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Original Article

Laparoscopic one-stage Fowler-Stephens orchiopexy preserving gubernaculum

Gubernakulum korunarak yapılan laparoskopik tek basamaklı Fowler-Stephens orşidopeksi

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ABSTRACT

Objective: To assess gubernaculum-sparing laparoscopic one-stage Fowler-Stephens orchiopexy (FSO), in the management of high intrapelvic testis.

Material and methods: Medical reports of boys who underwent laparoscopic one-stage FSO were retrospectively reviewed. High intrapelvic testis was defined as testis ≥3 cm away from ipsilateral internal ring. Testes were evaluated on physical examination at 3rd, 6th and 18th months after surgery. Children were evaluated as for their demographic data, operative findings, interventional details and outcomes.

Results: Seven patients met inclusion criteria of the study. Six of 7 testis were small and had abnormal appearance, compared with the contralateral testis. Average distance of the testes from the internal ring was 4.2±1.1 cm (3 to 6). Average age at surgery was 6.1±4.2 years (2 to 12). Average follow-up period was 14±5.8 months (8 to 20), and 5 testis (71.4%) were considered to be normal in volume and scrotal location. Two testes were relatively atrophic and underwent orchiectomy.

Conclusion: Our preliminary results shows a good testicular survival rate for one-stage laparoscopic FSO. Sparing collateral vasculature of the gubernaculum is important.

Keywords: Laparoscopy; male; orchiopexy; testis; urologic surgical procedures.

ÖZ

Amaç: İntrapelvik yüksek yerleşimli testislerin yönetiminde gubernakulum damarları koruyarak yapılan laparoskopik tek basamaklı Fowler-Stephens orşidopeksi (FSO) ameliyatını değerlendirmek.

Gereç ve yöntemler: Laparoskopik tek basamaklı FSO uygulanan çocukların tıbbi kayıtları tarandı. Aynı taraf internal ringden ≥3 cm olan testisler yüksek intrapelvik testis olarak tanımlandı. Ameliyattan 3, 6 ve 18 ay sonra testis fizik inceleme ile değerlendirildi. Çocukların demografik verileri, ameliyat bulguları, girişim ayrıntıları ve sonuçları kaydedildi.

Bulgular: Çalışmanın kriterlerini 7 hasta karşılıyordu. Yedi testisten altısı küçük ve anormal görünümlü idi. Testislerin iç halkadan uzaklığı ortalama 4±1,15 cm (3 to 6) idi. Ameliyat sırasında yaş ortalaması 6,14±4,2 yaş (2-12) idi. Ortalama takip zamanı 14±5,8 ay (8-20) idi; 5 testis (%71,4) skrotumda ve normal hacimde bulundu; iki testise ise atrofik olması nedeniyle orşiektomi yapıldı.

Sonuç: Erken dönem sonuçlarımız, laparoskopik tek basamaklı FSO ameliyatında testiküler canlılık oranının iyi olduğunu ve gubernakulum kollateral dolaşımının korunmasının önemini göstermektedir.

Anahtar Kelimeler: Laparoskopi; erkek; orşidopeksi; testis; urolojik cerrahi işlem.

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Introduction

The management of high intrapelvic testis is a challenging issue in pediatric urology. In the majority of the cases, length of testicular vessels restricts the testis being brought down into the scrotum. The previous attempts by division of testicular vessels to gain length had high testicular atrophy rates. However, the key stone for this technique was in 1959 when Fowler and Stephens[1] revised the vascular anatomy and divided testicular vessels high from the testis to maintain collateral blood supply, then in 1976 Cortesi et al.[2] described laparoscopy as a diagnostic tool for impalpable testis. Since then, various contributions have been made to achieve good results in the management of high intrapelvic testis.

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The Fowler-Stephens orchiopexy (FSO) is a standard technique for the management of high intrapelvic testis. The technique was originally a one-stage procedure. In 1984, Ransley et al.[3] introduced the two-stage procedure, anticipating development of collateral blood supply after dividing the testicular vessels. Today, FSO is performed either one- or two-stage procedures. A recent meta-analysis evaluating this issue interpreted that both techniques had quite high success rates up to 80% for one-stage and 85% for two-stage FSO.[4] Stec et al.[5] performed one-stage FSO in 27 testes and 2-stage FSO in 37 with success rates of 63.0 and 67.6%, respectively. It would be the preference of the parents as well as the surgeons to elect for one-stage procedure if the results have been indeed comparable. One-stage procedure would prevent repeat anesthesia and extensive dissection that may be needed during the next operation.

The key points leading to success for one-stage FSO is using the advantage of laparoscopy; understanding vascular anatomy of gonadal tissue, and surgical technique. In the management of high intrapelvic testis, we describe a modification of laparoscopic one-stage FSO, in which gubernaculum is preserved and testis is brought down through the internal ring.

Material and methods

From August 2008 to June 2011 patients who underwent laparoscopic one-stage FSO for high intrapelvic testis at the department of pediatric surgery, were screened. Approval of Clinical Research Ethics Committee and informed consent from patients were obtained. High intrapelvic testis was defined as the testis situated ≥3 cm proximal to ithe ipsilateral internal ring. Testicular morphology was evaluated by inspection and/or palpation, and compared with the contralateral testis. Medical records were retrospectively reviewed for demographic data, operative findings, intervention details and follow-up.

All patients were re-examined under anesthesia. If the testis was still impalpable, we proceeded to laparoscopy. The laparoscopic procedure was performed with the patient in the Trendelenburg position. Using the Hasson technique, a 5 mm camera port (Storz®, Tuttlingen, Germany) was introduced into umbilicus, and a telescope with a 30-degree lens (Storz®, Tuttlingen, Germany) was inserted for inspection. If the testis was identified, 2 additional 5-mm working ports were inserted in the right and left lower abdominal quadrant for further exploration. The morphology and location of the testis, testicular vessels and vas deferens were identified. The distance of the testis from the internal ring was measured with a graduated probe. High intrapelvic testis was defined as testis situated ≥3 cm proximal to the ipsilateral internal ring. Laparoscopically, peritoneum was cut lateral to testicular vessels, and incision was extended firstly upwards including the border of internal ring, and encircling testis and epididymis; then medially along vas deferens extending close to the bladder, with 1 cm border of peritoneum on either side (Figure 1). This peritoneal triangle provided collateral blood supply for testis after dividing the testicular vessels. Handling the tissues gently and refraining from manipulating the vas deferens, epididymis and testis throughout the procedure were emphasized. Our study protocol was the same as indicated in the literature. If the testis could not reach the scrotum we proceeded with the FSO. Testicular vessels were clipped and cut as high as possible. A standard groin incision was made and the external oblique aponeurosis was incised. The deferential and cremasteric vessels were preserved along with the gubernaculum and testis was taken down through the internal ring. No attempt was made to close the internal ring. Testis was fixed in a subdartos pouch.

Follow-up consisted of physical examination at 3rd, 6th and 18th months after surgery. On examination, patients were carefully examined and the size and position of the testis were described. Procedural success was defined as intrascrotal placement of normal sized testis.

Statistical analysis

Testicular distance to internal inguinal ring, age at surgery and follow up were evaluated with descriptive analysis.

Results

In total, 64 diagnostic laparoscopies were performed for impalpable testes, which were bilateral interventions in 12 cases. Laparoscopy revealed blind ending vas and vessels in 8, their entry into internal ring in 47; and intra-abdominal testis in 21 cases. Seven testes were defined as high intrapelvic testis. 6 of 7 testes were small and had abnormal appearance compared with the contralateral testes. The distance of the testis from the internal ring ranged between 3, and 6 cm (mean 4.2±1.1). The

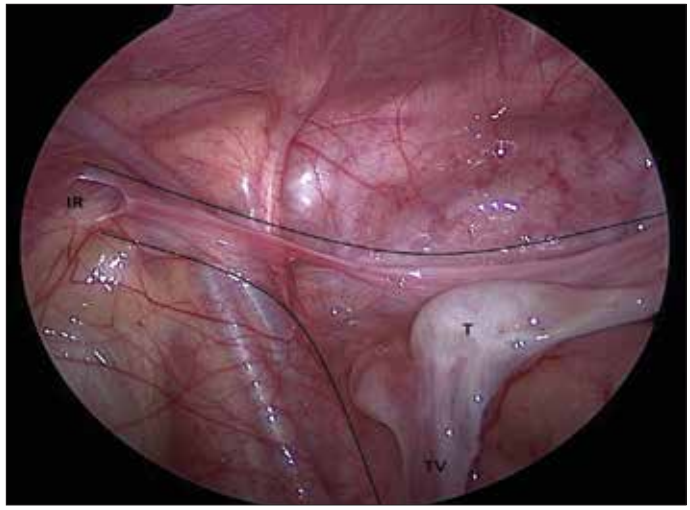

Figure 1. High intrapelvic testis
Peritoneal incision (Black line). T: testis; TV: testicular vessels; IR: internal ring

patients underwent laparoscopic one-stage FSO. Age at surgery varied between 2, and 12 years (mean 6.1±4.2). Follow-up period changed between 8, and 20 months (mean 14±5.8). On follow-up, in 3 patients normal-sized testes were well positioned in the scrotum. Testicular retraction and an acceptably high scrotal position could be achieved in one patient; and in another patient who underwent redo orchiopexy testis was in inguinal canal. Testicular atrophy was found in 2 patients, leading to orchiectomy. There were no complications during or after surgery (Table 1).

Discussion

In the management of high intrapelvic testis, laparoscopic one-stage FSO and preservation of the gubernaculum is the preferred technique in our clinic providing a good testis survival rate of 71.4%.

The key to success in the management of high intrapelvic testis relies basically on understanding testicular blood supply. The testis becomes more dependent on collateral blood supply after division of testicular artery. Pascual et al.[6] showed in an experimental 133- xenon washout technique that testicular blood flow reduced up to 80% after division of the artery, yet returned to normal levels 30 days later. The testis has collateral blood supply from vas deferens artery, an internal iliac artery branch of inferior vesical artery, and cremasteric artery which is an external iliac artery branch via inferior epigastric artery. To support collateral blood supply, a wide peritoneal triangle should be prepared during mobilization of vas deferens, epididymis and testis, and attention should be paid throughout the procedure to avoid handling these tissues. A very delicate and sharp dissection should be carried out. The benefit of high definition laparoscopy is that it provides a clear image and magnification during dissection. The gubernaculum has an excellent blood supply.[7] If the plan is to proceed with one-stage FSO, then the gubernaculum should be preserved for additional collateral blood supply. The testis may then travel more distally compared with cutting the gubernaculum and creating a more direct course medial to the inferior epigastric vessels. However, the priority is to preserve the gubernaculum and support the dense network of vessels around the gubernaculum and vas deferens. In our study, descending the testis through the internal ring did not cause tension on the testicular pedicle in any case, and/or indirect inguinal hernia did not developed during follow-up.

In the literature a wide spectrum of testicular survival rates for one-stage laparoscopic FSO ranging from 43% up to 100% have been reported (Table 2).[8-12] Robertson et al.[13] and Mahomed et al.[14] reported 86% (18 of 21 testis); and 100% (18 of 18 testis) testicular survival rates, respectively for two-stage gubernaculum-sparing laparoscopic FSO procedures resembling our technique. Our success rate for laparoscopic one-stage FSO was 71.1%. Despite our small sampling size, the relatively low success rate can be attributed to the testicular morphology and location. Indeed in our series, the majority of the testes were small and had abnormal appearance, compared with the contralateral testis, and the distance of the testis from the internal ring. was more than 3 cm. On

Table 1. Demographic data, peri-, and postoperative findings

No.	Age at surgery	Laterality	Testicular morphology	Distance to internal inguinal ring	Operative time	Testicular outcome on Follow-up	Patient Follow-up
1	2 years	Left	Small, abnormal appearance	4 cm	80 minutes	Testicular atrophy, orchiectomy	8 months
2	2 years	Right	Small, abnormal appearance	3 cm	90 minutes	High-scrotal position and normal size	17 months
3	4 years	Right	Small, abnormal appearance	3 cm	90 minutes	Testicular atrophy, orchiectomy	9 months
4	5 years	Left	Small, abnormal appearance	5 cm	50 minutes	Scrotal position and normal size	20 months
5	6 years	Left	Normal size and appearance	6 cm	75 minutes	Scrotal position and normal size	8 months
6	12 years	Right	Small, abnormal appearance	4 cm	100 minutes	Redo-orchiopexy	18 months
7	12 years	Left	Small, abnormal appearance	3 cm	70 minutes	Scrotal position and normal size	18 months

Table 2. Outcomes of some one-stage laparoscopic Fowler-Stephens orchiopexies cited in the literature

Literature	Testicular location and morphology	Gubernaculum spared	Testicular viability	Follow-up; 6 months
Lindgren et al.[11]	No comment on intrapelvic location and morphology	None	11 /11 (100%)	All
Park et al.[9]	No comment on intrapelvic location and morphology	None	6 /10 (60%)	All
Singh et al.[12]	Low intrapelvic; no comment on morphology	None	3 / 3 (100%)	?
Abbas et al.[10]	Low intrapelvic; no comment on morphology	None	1/ 7 (14.5%)	5 patients missing
In our study	High intrapelvic; 6 / 7 testes had abnormal appearance	All	5 / 7 (70%)	All

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the contrary, in the series of Robertson et al.[13], only 5 of the 18 testes in their series were mentioned to be small with abnormal appearance; and only 5 of the 18 testes were in a high intrapelvic position. In the series of Mahomed et al.[14] no commend was made on testicular morphology or intrapelvic location of testes. In our unit, we recommend orchiopexy for impalpable testis before the age of 12 months. However, because of late presentation and/or referrals, the mean age at surgery was 6.1±4.2 years (range 2-12). This may explain the high rate of small and abnormal appearance of the testes, compared with the contralateral testes and also the relatively low success rate.

In conclusion, in the management of high intrapelvic testis, the initial result of laparoscopic one-stage FSO is encouraging. Sparing gubernacular as well as cremasteric and the deferential vasculature may improve testicular survival rates. Moreover, one-stage procedure prevents repeat anesthesia and extensive dissection that may be needed during the next operation.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Mersin University School of Medicine.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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