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ORIGINAL PAPER

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The efficacy of bilateral varicocelectomy in patients with palpable bilateral varicoceles: comparative study with unilateral varicocele

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Abstract To determine whether the beneficial effect of bilateral varicocelectomy for bilateral varicoceles is similar to that of unilateral varicocelectomy for unilateral varicoceles, we compared the effect of varicocelectomy in men with unilateral and bilateral palpable varicoceles. Seventy-five men with unilateral varicocele and 34 with bilateral varicoceles were included in this study. Serum concentrations of follicle-stimulating hormone (FSH), luteinizing hormone (LH), testosterone, prolactin, and estradiol were measured in morning blood specimens. Unilateral varicocelectomy was performed for unilateral and bilateral varicocelectomy for bilateral varicoceles using a microsurgical technique. The seminogram was determined every 3 months for up to 18 months. There were no significant differences in the change in the sperm concentration between the unilateral and bilateral groups. Sperm concentration before surgery in unilateral and bilateral group was $8.0 \pm 5.0 \times 10^6$/ml and $8.1 \pm 4.9 \times 10^6$/ml, respectively. Eighteen months after surgery, the sperm concentration significantly increased to $23.4 \pm 15.8 \times 10^6$/ml and $26.9 \pm 24.6 \times 10^6$/ml in unilateral and bilateral group, respectively. Preoperative motility in the unilateral and bilateral group was $38.9 \pm 15.2\%$ and $39.6 \pm 15.7\%$, respectively. Eighteen months after operation, sperm motility had increased and was similar in the two groups, $43.1 \pm 19.2\%$ and $45.4 \pm 17.6\%$. Sperm morphology was unaffected by surgery in either group. Improvement in the seminogram of patients following bilateral varicocelectomy was comparable to that in patients with unilateral varicocelectomy. Bilateral repair for bilateral varicocelectomies is justified for patients who desire improved spermatogenesis.

Keywords Bilateral varicocele testis · Varicocelectomy · Spermatogenesis

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Introduction

Varicocelectomy improves seminal characteristics and increases pregnancy rates [1]. Attempts to define patient subgroups most likely to benefit from varicocelectomy are worthwhile, but such studies have been limited by the heterogeneity of varicoceles and the lack of control subjects. Some authors have recommended varicocelectomy based upon size of the varicocele [2, 3], size of the testis [4], preoperative sperm concentration [5], and provocative endocrine testing [6]. Scherr et al. [7] suggested that even a small, unrepaired, palpable right varicocele after left varicocelectomy has a detrimental effect on bilateral testis function. Bilateral varicocele may have a greater deleterious effect on spermatogenesis than a unilateral one, and they recommended that men with bilateral palpable varicoceles undergo bilateral repair.

Our question was whether the effect of bilateral varicocelectomy in the patient with bilateral varicoceles is similar to that of unilateral varicocelectomy in the patient with unilateral disease. In this study, we compared the effect of varicocelectomy in men with unilateral palpable varicocele vs bilateral palpable varicoceles.

Patients and methods

All 109 patients, including 75 men with unilateral varicocele and 34 with bilateral varicoceles, were referred for infertility evaluation. Semen analysis was performed at least three times preoperatively after collection by masturbation following a 5-day abstinence period. All specimens were analyzed within 1 h of collection to

determine the volume of ejaculate, sperm count, and the percent motility using a Makler chamber (Sefi Medical. Industries, Ltd., Haifa, Israel) according to the guideline of the World Health Organization [8]. Patients with azoospermia in all three specimens were excluded from study. Serum concentrations of follicle-stimulating hormone (FSH), luteinizing hormone (LH), testosterone, prolactin, and estradiol were examined in morning blood specimens. Varicoceles were graded by physical examination in a warm room with the patient standing, using the guidelines of the World Health Organization [8]. Grade I is assigned when there is no visible or palpable distention except when the man performs the Valsalva maneuver. Grade II is designated when intrascrotal venous distention is easily palpable but not visible. Grade III is assigned when the distended venous plexus bulges visibly through the scrotal skin and is easily palpable. The numbers of patients with unilateral varicocele grades I, II and III and bilateral varicoceles are listed in Table 1. Unilateral varicocelectomy was performed for unilateral and bilateral varicocelectomy for bilateral varicoceles using a microsurgical technique [9]. Patients were followed every 3 months for more than 6 months for the assessment of semen and the recurrence. The seminogram was assessed for up to 18 months. The mean follow-up time of unilateral and bilateral group was 10.6 ± 4.2 months (mean $\pm$ S.D.) and 10.5 ± 5.0 months, respectively.

Statistical comparison of clinical parameters between unilateral and bilateral varicocele was performed by analysis of variance (ANOVA) followed by Scheffe multiple comparison testing, or where appropriate by an unpaired Student *t* test. *P* values less than 0.05 indicated significance.

Results

Characteristics of patients with unilateral left varicocele and bilateral varicoceles are listed in Table 1. No intergroup differences were observed in terms of age, duration of sterility, bilateral testicular volume, or the serum concentrations of FSH, LH, testosterone, and estradiol.

Sperm concentration increased similarly in both groups from 3 to 18 months. There was no difference in sperm concentration between the unilateral and bilateral groups. Sperm concentration before surgery in the unilateral and bilateral groups was $8.0 \pm 5.0 \times 10^6$/ml and $8.1 \pm 4.9 \times 10^6$/ml (mean $\pm$ SD), respectively. Eighteen months after surgery, sperm concentration significantly increased to $23.4 \pm 15.8 \times 10^6$/ml and $26.9 \pm 24.6 \times 10^6$/ml in the unilateral and bilateral groups, respectively ($p < 0.05$; Fig. 1). Sperm motility in both groups also increased for up to 18 months. Preoperative motility in the unilateral and bilateral groups was $38.9 \pm 15.2\%$ and $39.6 \pm 15.7\%$, respectively. Eighteen months after surgery, sperm motility improved and was similar in both groups ($43.1 \pm 19.2\%$ and $45.4 \pm 17.6\%$, respectively) (Fig. 2). No significant differences in preoperative sperm motility were observed between two groups. Sperm morphology in both groups did not change after the operation. When the patients with unilateral and bilateral varicocele were divided into three groups according to left varicocele grade, no significant differences in the improvement of sperm concentration and motility between two groups in grades I, II and III were observed (Table 2).

Table 1 Patient characteristics

	Unilateral varicocele ($n = 75$)	Bilateral varicocele ($n = 34$)
Age	33.8 ± 4.7	32.7 ± 4.5
Duration of sterility (months)	38.2 ± 26.7	39.0 ± 40.0
Testicular volume (ml)		
Rt	17.6 ± 5.1	17.9 ± 4.3
Lt	16.5 ± 4.3	17 ± 3.9
Varicocele grade		
I	22	3
II	27	13
III	26	18
Hormone		
FSH (mIU/ml)	8.4 ± 6.7	7.1 ± 3.7
LH (mIU/ml)	4.7 ± 3.1	4.3 ± 2.2
Testosterone (ng/ml)	9.7 ± 6.7	9.3 ± 3.6
Prolactine (ng/ml)	27.5 ± 11.7	26.3 ± 6.5
Estradiol (pg/ml)	5.0 ± 1.9	6.0 ± 7.7

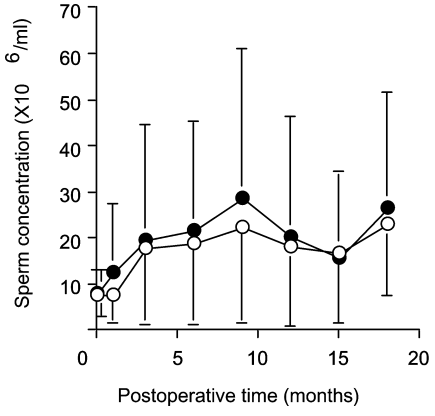

Fig. 1 The change in sperm concentration after varicocelectomy. The *bars* indicate standard deviation. ○ unilateral varicocele; ● bilateral varicocele

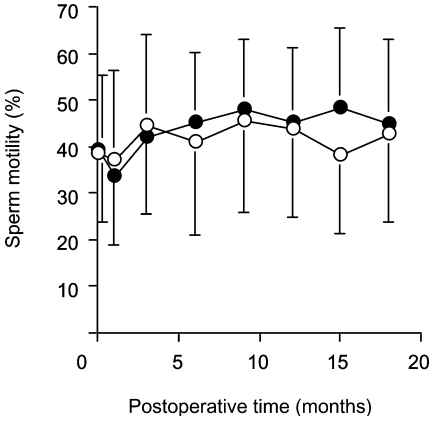

Fig. 2 The change in sperm motility after varicocelectomy. The *bars* indicate standard deviation. ○ unilateral varicocele; ● bilateral varicocele

Table 2 The change of seminogram after varicocelectomy according to the varicocele grade

	Preoperative	12 months
Unilateral		
LI	9.5 ± 5.5	22.7 ± 16.8
LII	7.5 ± 4.3	25.9 ± 22.4
LIII	7.1 ± 5.3	17.9 ± 6.5
Bilateral		
LI	6.8 ± 5.5	12.7 ± 8.1
LII	8.9 ± 4.8	17.4 ± 11.4
LIII	7.8 ± 5.2	22.0 ± 31.3

Patients with bilateral varicocele were divided into three groups according to the grade of left varicocele in both unilateral and bilateral varicocele.*LI* left varicocele grade I; *LII* left varicocele grade II; *LIII*, left varicocele grade III.

Discussion

Surgical repair for varicocele testis is the current standard of care [10, 11]. Numerous studies have linked the presence of varicoceles with infertility, and varicoceles remain the most common treatable cause of male factor infertility. Although the exact pathophysiology responsible for the deleterious effects of varicoceles is likely to prove multifactorial and still is not well understood, little controversy exists regarding the improvement in semen quality following varicocelectomy.

The treatment of the patient with bilateral varicoceles has been less well studied. In patients with bilateral palpable varicoceles, consisting of a large to moderate left varicocele with a small right varicocele, it is uncertain how much additional benefit is derived from repairing the right varicocele. Grasso et al. [12] reported that the ligation of only the left spermatic vein is adequate for patients with a large left varicocele and small right varicocele. Our approach to bilateral varicoceles is bilateral spermatic vein ligation, as Scherr et al. [7] suggested. Bilateral varicocele may have an even greater deleterious effect on the testis than a unilateral varicocele.

In our study, the improvement in the seminogram was comparable for unilateral and bilateral disease. Pathological and biochemical analysis has shown clearly that the unilateral varicocele induces irreversibly deleterious effects on testicular function [3, 13]. Therefore, we hypothesized that the improvement in bilateral group would be worse than that in the unilateral group. However, our results showed that the improvement in the bilateral group was similar to that in the unilateral group. Scherr et al. [7] demonstrated that maximal improvement in semen parameters is achieved by a bilateral repair in patients with a grade I, palpable right varicocele associated with a grade II to III left varicocele and concluded that a palpable right varicocele associated with a large or moderate left varicocele should be repaired for maximal improvement in semen parameters. Unfortunately, in our study, the number of patients with bilateral varicoceles was too small to analyze the outcome according to the varicocele grade.

We conclude that bilateral repair for bilateral varicocelectomy is beneficial for patients who desire improved spermatogenesis.

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