

The yield of microscopic varicocelectomy in men with severe oligospermia

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Abstract

Introduction: Varicocele is detected in 35%–50% of men with primary infertility and up to 81% with secondary infertility. Various studies have shown that varicocele is related to testicular hypotrophy and impaired spermatogenesis. The effect of varicocelectomy in mild-to-moderate male factor infertility has been well reported. However, only a few studies addressed the impact of varicocelectomy in severe oligospermia.

Methods: We included 45 patients with severe oligospermia (<5 million/mL) who underwent microsurgical varicocelectomy between May 2014 and November 2017. Results of semen analysis taken at 6 months after varicocelectomy were compared and patients were divided into responders and nonresponders. Chi-square was used to compare the preoperative and postoperative sperm count, motility, and volume.

Results: After 6 months only one patient was found to be a responder with a pre- to post-operative motility of 45%–74% and a sperm concentration of 1 million/mL to 28.1 million/mL. There was a significant improvement in the mean sperm concentration after varicocelectomy which improved from 1.31 million/mL to 5.32 million/mL. However, a significant decrease in sperm motility was noted which decreased from 35.62% to 28.64% postoperatively. Postoperative semen volume increased from 2.56 mL to 3.19 mL, but this difference was not found to be statistically significant ($P > 0.05$). Four patients (8.9%) were found to have azoospermia after a 6-month follow-up. In these four patients who turned azoospermic had count <50,000 sperm/mL, two of them had a history of cryptospermia before varicocelectomy. Ejaculate sperm returned in two of these four patients in long-term follow-up (>6 months).

Conclusion: The magnitude of improvement after microsurgical varicocelectomy for severely oligospermic patients is less profound than reported in mild male factor infertility.

Keywords: Azoospermia, infertility, varicoceles

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INTRODUCTION

Abnormally dilated veins in the pampiniform plexus are called varicoceles and they have been linked to male infertility because they occur more frequently in infertile men.^[1] Fifteen

percent of all men have a varicocele and up to 41% of men who present with primary infertility have them. They are the most common surgically treatable cause of male infertility and the most common cause of male infertility.^[2-3]

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There are several proposed mechanisms to which varicocele is thought to cause male infertility including, scrotal hyperthermia which impairs testicular endocrine function and spermatogenesis. Furthermore, the increased hydrostatic pressure and the oxidative stress leading to progressive damage to testicular biology over time is another proposed mechanism.^[4]

A consensus exists that varicocele repair is indicated in a male partner with a varicocele and a normal workup on the female partner, especially in young couples this seems to lead to a better chance of spontaneous pregnancy.^[5-7]

To the best of our knowledge, the role of microsurgical varicocelectomy specifically in men with severe oligospermia (sperm count <5 million) is not well studied. This study was designed to shed light on the matter and to predict the outcomes in this population.

METHODS

This is a single tertiary center retrospective study; all patients with severe oligospermia who underwent microsurgical varicocelectomy between May 2014 and November 2017 were included in the study. Severe oligospermia is defined as sperm count <5 million/mL. Patients with azoospermia, subclinical varicocele, and abnormal karyotype were excluded from the study. A total of 45 patients were included in the study. Preoperative hormonal evaluation consisting of serum follicle-stimulating hormone (FSH), luteinizing hormone (LH), and testosterone levels were obtained. All patients had a preoperative scrotal color Doppler ultrasound to assess subclinical pampiniform plexus dilatation along with measurement of the testicular volume using $0.71 \times \text{lengths} \times \text{width} \times \text{height}$ formula. Varicocele grading was done clinically using the World Health Organization diagnostic classification. Microsurgical varicocelectomy was performed using the subinguinal approach using an intraoperative vascular Doppler flow detector. Results of semen analysis taken at 6 months after varicocelectomy was compared and patients were divided into responders and nonresponders. Responders were defined as: (1) sperm motility rate improved after varicocelectomy and (2) sperm concentration increased from <1 million/mL to 5 million/mL or from 1 to 5 million/mL to >10 million/mL. Chi-square was used to compare the preoperative and postoperative sperm count, motility, and volume.

RESULTS

Forty-five patients were included in the study. Most patients underwent only left-sided microsurgical

varicocelectomy (62.2%). The mean age was 33.3 years, body mass index was 29.1 kg/m², testicular volume was 11.76 mL. The mean LH, FSH, and testosterone were 6.97 IU/L, 8.69 IU/L, and 14.53 nmol/L, respectively [Table 1]. Pre- and post-operative sperm count, motility, and volume are shown in Table 2. Using the previously mentioned criteria only one patient was found to be a responder with a pre- to post-operative motility of 45%–74% and a sperm concentration of 1 million/mL to 28.1 million/mL. While comparing pre- and post-operative semen analysis results, there was a significant improvement in the mean sperm concentration which improved from 1.31 million/mL to 5.32 million/mL. However, a significant decrease in sperm motility was noted which decreased from 35.62% to 28.64% postoperatively. Postoperative semen volume increased from 2.56 mL to 3.19 mL, but this difference was not found to be statistically significant ($P > 0.05$). Four patients (8.9%) were found to have azoospermia after a 6-month follow-up. In these four patients who turned azoospermic had count <50,000 sperm/mL, two of them had a history of cryptospermia before varicocelectomy. Ejaculate sperm returned in two of these four patients in long-term follow-up (>6 months).

DISCUSSION

Severe oligospermic men with clinical varicocele are faced with the option of varicocelectomy in the hope to improve their sperm quality. Its unclear whether or not

Table 1: The means for age, estrogen thyroid-stimulating hormone, prolactin, follicle-stimulating hormone, luteinizing hormone, and testosterone

Characteristic	Mean value (range)
Age (years), range	33.3 (22–56)
BMI (range)	29.1 (17.4–45)
Laterality of varicocele, n (%)	
Left	28 (62.2)
Bilateral	16 (37.8)
Grade of varicocele, n (%)	
I	7 (15.6)
II	19 (42.2)
III	19 (42.2)
Testicular volume, mL (range)	11.76 (3–19.3)
Testosterone, nmol/L (range)	14.53 (6.19–32.88)
FSH, IU/L (range)	8.69 (1.2–22.2)
LH, IU/L (range)	6.97 (2.3–20.5)

FSH: Follicle-stimulating hormone, LH: Luteinizing hormone, BMI: Body mass index

Table 2: Compares the pre- and post-operative means for motility, count, and volume

Semenalysis	Preoperative mean	Postoperative mean	P
Count, million/mL	1.31	5.23	0.037
Motility, %	35.62	28.64	0.046
Volume, mL	2.56	3.19	0.3

varicocelectomy will benefit those patients. In this study, we aimed to assess the effectiveness of microsurgical varicocelectomy in this group of infertile men. In our study, only 1 out of 45 patients was found who had significant improvement (based on our responder's criteria) in both sperm count and motility. Although there was a significant ($P > 0.05$) improvement in the mean postoperative sperm count the remainder of our patients was not considered responders due to decreased postoperative sperm motility which was noted in most patients.

Enatsu *et al.* conducted a similar study to ours on 102 patients and found that 41.1% became responders using the same criteria used in our study. He also found that improvement was only observed in patients with a sperm count of more than 2 million and only followed them up at 6 months.^[8] However in our study, the one patient under the category of responders represented (2.2%) and had a preoperative sperm count of 1 million/mL, the remainders were none responders and four patients became azoospermic on short-term follow-up. This raises the question of when should we follow these patient's postoperative to determine the outcome.

Gupta *et al.* recently did a study and included a group of men with severe azoospermia (sperm count <5 million) and found significant improvement in sperm motility and concentration. And took it a step further and looked at the spontaneous pregnancy rate in and found it to be (37.1%) at 2–8 months postoperatively. Semen analysis was followed up to 1 year postoperative.^[9]

A recent prospective study done by Shabana *et al.* to identify predictors of successful outcomes concluded that sperm count >8 million/mL and >18% progressive motility in men with varicocele Grade II or III led to a positive result.^[10]

A meta-analysis done by Baazeem *et al.* in 2011 concluded that varicocele repair enhances sperm parameters (count, total, and progressive motility), improves sperm morphology, and decreases sperm DNA damage and seminal oxidative stress. But concluded that varicocelectomy had no definite effect on spontaneous pregnancy rates and that microsurgical approach was superior to other modalities and lead to better results.^[11]

An interesting finding in our patients is that 4 out of 45 patients (8.9%) became azoospermic. A case report in 2014 reported this as a rare finding and even suggested cryopreservation preoperatively for both clinical and medicolegal reasons.^[12]

In humans, the process of spermatogenesis takes 64 days to be completed which is a crucial point to consider when evaluating semen analysis improvement.^[13] The time recommended for observing semen analysis improvement is between 3 and 6 months postvaricocelectomy.^[5]

Few studies addressed the effect of microsurgical varicocelectomy in men with severe oligospermia, as a result, there is no established preoperative recommendation nor postoperative follow-up plan to determine effectiveness. However, we recommend advising patients with a sperm count <100,000 sperm/mL to cryopreserve their sperms before undergoing varicocelectomy.

Our study is not without limitations, first is due to its retrospective nature. Furthermore, our sample size is small but is comparable to other studies. This can be explained by the very selective population that we targeted in our study.

CONCLUSION

Microsurgical varicocelectomy may improve sperm count in patients with severe oligospermia, but it also can decrease sperm motility. Sperm cryopreservation is advised in those with a sperm count <100,000 sperm/mL before varicocelectomy. Future studies are needed on a larger scale and also to include an impact on *in vitro* fertilization results. We also advise sperm cryopreservation before varicocelectomy in patients with <100,000 sperm/mL. This finding makes patients consultation vital in severely oligospermic men with regards to varicocele repair versus assisted reproductive technology.

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Conflicts of interest

There are no conflicts of interest.

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