second stage of the procedure in the form of open (67cases) or laparoscopic orchiopexy (11 cases) was performed. Only 65 patients were available for follow up at 6 and 18 months following the second stage. At each follow-up visit, the testicular position, size and viability were assessed by Technetium 99 (Tc99m) testicular scintigraphy.

Results: Out of 78 cases, 10 had bilateral high intra-abdominal testes. Second stage open orchiopexy was done in 67 cases while the remaining 11 cases were subjected to laparoscopic orchiopexy. No operative or

postoperative complications were detected apart from a prolonged ileus after the second stage in 6 patients. On follow up, 49 testes were scrotal and of good size while 6 testes were scrotal and atrophic. In the remaining 10 cases the testes were at the neck of the scrotum and of good size. Tc99m testicular scintigraphy was done in 65 cases. A good perfusion was detected in the majority of them (59 cases) while no radiotracer accumulation was detected in the remaining 6 cases.

Conclusion: Laparoscopic clipping of the gonadal vessels is safe in patients with high abdominal testes. The staged approach with preservation of the testicular collateral vascular supply provides an adequate viability of the high abdominal testis with a high success rate. Tc99m testicular scintigraphy allows a proper assessment of the testicular viability as compared to measurement of the testicular size only.

Key words: high intra-abdominal testis, Fowler-Stephens orchiopexy, Tc99m testicular scintigraphy

INTRODUCTION

The intra-abdominal testis often presents a significant therapeutic challenge for the urologist. In some children a standard orchiopexy with mobilization of the testicular vessels can be performed¹. However, in a large number of children the testicular artery is too short for conventional orchiopexy, and an alternative approach is necessary. Options include two-stage orchiopexy^{2,3}, microvascular autotransplantation⁴⁻⁶ and Fowler-Stephens orchiopexy, in which the testis is perfused via a collateral flow through the deferential and cremasteric arteries^{1,7,8}. Although Kogan et al. in their study reported a success rate as high as 89% when

using Fowler-Stephens orchiopexy⁸, other reports have not been as favorable^{1,9}. A failure of Fowler-Stephens orchiopexy may result from inadvertent transection of the collateral arterial supply or vasospasm of the collateral vessels during extensive mobilization of the testis.

Fowler-Stephens orchiopexy can be modified by performing the procedure in two stages. In stage I the testicular artery and vein are ligated without mobilization of the testis via an open¹⁰ or a laparoscopic approach¹¹. Then 6 months later, after the collateral flow through the deferential artery has improved, open or laparoscopic¹²⁻¹⁵ orchiopexy can be done. Preliminary results with this technique have been

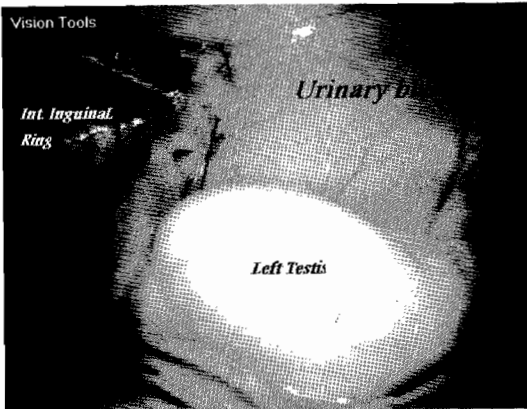


Fig. 1: Laparoscopic view of an intra-abdominal left testis in a 9-year-old child

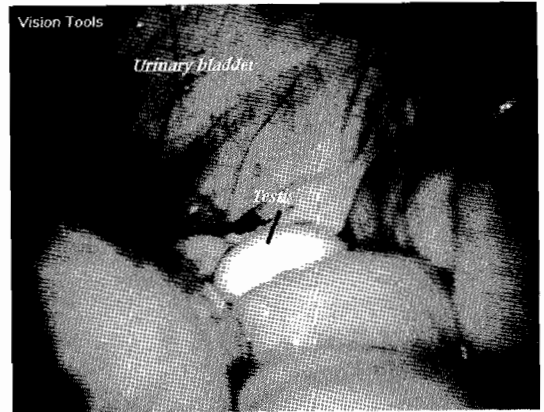


Fig. 2: Laparoscopic view of an intra-abdominal left testis in an 11-year-old child

favourable and seem to be superior to single-stage Fowler-Stephens orchiopexy^{10,13}.

Some authors^{16,17} have demonstrated that testicular scintigraphy can differentiate the non perfused testicle caused by acute torsion from the hyperaemic tissues seen in epididymo-orchitis. Testicular perfusion is assessed both by evaluation of the flow to the testicle on dynamic images and by assessment of the resultant blood pool on the immediate static study. Most authors advocate the use of Tc99m pertechnetate in a dose of 15-20 mci which can be injected as a bolus and remains in the blood pool for the performance of testicular scintigraphy¹⁸.

The aim of this study was to evaluate staged Fowler-Stephens orchiopexy for the high abdominal testis.

PATIENTS AND METHODS

The study included 78 patients with high intra-abdominal testes (Fig. 1, 2) diagnosed laparoscopically at the Urology Department, Assiut University Hospital, Assiut, Egypt between September 1998 and October 2002. Ten cases had bilateral testes and 68 cases had unilateral testes (40 testes were on the left side and 28 were on the right side). The patients' age ranged from 2 to 16 years with a mean age of 9 years.

All patients were subjected to two-stage Fowler-Stephens orchiopexy. The first stage was performed during diagnostic laparoscopy by clipping the spermatic vessels 2-3 cm superior to the testis. The second stage of or-

chiopexy was performed 6 months later either by open surgery (67 cases) or by laparoscopy (11 cases).

Open surgical orchiopexy was done under general anaesthesia. Through a midline suprapubic incision the peritoneum was reached and opened. The testes were explored intraperitoneally, and the spermatic vessels were ligated and divided above the clip. The testis was then mobilized on a wide swath of peritoneum with the vas deferens. An incision was made in the lateral peritoneal reflection, while the peritoneum medial to the testis was left undisturbed. The testis and vas were carefully mobilized and the most direct course through the abdominal wall into the scrotum was selected to place the testis in a subdartos scrotal pouch.

Laparoscopic orchiopexy was done as follows: after visualization of the testis and its clip, two ports were placed, one midway between the umbilicus and the symphysis pubis and the other in the contralateral iliac region. The spermatic vessels were then divided. The testis was mobilized on a broad peritoneal pedicle surrounding the vas deferens preserving the collateral blood supply. A passage for the testis was created over the pubic tubercle by gently guiding the dissecting instrument under direct laparoscopic vision and palpating externally medial to the obliterated umbilical vein and lateral to the bladder edge over the tubercle and to the scrotum. The testis was then fixed in the subdartos pouch.

After the second stage by open surgery, the patients remained in the hospital until removal of the intra-peritoneal drain with an average of

Table 1: Follow-Up Data of 65 Patients

No. of Cases	Position of Testis	TC99m Scintigraphy	
		viable	non-viable
55	scrotal	49 (75.3%)	6 (9.2%)
10	at the neck of the scrotum	10 (15.5%)	

three days with early mobilization. However, after a laparoscopic second stage we did not leave an intraperitoneal drain, and the patients were discharged on the second postoperative day.

Only 65 patients were available for follow up after 6 and 18 months. At each follow-up visit, the patients were clinically examined (position and size of the testis), and the viability of the testis was assessed by Technetium 99m testicular scintigraphy as follows: The patient was in a supine position under a gamma camera, and the window was set on 20% for 140 Kev. Both thighs and the penis were protected by a lead shield. The camera was positioned with its center facing the scrotal region. Then 15 mci of Tc99m pertechnetate were injected intravenously, and dynamic images were taken as image every 10 seconds for 30 minutes, then static images at 500 K counts.

RESULTS

A total of 78 cases had high intra-abdominal testes diagnosed laparoscopically. All cases (68 cases with unilateral abdominal testis and one side of the remaining 10 bilateral cases) underwent laparoscopic clipping of the spermatic vessels as first-stage procedure. No intraoperative complications were encountered, and the patients were discharged after one day in the hospital. The second stage was done after 6 months either by open (67 cases) or laparoscopic orchiopexy (11 cases). There were no intraoperative complications, however, a prolonged ileus developed in 6 cases. The average hospital stay was three days.

Sixty-five patients were available for follow up after 6 and 18 months (Table 1). An examination for the position and size of the testes

revealed that 49 testes were at the bottom of the scrotum and of good size, 6 testes were at the bottom of the scrotum but atrophic and 10 testes were at the neck of the scrotum because of their short vas but of good size. Tc99m testicular scintigraphy done for all cases (6 and 18 months postoperatively revealed a good perfusion in the majority of cases (n=59), while the remaining 6 cases (with the testes located at the bottom of the scrotum) showed no radiotracer accumulation.

DISCUSSION

The early diagnosis and management of undescended testes is mandatory to preserve fertility and improve early detection of testicular malignancy. Observation is not recommended beyond one year of age because it delays treatment, lowers the rate of surgical success and probably impairs spermatogenesis.¹⁹ In this study, the older age of our patients is noteworthy and is likely to represent the referral pattern in our area. We do not recommend waiting until patients are older to perform orchiopexy.

The high division of the spermatic vessels with dissection around the vas deferens as recommended by Fowler and Stephens has a varied success rate with an average atrophy rate of 30%²⁰. The atrophy rate can be reduced to around 10% if this procedure is performed in two stages, where the testicular vessels are divided first, allowing for collateral circulation to develop, and by performing the orchiopexy at a later stage¹⁰.

The modified two-stage Fowler-Stephens procedure entailing laparoscopic clipping of the spermatic vessels as the first stage and performing a delayed open orchiopexy around 6

months after the first stage was first reported by Bloom with results comparable to the two-stage Fowler-Stephens procedure¹³.

Law et al. in their series²¹ performed laparoscopic ligation of the spermatic vessels as stage one on 20 abdominal testes in 18 boys. Stage-two orchiopexy was done using an open technique. Two-stage orchiopexy in 18 boys included a bilateral procedure in two (one asynchronous and one synchronous). One testis with no vas deferens was determined to be non-viable at stage two. The remaining 19 testes (95%) were considered viable at a follow up of 6 months or longer. Viability was based on the testicular size and consistency similar to those of the contralateral testis. Finally, Law et al. concluded that laparoscopic ligation of the spermatic vessels as stage one of the procedure was a natural extension of laparoscopy and that the staged approach provided an adequate viability of the intra-abdominal testes.

We performed 78 two-stage Fowler-Stephens procedures with laparoscopic clipping of the spermatic vessels in the first stage. Six months later, the second stage was performed in the form of open orchiopexy in 67 and laparoscopic orchiopexy in 11 cases. In this study we depended on testicular scintigraphy rather than the measurement of testicular size for the proper assessment of testicular viability. At follow up, 59 testes (75.3%) were considered viable, while only 6 testes (9.2%) were considered non-viable. We agree with Nevarre et al. who concluded that Tc99m pertechnetate scan was the non-invasive test of choice to detect testicular ischaemia²².

Thorup et al.²³ suggested that spermatogonia might survive clipping and division of the spermatic vessels, although the number of spermatogonia per tubular transverse section decreases slightly.

A multi-institutional study for laparoscopic orchiopexy showed that laparoscopic orchiopexy for intra-abdominal testis, both in small and large series, can be expected to have a success rate higher than that historically ascribed to open orchiopexy²⁴. We conclude that laparoscopic clipping of the gonadal vessels is safe in patients with high abdominal testes. The staged approach with preservation of the testicular collateral vascular supply provides an adequate viability of the high abdominal testis with a high success rate. Tc99m testicular scintigraphy allows a proper assessment of the

testicular viability as compared to the measurement of the testicular size only.

REFERENCES

- Gibbons MD, Cromie WH, Duckett JW Jr. Management of the abdominal undescended testicle. *J Urol* 1976, 122:76.
- Steinhardt GF, Kroovand RL, Perlmutter AD. Orchiopexy: planned 2-stage technique. *J Urol* 1985, 133:434.
- Redman JF. The staged orchiopexy: a critical review of the literature. *J Urol* 1977, 117:113.
- Wacksman J, Dinner M, Handler M. Results of testicular autotransplantation using the microvascular technique experience with eight intra-abdominal testes. *J Urol* 1982, 128:1419.
- Harrison CB, Kaplan GW, Scherz HC, Packer MG, Jones J. Microvascular autotransplantation of the intra-abdominal testis. *J Urol* 1990, 144:506.
- Frey P, Bianchi A. Microvascular autotransplantation of intra-abdominal testis. *Prog Ped Surg* 1989, 23:115.
- Fowler R, Stephens FD. The role of testicular vascular anatomy in the salvage of high undescended testes. *Aust New Zeal J Surg* 1959, 29:92.
- Kogan SJ, Houman BZ, Reda EF, Levitt SB. Orchiopexy of the high undescended testis by division of the spermatic vessels: a critical review of 38 selected transactions. *J Urol* 1989, 141:1416.
- Clatworthy HW Jr, Hollenbaugh RS, Grosfield JL. The long-loop vas orchiopexy for the high undescended testis. *Amer Surg* 1972, 38:69.
- Ransley PG, Vordermark AS, Caldamone AA, Bellinger MF. Preliminary ligation of the gonadal vessels prior to orchiopexy for the intra-abdominal testicle: a staged Fowler-Stephens procedure. *World J Urol* 1984, 2:266.
- Bloom DA, Ayers JW, McGuire EJ. The role of laparoscopy in management of nonpalpable testes. *J Urol* 1988, 94:465.
- Jordon GH, Winslow BH. Laparoscopic single stage and staged orchiopexy. *J Urol* 1994, 152:1249.
- Bloom DA. Two-step orchiopexy with pelviscopic clip ligation of the spermatic vessels. *J Urol* 1991, 145:1030.
- Caldamone AA, Amaral JF. Laparoscopic two-stage Fowler-Stephens orchiopexy. *J Urol* 1994, 152:1253.
- Lindgren BW, Darby EC, Faiella L et al. Laparoscopic orchiopexy: procedure of choice for the nonpalpable testis. *J Urol* 1998, 159:2132.
- John E. *Scrotal Scintigraphy*. In: Gottschalk A, Sandler MP, Coleman RE, Patton GA (eds.). Di-

- agnostic Nuclear Medicine*, 4th ed. Moscow, New York: Lippincott Publishers, 2003, pp. 903-912.
17. Zuchier LS. *The genital tract*. In: Sodee B (ed.): *Clinic Molecular Medicine*, 3rd ed., Moscow, New York: Lippincott Publishers, 1995, pp. 800-814.
 18. Kim CK, Zuckier LS, Alavi A. The role of nuclear medicine in the evaluation of the male genital tract. *Semin Roentg* 1993, 28:31.
 19. Froeling FM, Sorber MJ, de la Rosette JJ, de Vries JD. The nonpalpable testis and the changing role of laparoscopy. *Urology* 1994, 43:222.
 20. Snyder HM III, Duckett JW. Orchidopexy with division of spermatic vessels: review of ten years experience. *J Urol* 1984, 131:126A.
 21. Law GS, Perez LM, Joseph DB. Two-stage Fowler-Stephens orchiopexy with laparoscopic clipping of the spermatic vessels. *J Urol* 1997, 158:1205.
 22. Nevarre D, Raezer M. Testicular vascular flow compromise caused by compressive haematocele after lichtenstein hernioplasty. *Hospital Physician* Feb. 1999, p. 49.
 23. Thorup JM, Cortes D, Visfeldt J. Germ cell may survive clipping and division of the spermatic vessels in surgery for intra-abdominal testes. *J Urol* 1999, 162:872.
 24. Baker LA, Docimo SG, Surer I *et al.* A multi-institutional analysis of laparoscopic orchidopexy. *BJ Int* 2001, 87:484.

RESUME

Evaluation de l'Orchidopexie en deux Temps de Fowler-Stephens pour Ectopie Testiculaire Haute Intra-Abdominale

Objectif: Evaluer l'orchidopexie en deux temps de Fowler-Stephens pour ectopie testiculaire haute intra-abdominale. **Patients et Méthodes:** L'étude inclue 78 patients présentant une ectopie testiculaire haute intra-abdominale diagnostiquée par laparoscopie. Leur âge est de 2-16 ans. Tous les cas ont subi une cure en deux temps selon la technique de Fowler-Stephens. La première étape est réalisée pendant la laparoscopie diagnostique en ligaturant l'artère spermaticque interne et la veine 2-3 centimètres en amont du testicule intra-abdominal. Six mois plus tard la deuxième étape de la procédure réalise une orchidopexie à ciel ouvert (67cas) ou une orchiopexie laparoscopique (11 cas). Seulement 65 patients étaient disponibles pour un suivi dans les 6 à 18 mois qui suivent la deuxième étape. A chaque visite du suivi, on note la position du testicule, ses dimensions et la viabilité du testicule étudiée par scintigraphie au Technetium 99 (Tc 99m). **Résultats:** 10 cas avaient des testicules hauts situés intra-abdominaux bilatéraux. La deuxième étape de l'orchiopexie est réalisée à ciel ouvert dans 67 cas et 11 cas par laparoscopie. Aucune complication per ou postopératoire n'a été notée à part d'un iléus prolongé après la deuxième étape chez 6 patients. Pendant le suivi, 49 testicules étaient intra scrotales et de bonnes dimensions, 6 testicules étaient intra scrotales mais atrophiques. Le reste des 10 cas étaient en position scrotale haute et de bonne dimension. Une scintigraphie testiculaire au Tc 99m a été réalisée chez 65 patients. Une bonne perfusion a été détectée chez la majorité d'eux (59 cas) pendant qu'aucune accumulation du radiotracteur n'a été détectée dans le reste (6 cas). **Conclusion:** La ligature laparoscopique des vaisseaux gonadiques est sûre chez les patients présentant une ectopie testiculaire haute intra-abdominale. L'approche en deux temps avec conservation du testicule permet un approvisionnement vasculaire par les collatérales et fournit une viabilité adéquate des testicules intra-abdominaux. La scintigraphie testiculaire au Tc 99m autorise un suivi plus adéquat de la viabilité du testicule comparé à la mesure de la dimension du testicule seul.

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