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Nature and Science

MARSLAND PRESS
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Microsurgical Subinguinal Varicocelectomy for Male Subfertility: A Prospective Study

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Abstract: Background: Several surgical approaches for varicocelectomy have been described to reach best postoperative outcomes and least complications. **Aim of study:** To assess outcome of microscopic subinguinal varicocelectomy in subfertile men with varicocele and affected sperm quality. **Materials and Methods:** This prospective cohort study was conducted on 100subfertile male with evident varicocele in Tanta Urology Department in 2018 and 2019. We included adult infertile men for more than 1 year with clinical evident varicocele and affected semen parameters. We excluded azospermic males, patients with abnormal hormonal profile or associated factors for male infertility. Patients were followed-up for at least 12 months. **Procedure:** Microscopic sub-inguinal varicocelectomy. **Outcome Measurements and Statistical Analysis:** Data were demonstrated as mean ± standard deviation, ranges or percentages. P value was significant if <0.05. The relation between semen parameters was demonstrated using chi-squared test. **Results and Limitations:** Semen parameters (sperm count, motility, abnormal morphology) changes from the mean baseline are our primary outcomes during the designated 12-months period. All data supported positive impact of varicocelectomy on postoperative semen parameters. **Conclusions:** Microsurgical subinguinal varicocelectomy is the standard procedure in subfertile male with clinical evident varicocele.

[Haytham A. Alshazly, Tarek A. Gamil, Maged M. Ragab, Magdy A. Sabaa. **Microsurgical Subinguinal Varicocelectomy for Male Subfertility: A Prospective Study.** *Nat Sci* 2019;17(12):350-352]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). http://www.sciencepub.net/nature. 41. doi:10.7537/marsnsj171219.41.

Key-words: subfertile, varicocelectomy, Microsurgical.

1. Introduction

Surgical repair of varicocele has significant role in improving semen parameters and spontaneous pregnancy rate after surgery. Spontaneous pregnancy rate reaches up to 55.2% after surgery. (1)

The principle of successful varicocelectomy is based on occlusion of varicosities and preservation of testicular arterial flow. Variable approaches were described to repair varicocele include inguinal, retroperitoneal, subinguinal, laparoscopic approach, sclerotherapy and radiological embolization. (2) The inguinal and subinguinal approaches are those most commonly used, and with the aid of surgical microscope these approaches have minimal risk of injury to arterial supply of testis and less pain postoperative. However, at this level larger number of veins need to be ligated. (3)

2. Materials and Methods

This prospective cohort study was conducted on 100 subfertile male with clinically evident varicocele in Tanta Urology Department, Tanta University Hospitals. A detailed informed consent with guarantee of confidentiality was obtained from all participants. Our local ethical committee approval was obtained under the number 32179/03/18. We included adult infertile men for more than 1 year with clinical evident varicocele and affected semen parameters (at least one of the following semen characteristics: sperm concentration <15 million/ml, progressive motility <32%, or morphorologically normal sperm <4%.). We excluded azospermic males, patients with abnormal hormonal profile or associated factors for male infertility (e.g. Smoking, history of testicular torsion, prior testosterone use, or prior chemotherapy exposure).

All 100 patients underwent microscopic subinguinal varicocelectomy. Ten patients didn't show up in follow up visits.16x magnification power surgical microscope (Leica m530 OHX surgical microscope) was used in all cases to avoid injury to the vas, the testicular artery and lymphatic vessels then ligation of the rest of cord structures by synthetic braided suture such as polyglactin (Vicryl) 3/0.

Outcome Measurements and Statistical Analysis:

Semen parameters (sperm count, motility, abnormal morphology) changes from the mean baseline are our primary outcomes during the designated one-year period. All data were demonstrated as mean ± standard deviation, range and

median or percentages. Statistical analysis was carried out using student's t and chi-square tests. p-value was significant if <0.05.

3. Results

Preoperative Data

90 patients were included. Baseline Anthropometric, clinical, and semen features of the analyzed patients were collected. Their age ranged from (23-36) with body mass index (BMI) from (20.7-30.2).

Table 1: Anthropometric measures

Age	Range	23	–	36
	Mean ± S. D	28.31	±	3.61
BMI	Range	20.7	–	33.2
	Mean ± S. D	28.50	±	3.61

Table 2: Preoperative hormonal profile

Total testosterone	Range	249	–	581
	Mean ± S. D	421.29	±	68.98
FSH	Range	1.7	–	9.6
	Mean ± S. D	5.15	±	2.00
LH	Range	1.7	–	12
	Mean ± S. D	5.86	±	2.52

Base line semen parameters:

Base line semen parameters (concentration, total motility and abnormal forms) showed stress pattern.

As regard to grade of varicocele

We had 7 patients with grade I varicocele, 18 grade II and 65 with grade III (Table 4).

Semen parameters changes after microscopic subinguinal varicocelectomy (Tables 5)

As regard to changes in semen parameters, all parameters improved significantly during follow-up versus baseline ($p < 0.0001$).

Table 3: Base line semen parameters of both arms

Concentration before varicocelectomy	Range	7	–	35
	Mean ± S. D	16.30	±	6.22
Motility before varicocelectomy	Range	12	–	57
	Mean ± S. D	26.92	±	10.01
Abnormal forms before varicocelectomy	Range	55	–	77
	Mean ± S. D	70.06	±	4.80

Table 4: Preoperative grade of varicocele

I	N	7
	%	7.8%
II	N	18
	%	20.0%
III	N	65
	%	72.2%
Total	N	90
	%	100.0%

Table 5: Postoperative Semen parameters changes

		Before			After			t. test	P-value
Concentration	Range	7	–	35	16	–	52	155.470	0.001*
	Mean ± S. D	16.30	±	6.22	29.64	±	8.02		
Motility	Range	12	–	57	20	–	66	90.728	0.001*
	Mean ± S. D	26.92	±	10.01	40.83	±	9.57		
Abnormal forms	Range	55	–	77	39	–	74	144.810	0.001*
	Mean ± S. D	70.06	±	4.80	58.98	±	7.30		

4. Discussion

Semen quality is taken as a surrogate measure of male fecundity in clinical andrology. (4).

In a prospective study, Guzick et al. demonstrated that infertility for semen parameters such as a semen concentration of <13.5 million/ ml, motility <32%, and normal morphology <9%. In addition, they reported that the percentage of normal semen morphology was the most significant parameter between the fertile men and infertile patients. (5) In contrast, Nallella et al. suggested that semen concentration and motility were superior predictors to the percentage of normal morphology for differentiating between fertile and subfertile male. (6)

A lot of investigators have reported improvement in semen quality in 51–74% of patients and an increased pregnancy rate of 24–71% after surgery. Some authors however reported no beneficial effect of varicocelectomy on semen quality and pregnancy rates (7,8).

A recent meta-analysis and review (Baazeem et al., 2011) proved the effectiveness of varicocelectomy in improving semen quality. The authors selected 22 prospective studies of sperm denisty before and after surgery in men with abnormal semen parameters and

clinical varicoceles. The mean improvement in sperm concentration for the 22 studies was 12.3 million sperm/ml (95% confidence interval [CI], 7.07–14.65; p <.001). Similarly, after varicocele repair, improvement in sperm total motility was 10.86% (95% CI, 7.07–14.65; p <.001) in collected data from 17 prospective studies. Progressive sperm motility showed improvement by 9.69% (95% CI, 4.86–14.52; p =.003) in data from 5 prospective studies. All improvements were statistically significant. (9)

In the present study, the mean of all semen parameters improved significantly during follow-up visits (p = 0.001). For sperm concentration (baseline 16.3 +/- 6.22, follow-up 29.64 +/- 8.02), for progressive motility (baseline 26.9 +/- 10.01, follow-up 40.83 +/- 9.57), and for abnormal morphology (baseline 70.06 +/- 4.8, follow-up 58.98 +/- 7.3)

Abdel-Meguid et, al, like our study, the mean of all semen parameters improved significantly during follow-up versus baseline (p < 0.0001). For sperm concentration (baseline 18.1 +/- 5.8, follow-up 32.2 +/- 10.6), for progressive motility (baseline 25.3 +/- 12.8, follow-up 41 +/- 10), and for normal morphology (baseline 31.2 +/- 4.1, follow-up 39.1 +/- 4.5). (2)

Madgar and coworkers, similarly performed a randomized controlled study of high ligation of the spermatic vein, proved that infertile men with varicocele as the only demonstrable factor of infertility, varicocele repair improved sperm quality and fertility rate (10).

Zini, Azhar et al in 2011 reported that Varicocele repair was associated with an increase in the mean sperm denisty and progressive sperm motility, although the differences were not statistical significance. (11)

In contrast, Nilsson et al. found no statistically significant improvement in semen parameters, morphology, or progressive motility in patients submitted to surgery compared with an untreated control arm (12). Similarly, Nieschlag et al. have suggested that regular follow up of infertile males is as effective as varicocele repair in achieving pregnancies (13).

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12/11/2019