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Five mm laparoscopic varicocelectomy versus conventional varicocele ligation in young men with symptomatic varicocele: A randomized clinical study

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KEYWORDS

Laparoscopic varicocelectomy;
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Abstract

Objectives: To compare the therapeutic success, morbidity and the costs of 5 mm laparoscopic varicocele ligation (LV) compared to inguinal varicocelectomy (IV).

Patients and methods: Eighty patients with idiopathic symptomatic varicocele of grades I–III diagnosed by clinical examination and Doppler ultrasonography were randomly assigned to LV or IV (40 patients in each group). The mean patient age was 25.2 ± 1.4 (range 18–40) years. Of the 80 patients treated 21.3% had a left-sided varicocele, 70% had bilateral varicoceles and 8.8% a right-sided varicocele. Of 136 varicoceles, 37 (27.2%) were grade III, 51 (37.5%) grade II and 48 (35.3%) were grade I. The indications for varicocele ligation were: abnormal spermiogram in 47 patients (58.7%), scrotal pain in 19 (23.8%) and cosmetic impairment in 14 (17.5%). A total of 136 varicocele ligations were performed (67 IV and 69 LV). All patients were followed up for 4–8 months to assess early complications, testicular size, late complications and persistence or recurrence of the varicocele.

Results: LV was associated with shorter operative time, shorter hospital stay and lower cost compared to IV. The overall incidence of postoperative complications including hydrocele, epididymitis and local pain was significantly higher among patients undergoing IV compared with LV (17.5% vs 5%). The incidence

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of persistent varicoceles was not significantly different between the 2 groups, but the varicocele recurrence rate was significantly lower in the LV compared to the IV group (5% vs. 17.5%, $p \leq 0.02$).

Conclusions: LV is a less invasive treatment than IV for managing male varicoceles. It is also associated with lower costs and better outcomes and should therefore be the preferred method of treatment for male varicoceles.

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Introduction

A varicocele is a collection of dilated veins in the pampiniform plexus that drains the testicles and is located in the upper scrotum just above the affected testis. Varicocele is the most common correctable cause of male infertility [1]. The enlargement of veins affects the testicular blood circulation and it is certainly not necessary to have a varicocele on both sides to affect both testicles [2]. A varicocele is found in approximately one sixth of the male population and in 40% of infertile men [1]. Surgical treatment of a varicocele aims at interrupting the venous reflux within the spermatic veins and may be performed using open surgery, laparoscopic surgery or the injection of sclerosing materials [2].

Despite extensive information being available on varicoceles and many studies on different surgical solutions, the ideal method of varicocele ligation is still a matter of controversy [3]. The Palomo technique is associated with a relatively high incidence of post-operative discomfort [4] and for this reason the modified Palomo procedure is often preferred [5]. Ivanisovich described a procedure where the testicular vein is tied at the inguinal ring and the testicular artery is spared [5]. The ideal technique would have low recurrence and complication rates [3].

In recent years laparoscopic varicocele ligation (LV) has been popularized and has gained growing acceptance among urologists [6]. Both LV and inguinal varicocelectomy (IV) have shown to be effective in many studies. However, inconsistent results and insufficient comparative data regarding morbidity, cost and failure rates, make it difficult to determine which of these techniques should be the treatment of choice [7]. To date, few prospectively randomized studies comparing LV and IV have been published. This prompted us to initiate a prospective analysis of the outcome, cost and complications of LV and IV in our institution. The aim of this study was to compare the therapeutic success, morbidity and costs of these two treatment modalities in 80 patients treated for varicoceles in our department.

Patients and methods

Patient data

From June 2009 to March 2011 we prospectively evaluated 80 patients with idiopathic symptomatic varicoceles of grades I–III according to the Dubin grading system. The mean patient age was 25.2 ± 1.4 (range 18–40) years. The diagnosis of a varicocele was based on clinical examination, Doppler ultrasonography of the varicocele and abdominal ultrasonography to rule out a kidney tumour as the cause of the varicocele. Of the 80 patients treated 17 (21.3%) had a left-sided varicocele, 56 (70%) had bilateral varicoceles and 7 (8.8%) had a right-sided varicocele. Of all 136 varicoceles, 37 (27.2%) were grade III, 51 (37.5%) were grade II and 48 (35.3%)

were grade I. The indications for varicocele ligation were as follows: abnormal spermogram in 47 patients (58.7%), scrotal pain in 19 (23.8%) and cosmetic issues due to a large varicocele in 14 patients (17.5%).

Surgical procedures

Patients were randomly assigned (using randomization software) to two treatment groups: 40 underwent open inguinal varicocelectomy (IV) and 40 had laparoscopic varicocelectomy (LV). A total of 136 varicocele ligation procedures were performed: 67 inguinal varicocelectomies in 40 patients and 69 laparoscopic varicocele ligations in 40 patients. LV was performed under general anaesthesia using three 5 mm ports.

The optical trocar was placed in the subumbilical position and working ports were placed in the right and left midclavicular line, 1–2 cm below the horizontal line to the umbilicus. The spermatic veins and artery were individually identified and the veins were clipped and divided with preservation of the artery.

Follow-up data

All patients were observed for the presence of complications in the early postoperative period. Treatment outcome was assessed at two time points (3 and 6 months postoperatively) by both physical examination and Doppler ultrasonography in all patients to assess testicular size, the presence of late complications and persistence or recurrence of the varicocele.

Statistical analysis

Statistical analysis was performed using SPSS v.19.0 software (Statistical Package for Social Sciences, SPSS, Chicago, IL, USA). Comparison of the incidence of varicocele recurrence and complications in the two groups was performed using the Chi-square test, Paired *T* test and the Mann–Whitney *U*-test. Unifactorial analysis of variance (ANOVA) was used for the analysis of continuous variables. A *p*-value of ≤ 0.05 was considered statistically significant.

Results

The mean patient age at the time of operation was 25.2 ± 1.4 years (range 18–40). Median follow-up was 6 months (range 4–8). LV was associated with shorter operative time and hospital stay, as well as lower cost compared to IV (Table 1). There were no statistically significant differences between the LV and IV groups with regard to mean age, grade of varicocele or side of varicocele ligation (Table 1). The mean operative time for LV was significantly less than that of

Table 1 Laparoscopic varicocelectomy (LV) compared to inguinal varicocelectomy (IV).

	LV	IV	<i>p</i> -Value
Total no. of patients	40	40	
Operative time (min)			
Bilateral ligation	21.6 ± 5.3	32.4 ± 8.5	0.05
Unilateral ligation	14.7 ± 3.6	15.8 ± 6.4	NS
Hospital stay (h)	9.3 ± 1.2	30.1 ± 6.2	0.04
Cost (SAR)	1100 ± 89	1600 ± 114	0.02
Age (years)	24.9 ± 1.8	26.1 ± 0.9	NS
Right side	3 (3.8%)	4 (5%)	NS
Left side	8 (10%)	9 (11.3%)	NS
Bilateral	29 (36.3%)	27 (33.8%)	NS
Grade I	25 (18.3%)	23 (16.9%)	NS
Grade II	27 (19.8%)	24 (17.6%)	NS
Grade III	17 (12.6%)	20 (14.8%)	NS

SAR = Saudi riyals; (±) standard deviation.

IV in bilateral, but not in unilateral varicocele ligation. The mean hospital stay was significantly shorter and the cost was significantly greater in the LV compared with the IV group (Table 1).

No major intraoperative complications occurred. Testicular atrophy, genitofemoral nerve damage or incisional hernia did not occur in any patient. At 3 months follow-up the overall incidence of postoperative complications including hydrocele, epididymitis and local pain was significantly higher among patients undergoing IV compared to LV (Table 2).

Minor bleeding from the inferior epigastric vessels was reported during LV in one patient. This was easily controlled and no conversion or blood transfusion was required. Hydroceles occurred significantly more often in patients after IV compared to LV (17.5% vs. 5%, $p \leq 0.05$). Four of the 7 postoperative hydroceles in the IV group required surgical treatment.

The incidence of persistent varicoceles was not significantly different after LV compared with IV, but the varicocele recurrence rate was significantly lower in the LV compared to the IV group (Table 2). Of the 6 patients with recurrence, *r* were re-treated using

Table 2 Complications of laparoscopic varicocelectomy (LV) and inguinal varicocelectomy (IV).

	LV	IV	<i>p</i> -Value
Total no. of patients	40	40	
Overall complications	8 (10%)	14 (17.5%)	NS
Inferior epigastric bleeding	1 (2.5%)	0	NS
Hydrocele	2 (5%)	7 (17.5%)	0.01
Epididymo-orchitis	1 (2.5%)	2 (5%)	NS
Prolonged pain	1 (2.5%)	2 (5%)	NS
Haematoma	0	1 (2.5%)	NS
Wound complications	0	1 (2.5%)	NS
Subcutaneous emphysema	1 (2.5%)	0	NS
Pneumoscrotum	1 (2.5%)	0	NS
Persistence of varicocele	4 (10%)	6 (15%)	0.5
Recurrence			0.02
Grade I	0	1 (2.5%)	
Grade II	0	2 (5%)	
Grade III	2 (5%)	4 (10%)	

LV. The recurrence rate increased progressively with the increase of varicocele size preoperatively (Table 2).

Discussion

Varicoceles are found in about 15% of the male population, in 35% of men with primary infertility and up to 80% of men with secondary infertility [8]. The goal of surgical treatment is to correct the retrograde blood flow in the internal spermatic vein, which can be accomplished by various techniques. In addition to the traditional open surgery, minimally invasive and laparoscopic techniques were established in the last years [7]. We analyzed the therapeutic success, morbidity and costs associated with these two techniques in 80 patients. Ficarra et al. [2], have shown that for both procedures, operative times can be reduced to approximately 15 min in the hands of experienced surgeons. In our series, the operative time for LV was 14.7 min in unilateral and 21.6 min in bilateral cases, and for IV it was 15.8 min in unilateral and 32.4 min in bilateral cases. Koyle et al. [9], demonstrated that LV, like IV, can be performed as an outpatient procedure, whereas in this study the patients left our department within 9.3 h after LV and 30.1 h after IV. With the rapidly increasing costs of public health, the lower cost of LV compared with IV in our study is an important advantage. In our series, the only disposable articles for LV were the PDS clips.

Serious intraoperative complications were not observed in our study. Misseri et al. [10] concluded that lymphatic sparing varicocelectomy should be used to decrease the incidence of postoperative hydrocele. Microsurgical subinguinal varicocele ligation has emerged as a modification that dramatically reduces hydrocele formation while offering high success rates [11] with 14% varicocele recurrence [7]. The laparoscopic approach may facilitate the identification and sparing of the lymphatics [12] which is believed to decrease the incidence of postoperative hydroceles [13]. In our patient population, the data confirm the significant reduction in the rate of postoperative hydrocele formation after LV (5%) compared to IV (17.5%). From the recurrence point of view, Parrott and Hewatt [14], in a retrospective long-term study, concluded that total ligation of the spermatic vein and artery in the modified Palomo approach is effective and safe with a significantly lower rate of recurrence. In this study, both procedures yielded comparable success rates, but complications and costs associated with IV were higher. We therefore concluded that LV should represent the preferred procedure for the treatment of varicoceles. While the prospective randomized design of this study was an advantage, patient numbers were small and the follow up relatively short. The number of patients treated certainly has an effect on the cost: the more patients treated, the lower the costs of laparoscopic treatment may be in the long run.

Conclusions

Our prospective randomized study confirmed the high success rate and low complication rate of LV compared with IV. The technique is effective, safe, minimally invasive, and cost effective.

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