

Taylor & Francis
Taylor & Francis Group

Archives of Andrology
Journal of Reproductive Systems

ISSN: 0148-5016 (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/iaan19

COMPARISON OF TWO DIFFERENT MICROSURGICAL METHODS IN THE TREATMENT OF VARICOCELE

I. Orhan, R. Onur, A. Semercioöz, F. Firdolas, A. Ardicoglu & I. T. Köksal

To cite this article: I. Orhan, R. Onur, A. Semercioöz, F. Firdolas, A. Ardicoglu & I. T. Köksal (2005) COMPARISON OF TWO DIFFERENT MICROSURGICAL METHODS IN THE TREATMENT OF VARICOCELE, Archives of Andrology, 51:3, 213-220, DOI: 10.1080/01485010590919648

To link to this article: https://doi.org/10.1080/01485010590919648

Published online: 09 Jul 2009.

Submit your article to this journal

Article views: 557

View related articles

Citing articles: 9 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=iaan20

Archives of Andrology, 51:213–220, 2005
Copyright © Taylor & Francis Inc.
ISSN: 0148-5016 print/1521-0375 online
DOI: 10.1080/01485010590919648

Taylor & Francis
Taylor & Francis Group

COMPARISON OF TWO DIFFERENT MICROSURGICAL METHODS IN THE TREATMENT OF VARICOCELE

I. Orhan, R. Onur, A. Semerciöz, F. Firdolas, and A. Ardicoglu □ *Firat University, Faculty of Medicine, Department of Urology, Elazig, Turkey*

I. T. Köksal □ *Akdeniz Üniversity, Faculty of Medicine, Department of Urology, Antalya, Turkey*

□ *We reviewed records from patients who underwent two different microsurgical varicocelectomy methods: 147 (high inguinal (MHIV) and 65 sub-inguinal (MSIV) microsurgery) to compare the therapeutic activity and complications. Patients who had 2 different microsurgical varicocelectomies were compared according to preoperative connected vein, number of designated arteries, postoperative semen and improvement degree in hormone parameters, increased ratio related with pregnancy and complications. The ratio of improvement of postoperative semen parameters in patients where MHIV and MSIV were performed was, 42% and 38% ($p > 0.05$). Pregnancy was achieved in MHIV at a ratio of 41% (34/82) and 33% (22/65) in MSIV ($p > 0.05$). There was no significant difference according to mean operation periods, the vein connected between the groups. The number of testicular arteries were significantly higher than the ones in MHIV ($p < 0.01$). However, as a postoperative complication, hydrocele was not seen in any of the patients, while relapses occurred in 1 MHIV and 2 MSIV patients. MHIV and MSIV techniques are effective methods to treat varicocele. However, the excess number of connected veins due to the anatomic feature of MSIV increases the possibility of relapses and the technical difficulty during surgical intervention.*

Keywords inguinal, male infertility, microsurgery, sub-inguinal, varicocele

INTRODUCTION

The incidence of palpable varicocele, which is the most correctable pathology in men's infertility, is higher among infertile men (21% to 41%) compared with the general population (4.4% to 22.6%) [6, 11, 12, 15, 17, 24]. After varicocele repair, seminal parameters in infertile men can be expected to improve in approximately 60% of cases, with pregnancy

Address correspondence to Ismail Turker Koksal, M.D., Department of Urology, Akdeniz University, Faculty of Medicine, Dumlupinar Bulvari, Campus, 07070, Antalya, Turkey. E-mail: tkoksal@akdeniz.edu.tr

rates between 30% and 50% [7]. Several alternative therapies are developed in the treatment of varicocelectomy due to the progressive impairment in testis functions and its role in the etiology of secondary infertility [10, 25]. Hypothermia, percutaneous embolization, laparoscopic and open surgical techniques are widely applied for this reason [8, 14, 16, 19, 26]. Open surgery is the most frequently applied and effective technique. Due to the decreases in artery injuries, relapses and postoperative complications, microsurgical varicocelectomy, which is one of the open surgical interventions in open surgery is successfully applied [9, 18]. We reviewed records from 147 patients, who underwent 82 high inguinal (MHIV) and 65 sub-inguinal (MSIV) microsurgical varicocelectomies, in order to compare the therapeutic activity and complications.

MATERIALS AND METHODS

A total 147 patients who underwent 82 MHIV and 65 MSIV microsurgical varicocelectomies at our institution from April 1998 to December 2003 were retrospectively reviewed. Charts were reviewed to document pre- and post-operative semen parameters, pregnancy ratios and complications. All patients were required the following criteria: infertility of at least 1 year in duration, no prior surgical or pharmacological manipulation, no previous inflammatory lesions of the genitourinary tract, no known exposure to toxic agents and no endocrinological abnormalities. All subjects underwent a complete history, physical examination and assessment of baseline hormonal values (total testosterone, LH and FSH) to exclude other known causes of infertility. At least 3 semen analyses performed within 4 months preoperatively demonstrated oligozoospermia and/or asthenozoospermia (oligozoospermia was defined as less than 20×10^6/ml and asthenozoospermia as motility less than 50%). Scrotal echo-color Doppler ultrasonography was then performed.

The varicocele determined during physical examination were classified as Grade 1, varicocele determined only by the valsalva maneuver as Grade 2, and varicocele which were palpable without the valsalva maneuver as Grade 3, which were recognized as visually dilated veins.

MHIV was performed to 68 patients out of 117 with a left varicocele among 147 patients whom were diagnosed with varicocele, to 14 patients out of 30 diagnosed with bilateral varicocele, according to the technique of general and regional anesthesia (optomic model, OP-C12, CEE). Microsurgical high inguinal varicocelectomy and microsurgical sub-inguinal varicocelectomy were performed to the remaining patients [9, 18]. Patients were assessed in detail according to preoperative anatomic features related with arteries and veins. Postoperative follow-up included: semen analysis at 3, 6 and 12 months for at least 1 year. A significant improvement in the

sperm parameters was considered to have occurred 1 year after surgery if the total motile (a + b) sperm count increased more than 50% above the preoperative values. All patients were evaluated postoperatively at the end of the first year by serum FSH, LH and testosterone levels. Additionally, patients were compared according to postoperative pregnancy achievement ratios and complications. Statistical analyses were performed using the 2-sample paired and unpaired tests, Mann-Whitney U test, Wilcoxon paired test, and chi-square test.

RESULTS

The mean age of patients undergoing MHIV and MSIV was 27 ± 2.6 (22–41) years and 28 ± 2.3 (19–38) years, respectively. There was no statistically significant difference between the MHIV and MSIV. Mean follow-up periods was 25.45 ± 3.4 (22–48) months for MHIV and 25 ± 2.4 (23–52) months for MSIV ($p > 0.05$). Scrotal echo-color US revealed the mean diameter of the dilated internal spermatic veins of patients in the MHIV group as 3.27 ± 0.52 mm (2.1–5.3), whereas it was 3.29 ± 0.17 (2.2–4.8) mm in patients undergoing MSIV ($p > 0.05$). The mean operation times in groups was summarized in Table 1. The difference between the operation periods was not significant ($p > 0.05$) (Table 1). The mean number of connected veins during the operation was 6.42 ± 1.22 (2–12), in MHIV and 9.76 ± 0.96 (3–14) in MSIV. When compared with MHIV, statistically the number of veins connected in MSIV was significantly higher in ratios ($p < 0.01$).

A single testicular artery was carried out in 60% (49/82) of the 82 patients with MHIV, a two testicular artery in 32% (26/82) of the patients and three testicular arteries in 2% (2/82) of the patients while it was unable to carry out an artery identification in 4% (30/65) of the patients. These ratios were, respectively, 32% (21/65), 46% (30/65), 15% (10/65) and 6% (4/65) for MSIV. The number of arteries determined preoperatively by MSIV was found to be significantly high in MHIV applied patients ($p < 0.01$).

Postoperatively, more than a 50% increase in total motile sperm count was considered as an improvement in semen parameter. In the present study, one year after varicocelectomy significant improvement was detected

TABLE 1 Comparison of Operating Time, Mean Tied Vein and Determined Mean Testicular Artery MHIV and MSIV

	MHIV	MSIV	p
Operating time (minute)	26 ± 3	25 ± 5.6	$p > 0.05$
Mean tied vein	3.4 ± 1.2	5.7 ± 0.9	$p < 0.01$
Determined mean testicular artery	1.3 ± 0.6	1.7 ± 0.8	$p < 0.01$

TABLE 2 Comparison of Semen Analysis and Hormone Profile (FSH, LH) Postoperative and Preoperative in MHIV and MSIV

	Preoperative	Postoperative	p
MHIV (n:82)			
Sperm concentration $\times 10^6$	30 ± 8.3	33 ± 8.9	0.01
% Motility	29 ± 8.4	35 ± 13.1	0.01
% Morphology*	9.8 ± 0.7	18 ± 0.8	<0.001
MSIV (n:65)			
Sperm concentration $\times 10^6$	29 ± 8.5	32 ± 10.0	0.05
% Motility	29 ± 8	34 ± 13.1	0.01
% Morphology	9.0 ± 0.5	17 ± 0.6	<0.001
P	>0.05	>0.05	
MHIV (n:82)			
FSH	16 ± 7.5	13 ± 6.8	<0.05
LH	14 ± 6.6	11 ± 5.3	<0.01
MSIV (n:65)			
FSH	18 ± 10.0	15 ± 6.1	<0.05
LH	15 ± 9.0	14.0 ± 7.5	<0.05
p	>0.05	>0.05	

in 34 (42%) of 82 patients in the MHIV group and in 25 (38%) of 65 patients in MSIV group. The rate of the improvement between preoperative and postoperative sperm parameters among two groups and the difference between these parameters in each group are summarized in Table 2. The mean serum level of FSH and LH in the preoperative period of 147 patients that underwent varicocelectomy were 16 ± 7.8 (4–22) and 14 ± 7.0 mIU/ml (6–18), respectively. Postoperatively, they were 15 ± 6.13 (4–18) and $13 + 6.8$ mIU/ml (5–16), respectively, and the decrease in hormone levels was considered to be statistically significant ($p < 0.05$, $p < 0.01$). However, there was no significant difference between MHIV and MSIV groups in respect to the decrease in mean serum FSH and LH levels ($p > 0.05$) (Table 2).

Overall, testosterone increased significantly in 112 (76%) ($p < 0.001$). There was no significant difference between patients with increased testosterone levels in MHIV and MSIV groups ($p > 0.05$). The pregnancy achievement ratio at the end of the postoperative year was 38%(56/147). The difference in the pregnancy achievement ratios in between both groups was not significant (Table 3). Two patients in MHIV and 1 patient

TABLE 3 Comparison of Pregnancy and Recurrence Rates MHIV and MSIV

	MHIV	MSIV	p
Pregnancy	41% (34/82)	33% (22/65)	>0.05
Recurrence	(1/82)	(2/65)	

in MSIV groups had post-operative wound infections and no other complication was observed. The hydrocele complication was not seen in any of the patients; however, relapses were determined by palpation in one patient in the MHIV group and in two patients in the MSIV group.

DISCUSSION

Since the detection of subclinical varicocele in 12% to 75% of patients evaluated for infertility, varicocele has become one of the most important pathologies in the etiology of male infertility [6, 7, 11, 12, 15, 17, 24]. Because of its progressive characteristics, varicocele is one of the leading causes of secondary infertility, and several different methods have been defined in the treatment of this common pathology [8, 14, 16, 19, 26]. The aim of treatment in varicocele regardless of the method choice is to ligate the internal and external spermatic veins with preserving the vas deferens and its vessels, spermatic artery with its branches and the testicular lymphatics. In the present study, MHIV and MSIV methods, the two most commonly used microsurgical procedures, were compared. Motility shows the best improvement among all sperm parameters after varicocelectomy. After varicocelectomy, motility and sperm count were improved 70% and 51%, respectively, and the pregnancy rates detected were between 24% and 53% [21]. In another study, 468 patients underwent varicocelectomy and total motile sperm count increased 34% in high ligation group, whereas the rate of increase in sperm count was 46% in the MHIV group. In the same study there was no significant difference in the increase of sperm counts between high ligation varicocelectomy and MHIV groups. However, the improvement in motility was significantly higher in the MHIV group. In a similar study there was no significant difference in pregnancy rates between two groups: pregnancy rates were 35% and 42%, respectively [5]. In the present study, semen density and motility in a total of 40% of patients revealed significant improvement after varicocelectomy. Postoperative semen density and motility improvements were not significantly different between patients that underwent MHIV and MSIV.

The exact mechanism by which a varicocele may affect hormonal function of the testis is unknown. The decreased testicular responsiveness to intramuscular injection of HCG suggest dysfunction at the Leydig cell level [1, 3]. An exaggerated gonadotropin (LH, FSH) response to intravenous GnRH was also reported. Blunted testosterone and exaggerated gonadotropin responses to HCG and GnRH stimulation become normal after surgical correction of the varicocele. This supports the hypothesis that the presence of a varicocele may induce testicular hormonal dysfunction that is reversed by varicocelectomy [13–20]. There was no siginificant change in FSH and LH levels after varicocelectomy [20]. Cayan et al. [4] performed MIV on

78 patients and postoperatively reported a significant increase in testosterone level and a significant decrease in FSH level. The increase in testosterone after varicocelectomy was related to the improvement in Sertoli and Leydig cell functions. In our study, a decrease in both postoperative FSH and LH groups where MHIV and MSIV were applied were statistically significant; however the differences between the fall in both groups were not significant.

The effect of varicocelectomy on nonstimulated testosterone levels has not been studied previously in a large series of patients. In 14 men with varicocele and oligozoospermia, there was no significant effect of varicocelectomy on serum testosterone levels [13]. Similarly, there was an insignificant rise in serum testosterone in patients who underwent high ligation varicocelectomy [22]. The techniques used in these two studies might result in a higher percent of varicocele recurrence, which contributes to the lack of significant increase in serum testosterone [23]. In other studies, serum testosterone increased significantly after microsurgical varicocelectomy [4]. In our study, testosterone and sperm parameters, which are indicators of testicular function, were assessed in a total of 147 patients, and the increase in serum testosterone was significantly higher in both MHIV and MSIV groups.

In our study, there was no significant difference between the MHIV and MSIV techniques, both according to semen parameters and their effect on hormonal profiles. There is no difference either on pregnancy achievement and postoperative complications. Operation periods were shorter in patients with MSIV while the difference with MHIV was not statistically significant. During surgical intervention in MSIV, most of the time during the operation period is spent for cord structures and vein dissection. Because it is easy to identify the spermatic cord by this technique, the opening and closure of folds are therefore carried out at a shorter period. However, as the number of veins connected at this level are fewer in number, and as arterial branching is higher than MHIV, such a condition may cause a large waste of time in the operation period. In MHIV, the dissection of facial structures caused an extension in the operation period; but merely the total period of the operation was not longer than MSIV due to the fewer number of veins connected and the less arterial branching when compared with MSIV. Preoperatively the number of veins connected in MSIV was statistically higher than the number of veins connected in MHIV. When this difference is considered higher especially in the sub-inguinal region where arterial branching is excess, it is recommended to pay more attention in MSIV surgery.

Because ligated veins that must be connected in excess number may lead to relapses and cause more arterial branching, it is therefore suggested that possible arterial injuries may cause dysfunction of the testes [2].

Any damage to the lymphatic drainage during the excess dissection of the cord structures may increase the possibility of hydrocele. In our study, relapses occurred in two patients in the MSIV group and in one patient in the MHIV group. Although these numbers were not statistically significant, it is suggested that in a larger series of studies where the numbers of patients tend to increase, this difference may become significant. As a conclusion, MHIV and MSIV techniques are effective methods in the treatment of varicocele. There are no significant differences between these groups according to improvement in postoperative semen parameters, ratio of achieving pregnancy, complications and operation periods. However, the excess number of connected veins due to the anatomic feature of MSIV may increase the possibility of relapses and bring technical difficulty during surgical intervention.

REFERENCES

1. Ando S, Giacchetto C, et al. (1983): Plasma levels of 17-OH progesterone and testosterone in patients with varicoceles. Acta Endocrinol 102:463–469.
2. Beck EM, Schlegel PN, Goldstein M (1992): Intraoperative varicocele anatomy: a macroscopic and microscopic study. J Urol 148:1190–1194.
3. Castro–Magana M, Angulo M, et al. (1990): J. Leydig cell function in adolescent boys with varicoceles. Arch Androl 24:73–79.
4. Cayan S, Kadioglu A, et al. (1999): The effect of microsurgical varicocelectomy on serum follicle stimulating hormone, testosterone and free testosterone levels in men with varicocele. BJU Int 84:1046–1049.
5. Cayan S, Kadioglu TC, et al. (2000): Comparison of results and complications of high ligation surgery and microsurgical high inguinal varicocelectomy in the treatment of varicocele. Urology 55:750–754.
6. Dubin L, Amelar RD (1971): Etiologic factors in 1294 consecutive cases of male infertility. Fertil Steril 22:469–474.
7. Dubin L, Amelar RD (1997): Varicocelecotomy: 986 cases in a twelve-year study. Urology 10:446–449.
8. Enquist E, Stein BS, Sigman M (1994): Laparoscopic versus subinguinal varicocelectomy: A comparative study. Fertil Steril 61:1092–1096.
9. Goldstein M, Gilbert BR, et al. (1992): Microsurgical inguinal varicocelectomy with delivery of the testis: an artery and lymphatic sparing technique. J Urol 148:1808–1811.
10. Gorelick JI, Goldstein M (1993): Loss of fertility in men with varicocele. Fertil Steril 59:613–616.
11. Greenberg SH (1977): Varicocele and male fertility. Fertil Steril 28:699–706.
12. Greenberg SH, Lipshultz LI, Wein AJ (1978): Experience with 425 subfertile male patients. J Urol 119:507–510.
13. Hudson RW, Perez-Marrero RA, et al. (1985): Hormonal parameters of men with varicoceles before and after varicocelectomy. Fertil Steril 43:905–910.
14. Ivanissevich O (1960): Left varicocele due to reflux, experience with 4470 operative cases in 42 years. J Int Coll Surg 34:742–745.
15. Johnson DE, Pohl DR, Rivera-Correa H (1970): Varicocele: an innocuous condition? South Med J 63:34–36.
16. Lima SS, Castro MP, Costa OF (1978): A new method for the treatment of varicocele. Andrologia 10:103–106.
17. MacLeod J (1969): Further observations in the role of varicocele in human male infertility. Fertil Steril 20:545–563.

18. Marmar JL, Kim Y (1994): Subinguinal microsurgical varicocelectomy: a techinical critique and statistical analysis of semen and pregnancy data. J Urol 152:1127–1132.
19. Palomo A (1949): A radical cure of varicocele by a new technique: preliminary report. J Urol 61:604–607.
20. Podesta M, Gottlieb S, et al. (1994): Hormonal parameters and testicular volume in children and adolescents with unilateral varicocele: preoperative and postoperative findings. J Urol 152:794–797.
21. Pryor JL, Howards SS (1987): Varicocele. Urol Clin North Am 14:499–513.
22. Segenreich E, Schmuely H, et al. (1986): Andrological parameters in patients with varicocele and fertility disorders treated by high ligation of the left spermatic vein. Int J Fertil 31:200–203.
23. Su L, Goldstein M, Schlegel PN (1995): The effect of varicocelectomy on serum testosterone levels in infertile men with varicoceles. J Urol 154:1752–1755.
24. Vestroppen GR, Steeno OP (1977): Varicocele and pathogenesis of the associated subfertility: a review of various theories. II: Results of surgery. Andrologia 9:293–300.
25. Witt MA, Lipshultz LI (1993): Varicocele: A progressive or static lesion? Urology 42:541–544.
26. Zorgniotti AW, Sealfon AL (1984): Scrotal hypothermia: a new treatment for poor semen. Urology 23:439–441.