

Comparison of response to treatment of unilateral and bilateral varicocele surgery

Ercan ÖĞREDEN^{1*}, Ural OĞUZ¹, Abdullah ÇIRAKOĞLU², Erhan DEMİRELLİ¹, Erdal BENLİ², Orhan YALÇIN¹

¹Department of Urology, Faculty of Medicine, Giresun University, Giresun, Turkey

²Department of Urology, Faculty of Medicine, Ordu University, Ordu, Turkey

Received: 11.11.2015 • Accepted/Published Online: 23.05.2016 • Final Version: 27.02.2017

Background/aim: We aimed to compare the results of unilateral and bilateral varicocele surgery.

Materials and methods: In two referral hospitals, the data of 180 patients who were treated with unilateral and bilateral microscopic varicocele surgery were retrospectively analyzed. Sperm parameters and spontaneous pregnancy rates were compared in patients who underwent bilateral and unilateral microscopic varicocele surgery.

Results: The mean age was 29.6 (17–46) years. While 82 patients underwent unilateral varicocele surgery (Group I), 98 patients underwent bilaterally varicocele surgery (Group II). Forty (48.8%) spontaneous pregnancies occurred in Group I and 59 (60.2%) in Group II. When we analyzed sperm parameters, the rate of increase in the number of sperm in spermograms was 17% in Group I and 27.5% in Group II. The rate of increase in sperm motility was 58.5% and 50% in Group I and II, respectively. The improvement rate in sperm morphology was 46.3% in Group I and 56.1% in Group II. There were no significant differences between all these parameters.

Conclusion: In light of our results, although pregnancy rates seemed to be higher in patients who underwent bilateral varicocele surgery, these results were not statistically significant. Improvement rates in sperm parameters were similar between the patients who underwent unilateral and bilateral varicocele surgery.

Key words: Side varicocele surgery, spermogram parameter, spontaneous pregnancy

1. Introduction

Varicocele is the most common cause of correctable male infertility. Varicocele is seen in 10%–15% of the general population and it is associated with 30%–35% of the males with primary infertility and 69%–80% of the males with secondary infertility (1). Varicocele occurs on the left side in 90% of the cases and 10% are bilateral. Occurrence on the right side alone is rather rare (2).

Although the etiology of varicocele is not well known, it is assumed that several factors such as functional insufficiency of venous valves draining the testicles and resulting reflux, oxidative stress, reflux of adrenal-derived metabolites, and dysfunction of the testicular temperature conversion system play a role in its pathophysiology (3,4).

Today, the only surgical method in varicocele treatment is surgical ligation. Varicose veins are ligated using inguinal and subinguinal techniques. Sometimes diminished complication rates are targeted by combining a microscope or loupe in order to preserve the arterial and lymphatic system (5,6). However, there are no comparative data on the results of uni- and bilateral varicocele surgery in the international literature. In this study we aimed

at comparing sperm parameters and pregnancy rates in patients who underwent unilateral or bilateral microsurgical varicocele surgery for primary infertility.

2. Materials and methods

Data of the patients who underwent unilateral or bilateral microsurgical varicocele surgery between 2009 and 2014 at two centers were analyzed retrospectively. Varicocele diagnosis was made by genital examination. Indications of scrotal Doppler ultrasonography were accepted as short cord, inability of carrying out genital examination because of obesity, presence of previous inguinal surgery, and evaluation of right subclinical varicocele in patients with left clinical varicocele.

Eighty-two patients (45.6%) who underwent unilateral varicocele surgery were identified as Group I and 98 patients (54.4%) who underwent bilateral varicocele surgery were identified as Group II. Preoperative FSH, LH, and total testosterone levels were measured in all patients. Patients were evaluated with at least two semen analyses done 15 days apart following a physical exam. Microscopic varicocele surgery accompanied with loupe/microscope

* Correspondence: ercanogreden@gmail.com

was done in patients who had abnormal sperm count and in those whose testicular volume difference was above 10% between the right and left testicles. All patients were followed up with a physical exam and semen analysis 3, 6, and 12 months after the treatment. Preoperative and postoperative semen analyses and spontaneous pregnancy rates were compared in both groups. Patients with left clinical or right subclinical varicocele were excluded from the study.

2.1. Statistical analysis

Data obtained in this study were analyzed with SPSS 20.0. Frequency and percentage distributions of the data were given. The chi-square test was used when the dependency between the groups were examined. Level of significance was accepted as 0.05; a significant dependency between the groups was reported at $P < 0.05$ and dependency between the groups was insignificant at $P > 0.05$.

3. Results

The average age of the patients was 29.6 years ($n = 180$). The average age of the patients in Group I was 29.2 ($n = 82$), while it was 29.9 ($n = 98$) in Group II. Surgery-related hydrocele or testicular atrophy did not develop in any patients following microsurgical varicocelectomy.

When sperm parameters were evaluated between the groups, the rate of patients with normospermia upon preoperative semen analysis was 58.5% in Group I and 60.2% in Group II, with a total of 59.4%. However, the rate of patients with normospermia upon postoperative semen analysis was 75.6% in Group I and 87.8% in Group II, with a total of 82.2%. Although there was an increase in the percentage of patients with normospermia in the postoperative period, this increase was not found to be statistically significant ($P = 0.05$).

The rate of the patients with asthenospermia in the preoperative period in Group I was 90.2%, while it was 82.7% in Group II and 86.1% in total. However, the rate of patients with asthenospermia upon postoperative semen analysis was 31.7% in Group I and 22.5% in Group II, with a total of 26.7%. Although marked improvements occurred in rates of motile sperms in postoperative sperm counts of both groups, there was not a statistically significant difference between the groups ($P = 0.2$).

Preoperative normal morphology was 45.1% in Group I, 37.8% in Group II, and 41.1% in total, while postoperative normal morphology was 91.5%, 93.9%, and 92.8%, respectively. Although marked improvements occurred regarding postoperative normal morphology, there was not a statistically significant difference between the groups ($P = 0.7$).

The rate of the patients who had improvement in concentration was 41.2% in Group I and 69.2% in Group II; the rate of the patients who had improvement in

motility (A + B) was 64.8% in Group I and 90.1% in Group II (Table). Although morphology, number, and motility improved in both groups, there was not a statistically significant difference between the groups ($P > 0.05$).

Spontaneous pregnancy occurred in 99 (55%) of the patients following surgery. The remaining 81 (45%) patients were directed to assisted reproduction modalities. When the distributions between groups were analyzed, 40 pregnancies (48.8%) occurred in Group I and 59 pregnancies (60.2%) occurred in Group II. (Table) There was not a statistically significant difference between the groups in terms of pregnancy rates ($P = 0.13$).

4. Discussion

Infertility is an important problem affecting the mental health and social life of couples. It is known that a female factor is solely responsible in 50% of infertile couples, a male factor is solely responsible in 30%, and both male and female factors play a role in 20% of cases (7). The surgical approach still maintains its place as the gold standard in treatment of varicocele. The aim of surgical treatment of varicocele is to ligate internal and external (if any) spermatic veins with preservation of the vas deferens and lymphatic vessels (8). In order to achieve this, open surgical approaches (high retroperitoneal, inguinal, subinguinal, and scrotal) as well as laparoscopic surgery and, rarely, radiologic embolization methods are used (9). In inguinal/subinguinal varicocelectomy, a conventional modality, invisibility of small-sized vessels constitutes the most important cause of recurrence. The best method used for decreasing the recurrence rate due to small veins is microsurgical varicocelectomy performed with an optic magnifier or microscope. There are studies suggesting that an operating microscope is more useful than a loupe magnifier and results are more successful (9–11).

It is well known that varicocele causes structural disorders of sperm with normal morphology. Sperm with abnormal morphology do not have the ability to fertilize the ovum. Progressive testicular damage can be prevented by abolishing these abnormal veins. Several studies reported that sperm concentration, morphology, and motility improved following varicocelectomy and an increase in spontaneous pregnancy rates was observed. Varicocelectomy can be performed with a subinguinal, inguinal, or high inguinal approach. Laparoscopic approaches or angioembolization also have been tried. Comparative studies show that, of all these methods, pregnancy rates and improvements in sperm parameters were better with subinguinal microscopic varicocelectomy (12–17).

Studies reported that an increase in bilateral testicular blood flow was observed in the presence of unilateral varicocele and blood flow returned to normal following

Table. Semen parameters and postoperative pregnancy rates of the groups.

		Microsurgical varicocele						Statistical analysis	
		Group I		Group II		Total			
		n	%	n	%	n	%	Chi-square	P
Preoperative concentration	Azoospermia	3	3.7	6	6.1	9	5.0	-	-
	Oligospermia	31	37.8	33	33.7	64	35.6		
	Normospermia	48	58.5	59	60.2	107	59.4		
Postoperative concentration	Oligospermia	20	24.4	12	12.2	32	17.8	3.71	0.05
	Normospermia	62	75.6	86	87.8	148	82.2		
Preoperative motility	Pr ≥32	8	9.8	17	17.4	25	13.9	1.56	0.21
	Pr < 32	74	90.2	81	82.7	155	86.1		
Postoperative motility	Pr ≥32	56	68.3	76	77.6	132	73.3	1.51	0.22
	Pr < 32	26	31.7	22	22.5	48	26.7		
Preoperative morphology	Normal	37	45.1	37	37.8	74	41.1	1.00	0.32
	Abnormal	45	54.9	61	62.2	106	58.9		
Postoperative morphology	Normal	75	91.5	92	93.9	167	92.8	0.11	0.74
	Abnormal	7	8.5	6	6.1	13	7.2		
Postoperative pregnancy	Existence	40	48.8	59	60.2	99	55.0	2.35	0.13
	Absent	42	51.2	39	39.8	81	45.0		
	Total	82	100.0	98	100.0	180	100.0		

Pr: progression.

varicocele. However, it is not well known why unilateral varicocele resulted in increased bilateral blood flow. It is suggested that hormonal or neuronal factors might be important. Contrary to this, some studies reported that varicocele never altered testicular blood flow or caused a decrease in blood flow (18,19).

There are a limited number of studies that compared unilateral and bilateral varicocele treatments. Surgical treatment is not recommended in subclinical varicocele, and controversy remains about whether bilateral treatment should be performed in patients with left clinical or right subclinical varicocele (20,21). Pasqualotto et al. (22) analyzed data from 112 patients and compared data of the patients with left clinical varicocele who underwent left varicocele with those with left clinical and right subclinical varicocele who underwent bilateral varicocele. They showed that pregnancy rates and improvement in semen parameters were higher in patients who underwent bilateral surgery. In another study that compared patients who underwent bilateral or unilateral varicocele, sperm count and concentration parameters showed greater improvement in bilateral varicocele than unilateral varicocele patients (23).

Libman et al. (24) performed bilateral varicocele in 157 patients and left varicocele in 212 patients who had bilateral varicocele (left grade 2-3 and right grade 1) and compared sperm count and pregnancy rates. Sperm motility improvement percentage (8% vs. 4.4%) and spontaneous pregnancy rates (49% vs. 36%) were higher in the bilateral varicocele group. The same study showed that although pregnancy rates in patients who underwent assisted reproduction methods were not statistically significant, they were higher in patients who underwent bilateral varicocele (64% vs. 51%). On the other hand, there are studies showing that in patients with low-grade bilateral varicocele, performing a left varicocele alone would be sufficient (25).

In a prospective study, Fujisawa et al. (26) compared the data from 75 patients with bilateral varicocele who underwent bilateral varicocele and 34 patients with unilateral varicocele who underwent unilateral varicocele. When semen analyses at the 18th postoperative month were evaluated, sperm concentrations in patients who underwent bilateral varicocele had increased from 8 million/mL to 23.4 million/mL, while sperm concentrations in patients who underwent unilateral varicocele had increased from 8.1 million/mL to

26.9 million/mL. Motility improvement rates increased from 38.9 million/mL to 43.1 million/mL and from 39.6 million/mL to 45.4 million/mL, respectively. Increases in motility and concentration were similar between the groups. On the other hand, these authors interestingly reported that sperm morphology was not affected in either group.

In our study, sperm concentration, motility, and morphology improved significantly in patients who underwent unilateral and bilateral varicocelectomy, while no significant difference was noted between the groups. Similarly, there was not any difference between the two groups in terms of postoperative pregnancy rates.

References

- Gorelick JJ, Goldstein M. Loss of fertility in men with varicocele. *Fertil Steril* 1993; 59: 613-616.
- Harrison RM, Lewis RW, Roberts JA. Pathophysiology of varicocele in nonhuman primates: long-term seminal and testicular changes. *Fertil Steril* 1986; 46: 500-510.
- Lipshultz LI, Corriere JN Jr. Progressive testicular atrophy in the varicocele patient. *J Urol* 1977; 117: 175-176.
- Vanlangenhove P, Dhondt E, Everaert K, Defreyne L. Pathophysiology, diagnosis and treatment of varicoceles: a review. *Minerva Urol Nefrol* 2014; 66: 257-282.
- Pajovic B, Radojevic N, Dimitrovski A, Radovic M, Rolovic R, Vukovic M. Advantages of microsurgical varicocelectomy over conventional techniques. *Eur Rev Med Pharmacol Sci* 2015; 19: 532-538.
- Ficarra V, Crestani A, Novara G, Mirone V. Varicocele repair for infertility: what is the evidence? *Curr Opin Urol* 2012; 22: 489-494.
- Dohle GR, Colpi GM, Hargreave TB, Papp GK, Jungwirth A, Weidner W. EAU guidelines on male infertility. *Eur Urol* 2005; 48: 703-711.
- Baazeem A, Belzile E, Ciampi A, Dohle G, Jarvi K, Salonia A, Weidner W, Zini A. Varicocele and male factor infertility treatment: a new meta-analysis and review of the role of varicocele repair. *Eur Urol* 2011; 60: 796-808.
- Lv JX, Wang LL, Wei XD, Zhang Z, Zheng TL, Huang YH, Zhou J, Xia F, Pu JX. Comparison of treatment outcomes of different spermatic vein ligation procedures in varicocele treatment. *Am J Ther* 2016; 23: e1329-e1334.
- Pajovic B, Radojevic N, Dimitrovski A, Radovic M, Rolovic R, Vukovic M. Advantages of microsurgical varicocelectomy over conventional techniques. *Eur Rev Med Pharmacol Sci* 2015; 19: 532-538.
- Zhang H, Liu XP, Yang XJ, Huang WT, Ruan XX, Xiao HJ, Li LY, Gao X, Zhang Y1. Loupe-assisted versus microscopic varicocelectomy: is there an intra operative anatomic difference? *Asian J Androl* 2014; 16: 112-114.
- Cayan S, Kadioglu TC, Tefekli A, Kadioglu A, Tellaloglu S. Comparison of results and complications of high ligation surgery and microsurgical high inguinal varicocelectomy in the treatment of varicocele. *Urology* 2000; 55: 750-754.
- Goldstein M, Gilbert BR, Dicker AP, Dwosh J, Gnecco C. Microsurgical inguinal varicocelectomy with delivery of the testis: an artery and lymphatic sparing technique. *J Urol* 1992; 148: 1808-1811.
- Peng J, Long H, Yuan YM, Cui WS, Zhang ZC, Pan WB. Comparison of the outcomes of microscopic varicocelectomy and laparoscopic varicocelectomy. *Beijing Da Xue Xue Bao* 2014; 46: 541-543 (in Chinese with abstract in English).
- Leung L, Ho KL, Tam PC, Yiu MK. Subinguinal microsurgical varicocelectomy for male factor subfertility: ten-year experience. *Hong Kong Med J* 2013; 19: 334-340.
- Al-Said S, Al-Naimi A, Al-Ansari A, Younis N, Shamsodini A, A-Sadiq K, Shokeir AA. Varicocelectomy for male infertility: a comparative study of open, laparoscopic and microsurgical approaches. *J Urol* 2008; 180: 266-270.
- Pan LJ, Pan F, Zhang XY, Liu Y, Zhang FL. Treatment of varicocele by microsurgical varicocelectomy: report of 94 cases. *Zhonghua Nan Ke Xue* 2012; 18: 416-418 (in Chinese with abstract in English).
- Tarhan S, Gümüş B, Gündüz I, Ayyıldız V, Gökten C. Effect of varicocele on testicular artery blood flow in men-color Doppler investigation. *Scand J Urol Nephrol* 2003; 37: 38-42.
- Ross JA, Watson NE, Jarow JP. The effect of varicoceles on testicular blood flow in man. *Urology* 1994; 44: 535-539.
- European Association of Urology. Guidelines on Male Infertility. Arnhem, the Netherlands: EAO; 2015.
- Miyaoka R, Esteves SC. A critical appraisal on the role of varicocele in male infertility. *Adv Urol* 2012; 2012: 597495.
- Pasqualotto FF, Lucon AM, de Góes PM, Sobreiro BP, Hallak J, Pasqualotto EB, Arap S. Is it worthwhile to operate on subclinical right varicocele in patients with grade II-III varicocele in the left testicle? *J Assist Reprod Genet* 2005; 22: 227-231.

23. Scherr D, Goldstein M. Comparison of bilateral versus unilateral varicoectomy in men with palpable bilateral varicoceles. *J Urol* 1999; 162: 85-88.
24. Libman J, Jarvi K, Lo K, Zini A. Beneficial effect of microsurgical varicoectomy is superior for men with bilateral versus unilateral repair. *J Urol* 2006; 176: 2602-2605.
25. Grasso M, Lania C, Castelli M, Galli L, Rigatti P. Bilateral varicocele: impact of right spermatic vein ligation on fertility. *J Urol* 1995; 153: 1847-1848.
26. Fujisawa M, Ishikawa T, Takenaka A. The efficacy of bilateral varicoectomy in patients with palpable bilateral varicoceles: comparative study with unilateral varicocele. *Urol Res* 2003; 31: 407-409.