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# Microsurgical Varicocelectomy for Isolated Asthenospermia

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**Purpose:** Varicocele represents the most common cause of male infertility, and most reports indicate that varicocelectomy has a beneficial effect on male fertility and pregnancy outcome. We evaluated the clinical outcomes of infertile couples with varicocele and isolated asthenospermia who chose to undergo varicocelectomy as well as those who chose not to undergo the procedure.

**Materials and Methods:** We performed a retrospective review of 118 consecutive infertile couples in whom the man presented with clinical varicocele and isolated asthenospermia (less than 50% motile sperm). All couples were presented with possible treatment options (observation, varicocelectomy, assisted reproductive technologies). The clinical characteristics and outcomes of 2 subgroups of men—those who elected to undergo surgery (varicocelectomy, 69) and those who did not (49)—were examined and compared.

**Results:** Mean male and female patient age, duration of infertility and baseline total motile sperm count were not significantly different in the control and surgery groups. The mean total motile sperm count increased significantly after varicocelectomy (29.6 million preoperatively vs 39.0 million postoperatively,  $p < 0.05$ ). The spontaneous pregnancy rate was significantly higher in the surgery group compared to the control group (65% vs 32%, respectively,  $p < 0.01$ ). The combined spontaneous and intrauterine insemination pregnancy rate was also significantly higher in the surgery group compared to the control group (74% vs 36%, respectively,  $p < 0.01$ ). Use of in vitro fertilization/intracytoplasmic sperm injection was significantly higher in the control group compared to the surgery group (32% vs 11%, respectively,  $p < 0.05$ ).

**Conclusions:** Our data support the practice of varicocelectomy for the treatment of clinical varicocele and isolated asthenospermia.

*Key Words: infertility, male; varicocele; reproductive techniques, assisted; sperm motility*

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A varicocele represents dilated veins in the pampiniform plexus of the spermatic cord. Varicocele is currently the most common abnormality identified in men being evaluated for infertility, and although the exact pathophysiology is not known varicocele has been associated with impaired sperm quality, a decrease in testicular volume and decreased Leydig cell function.<sup>1</sup>

Assessment of the infertile male has traditionally depended on semen analysis, which includes measurement of sperm concentration, motility and morphology. Infertile males with varicocele typically present with abnormalities in multiple semen parameters (eg oligoasthenospermia or oligoasthenoteratospermia). However, a significant number of men can present with isolated asthenospermia, although the exact percentage is not known. It is also not known which, if any, of these parameters correlate most strongly with male fertility potential, although some authors believe that sperm motility and morphology have a particularly significant role in male fertility.<sup>2</sup>

Sperm motility is commonly abnormal in the setting of varicocele and has previously been shown to improve after varicocele ligation, but this is often in the context of concurrent abnormalities in other semen parameters.<sup>2-4</sup> To date no studies have evaluated the effect on varicocelectomy in men with isolated asthenospermia. As such it is not known how best to counsel patients with varicocele who present only with sperm motility abnormalities. Therefore, we evaluated the clinical outcomes of infertile couples with varicocele and isolated asthenospermia who chose to undergo varicocelectomy as well as those who elected no surgery.

## MATERIALS AND METHODS

We performed a retrospective review of 610 consecutive infertile couples in whom the male presented with a clinical varicocele to Mount Sinai Hospital (Toronto, Canada) between July 1996 and December 2002. From this original group we identified a cohort of 118 men presenting with 1 year or more of infertility, a clinically palpable varicocele and asthenospermia (less than 50% total motility) in the absence of any other semen parameter abnormalities. Cou-

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ples in whom the wife had tubal obstruction or ovulatory failure were excluded from this study.

At the completion of the infertility evaluation couples were presented with all available treatment options (observation, varicocelectomy, assisted reproductive technologies). The clinical characteristics and outcomes of 2 subgroups of men (SUR—69 men who elected to undergo varicocelectomy and CTL—49 men who did not choose surgery) were examined and compared.

All cases of varicocele were detected and graded by the same fellowship trained male infertility specialist (AZ) based on the grading system of Dubin and Amelar.<sup>5</sup> Subclinical varicocele was not included in this study. All microsurgical varicocelectomies were performed by the same surgeon (AZ) as previously described.<sup>6,7</sup>

Nearly all men had at least 2 semen analyses before and 2 semen analyses after surgery. However, to eliminate possible inter-laboratory variations we included only the preoperative (performed 1 to 3 months before varicocelectomy) and postoperative (performed 6 to 8 months after surgery) semen analyses conducted in the same laboratory for data analysis. Samples were obtained by masturbation after 3 to 5 days of sexual abstinence. After liquefaction of semen standard semen parameters (volume, density, motility, morphology) were obtained according to WHO guidelines.<sup>8</sup> The TMC was calculated as semen volume multiplied by sperm concentration multiplied by percent motility divided by 100.

Followup assessment was conducted by chart review and telephone calls from January to June 2004 (therefore, at minimum 12 months after surgery or observation). The gathered information included details regarding patient history and physical examination, semen parameters and pregnancy outcome (spontaneous and/or assisted). The outcome measures included changes in semen parameters, pregnancy rates (spontaneous and assisted) and use of ART (IUI and IVF/ICSI).

Patient information for this study remained confidential and within the institution. At our institution approval from the institutional review board is not necessary for retrospective studies. Therefore, institutional review board approval was not obtained.

Results are expressed as means  $\pm$  1 SD. Parametric and nonparametric tests were used (as appropriate) to estimate differences between the semen parameters before and after varicocelectomy, and to estimate differences between the surgical and nonsurgical groups (SAS®) with  $p < 0.05$  considered statistically significant.

## RESULTS

### Patient Characteristics

Of the men 58% (69 of 118) elected to undergo varicocele repair (SUR group), while 42% (49 of 118) elected not to undergo surgery (CTL group). Mean male and female age, duration of infertility and baseline TMC were not significantly different in the CTL and SUR groups (data not shown). Mean followup was not significantly different between the CTL and SUR groups ( $39.9 \pm 14.4$  vs  $44.1 \pm 26.5$  months, respectively,  $p > 0.05$ ). The mean duration of infertility ( $31.9 \pm 24.2$  months in CTL vs  $33.8 \pm 22.6$  months in SUR) and the proportion of men presenting with secondary infertility (33% in CTL group vs 30% in SUR group) were not significantly different between groups.

Pregnancy outcome and ART use data were available for 70% (82 of 118) of couples overall and, more specifically, pregnancy outcome data were available for 78% (54 of 69) and 57% (28 of 49) of couples in the SUR and CTL groups, respectively ( $p = 0.0243$ ). Among the 69 couples who underwent surgery (SUR group) there were no significant differences in duration of infertility ( $31 \pm 19$  vs  $43 \pm 30$  months), serum FSH levels ( $4.5 \pm 3.4$  vs  $4.2 \pm 5.4$  IU/l), sperm concentration ( $45.1 \pm 28.0$  vs  $58.3 \pm 34.0$  million per ml), sperm motility ( $22.9\% \pm 9.9\%$  vs  $24.9\% \pm 12.3\%$ ) and normal forms ( $43.6\% \pm 9.4\%$  vs  $45.8\% \pm 16.7\%$ ) between couples who did (54) and did not (15) have pregnancy outcome data, respectively. However, in the SUR group mean paternal and maternal age was significantly higher in those couples who did not have pregnancy outcome data compared to those who did ( $38.6 \pm 4.8$  vs  $35.9 \pm 4.5$  years and  $36.4 \pm 3.6$  vs  $34.0 \pm 2.9$  years, respectively,  $p < 0.05$ ). In the 49 couples who elected not to have surgery (CTL group), there were no significant differences in paternal ( $38.3 \pm 5.8$  vs  $37.4 \pm 5.2$  years) or maternal age ( $33.9 \pm 5.2$  vs  $35.1 \pm 5.6$  years), duration of infertility ( $30 \pm 25$  vs  $34 \pm 23$  months), serum FSH levels ( $3.8 \pm 2.6$  vs  $4.8 \pm 3.7$  IU/l), sperm concentration ( $54.5 \pm 42.1$  vs  $40.7 \pm 23.1$  million per ml), sperm motility ( $27.1\% \pm 14.1\%$  vs  $31.4\% \pm 12.4\%$ ) and normal morphology ( $39.5\% \pm 9.6\%$  vs  $42.7\% \pm 12.2\%$ ) between couples who did (28) and did not (21) have pregnancy outcome data, respectively.

### Postoperative Semen

#### Parameters in the Varicocelectomy Group

Varicocele repair was associated with an increase in the percentage of motile sperm and of sperm with normal morphology, but only the increase in percent motile sperm reached statistical significance (table 1). Decreases in mean semen volume and mean sperm concentration were noted postoperatively but only the change in sperm concentration reached statistical significance. The mean percentage sperm motility and the mean total motile sperm count increased significantly after varicocelectomy.

### Pregnancy Outcome and ART Use

Direct comparison of the couples with pregnancy outcome and ART use data (54 in the varicocelectomy and 28 in the observation group) demonstrated that except male age being significantly higher in the CTL compared to the SUR group ( $38.3 \pm 5.8$  vs  $35.9 \pm 4.5$  years, respectively,  $p = 0.044$ ),

TABLE 1. Semen parameters in 69 men with clinical varicocele and isolated asthenospermia who elected to undergo varicocelectomy

	Mean $\pm$ SD		p Value*
	Preop	Postop	
Semen vol (ml)	3.3 $\pm$ 4.1	2.9 $\pm$ 1.5	Not significant ( $p \geq 0.05$ )
Sperm concentration ( $\times 10^6$ /ml)	48.0 $\pm$ 29.7	36.6 $\pm$ 26.0	0.027
Sperm motility (% motile)	23.4 $\pm$ 10.4	33.2 $\pm$ 20.6	0.0002
Sperm morphology (% normal forms)	42.8 $\pm$ 9.5	47.3 $\pm$ 17.6	Not significant ( $p \geq 0.05$ )
TMC ( $\times 10^6$ )	29.6 $\pm$ 27.4	39.0 $\pm$ 45.5	0.047

\* Mann-Whitney rank sum test.

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