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Safety and Efficacy of Microscopic Varicocelectomy

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Abstract:

Introduction: Varicocele causes infertility in only 20% of patients with varicocele. About 15-20% of males have varicocele. Varicocele is asymptomatic in most cases.

Aim of the study: To study the effectiveness and safety of microscopic varicocelectomy.

Subjects and Methods: The current study incorporated 25 patients. Clinical grading of varicocele in both sides was assessed before the procedure. All patients were investigated in the form of semen analysis and scrotal Doppler ultrasound, including measurement of testicular volume and diameter of veins before and 3 months post-operatively.

Results: Microscopic varicocelectomy led to a statistically significant enhancement in semen parameters post-operatively, with a *P*-value <0.05. Nevertheless, there was no statistically significant difference in testicular volume post-operatively, with a *P*-value <0.05. Only 1 case of recurrence was reported at the end of the follow-up period, with no other complications reported.

Conclusions: Using microscopic varicocelectomy is a safe and efficient technique in treating varicocele.

Keywords: Varicocele; Infertility; Microscope; Varicocelectomy.

1. Introduction

Varicocele is asymptomatic in most cases or can cause testicular heaviness. Varicocele causes infertility in only 20% of patients. About 15-20% of males have varicocele. The gold standard method for treatment is now considered to be microscopic varicocelectomy [1-2].

2. Subjects and Methods

2.1. Subjects

From June 2023 until May 2024, this study was carried out prospectively on 25 patients fulfilling eligibility criteria. All patients had varicoceles and underwent a microscopic varicocelectomy procedure.

Inclusion criteria

Patients aged 18 to 50 years with clinical varicocele with any of the following criteria: 1st or 2nd infertility, intractable pain, affected semen parameters**,** reduced testicular volume.

Exclusion criteria

Patients less than 18 years old, older than 50 years old, and patients who previously underwent inguinoscrotal surgery on the same side or varicocelectomy.

2.2.Study design

Prospective randomized clinical trial.

2.3.Statistical Methods

To facilitate manipulation, the obtained data were coded, entered into Microsoft Access, and analyzed with SPSS software version 29 in Windows 10 (SPSS Inc., Chicago, USA). Using a descriptive Simple analysis of the qualitative data in the form of percentages and numbers, and the arithmetic means as measurements of the central tendency, the standard deviation was used to quantify the dispersion of parametric quantitative data. In addition, regarding quantitative parametric data, A t-test was employed to contrast the quantitative measurements across two independent groups. On the other hand, the Chi-square test was utilized to assess and contrast two or more qualitative groups for qualitative data. The *P*-value of 0.05 was deemed a statistically significant value.

3. Results

Our study included 25 patients between 18 and 50 years' old underwent microscopic varicocelectomy with mean age of 29.03 years (±7.38), there were 16 patients with 1ry infertility, 7 patients with 2ry infertility and 2 patients unmarried but underwent varicocelectomy due to affected semen parameters, 9 patients (36%) with left side varicocele only and 16 patients (64%) with bilateral varicocele.

During the procedure, testicular artery pulsation was detected in 32 units, including the right and Left sides; testicular artery pulsation was not detected in 9 units, as shown in **Table 1.**

Table 1: Testicular artery pulsation detection in MV.

Testicular artery pulsation	Frequency
Detected	32 (78.04%)
Not-detected	9 (21.96%)

The mean count of ligated Internal spermatic veins was 3.21 ±1, and ligated External spermatic veins was 1.30 ±0.46, as shown in **Table 2.**

Table 2: Number of ligated Internal spermatic and External spermatic veins in MV.

Ligated Veins	MV group
Internal spermatic veins	3.21 (±1)
External spermatic veins	1.30 (±0.46)

The median duration of the MV procedure in the case of unilateral varicocele was 62.8 ±3.6 min, and in the case of bilateral varicocele was 101.2 ±7.6 min. The mean semen parameters of the patients post-operatively were as follows: sperm concentration was 31.83 million/ml (±27.33), progressive motility was 41.37 % (±17.23) and abnormal forms was 46.34 % (±20.02), the study shows a statistically significant rise in the progressive motility and concentration for the sperm, and a diminution of the sperm abnormal forms but there is no statistically significant improvement in semen volume in MV procedure, as shown in **Table 3**.

There was a statistically insignificant difference regarding testicular volume post-operatively (p <0.05). Only one case of recurrence was reported at the end of the follow-up period, with no other complications reported.

Table 3: Comparison of semen parameters pre- and postoperatively in the MV procedure.

MV group	Preoperative	3m post-operative	*P*-value
Volume (ml)	3.53 ±1.20	3.52 ±0.79	0.974*
Concentration (million/ml)	23.50 ±26.93	31.83 ±27.33	0.005*
Progressive motility (%)	28.31 ±18.55	41.37 ±17.23	< 0.001*
Abnormal forms (%)	55.86 ±26.38	46.34 ±20.02	0.008*

4. Discussion

Varicocele is frequently encountered in urological practice, particularly among men experiencing infertility. While the condition may be asymptomatic, it can lead to scrotal pain and/or difficulties with fertility [3].

The varicocelectomy procedure aims to achieve optimal outcomes while minimizing complications, including recurrence or persistence of varicocele, formation of hydrocele, and injury to the testicular artery. Microsurgical techniques are highly effective in open varicocele repair and can preserve more lymph vessels and internal spermatic arteries and tie off more veins compared to the macro-surgical procedure [4].

There are various treatment options available, such as angiographic embolization of the testicular vein, laparoscopic Varicocelectomy and open sublingual microsurgical varicocelectomy, which is the most effective treatment [5].

Zhang and his colleagues stated that there were statistically significant differences in the average count of testicular arteries observed among microscopic and open sub-inguinal varicocelectomy (p <0.001) [4]. In our study, the rate of arterial pulsation detection was 78.04%. Also, Zhang and others found that there was a statistically significant difference in the average number of ligated veins between microscopic and open sub-inguinal varicocelectomy (p <0.001) [4].

In our study, the mean count of ligated Internal spermatic veins was 3.21 (±1) and ligated External spermatic veins was 1.30 (±0.46).

As regards the evaluation of semen parameters pre- and post-operatively, we noted a significant enhancement in the

progressive motility of the sperm, sperm concentration, and a reduction in sperm abnormal forms.

Previous research has demonstrated a significant rise in both sperm quality and gestation rates when microsurgical techniques were used to treat varicocele [6]. In our study, we did not study the pregnancy rate postoperatively, but we documented that 10 couples got pregnant, this cannot be reliable due to the short duration of follow-up.

A meta-analysis study consisting of 14 studies evaluating preoperative and postoperative semen parameters after varicocelectomy, through either sub-inguinal varicocelectomy or high ligation [7], found a notable and comparable rise in sperm motility and count, irrespective of the operative procedure used. Many other studies have reported similar improvements in postoperative semen characteristics [8].

5. Conclusion

The microscopic varicocelectomy procedure is an effective and safe technique for varicocelectomy.

Statement on Ethical Approval: The committee of Ethics in Fayoum University Hospital & Faculty of Medicine approved this study and numbered M 652; all the participants were informed about the details of the procedure and the possible outcomes.

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