

Improvement in Semen Parameters and Fertility Rate After Varicocelectomy

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ABSTRACT

Objective To determine the mean change of semen parameters and fertility rate after surgery for varicocele.

Study design Cross sectional study.

Place & Duration of study Department of Urology, Jinnah Postgraduate Medical Center (JPMC) Karachi, from January 2015 to December 2019.

Methodology Patients with primary infertility with oligo-asthenospermia, and clinically demonstrable varicocele (Grade II and III) were included in the study. Detailed history and examination were done. Doppler color ultrasound was used to assess the diameter of varicocele based upon diameter of vessels > 2.4mm and reversal of venous flow. Pre and post- varicocelectomy semen analysis were done. Sixth month sample report was taken as reference. Pre and post- operative semen parameters were compared and tabulated. Postoperative fertility rate and complications were also recorded.

Results Total of 95 patients were included in this study. Age was from 18 year to 45 year with mean age of 32.63± 7.97 year. Fifty-five patients (58%) belonged to age more than 30 years. Unilateral left sided primary varicocele was noted in 84.2% of patients. Grade II varicocele was noted in 69.4% of patients while grade III in 30.6%. Both open inguinal and laparoscopic methods were used for varicocelectomy. After surgery, sperm concentration, motility and morphology of semen were significantly increased ($p < 0.001$) but little change found in the volume of semen. There was no significant difference in improvement in semen parameters in patients below and above 30 years of age ($p = 0.24$). Postoperative fertility rate was 14.7%, with recurrence rate of 4.2%.

Conclusion Varicocelectomy significantly improved the semen parameters and chances of fertility.

Key words Primary infertility, Varicocelectomy, Semen parameters.

INTRODUCTION:

Infertility in males has grave consequences on the marital life. Male infertility accounts for 30-50% of cases among infertile couples.¹ There are many risk factors including obstructive, ejaculatory disorders,

age, genetics and occupation related issues.² Among these factors the most common and correctable cause is varicocele which is considered as a vascular lesion characterized by abnormal dilation of gonadal veins (pampiniform plexus and internal spermatic vein) in the scrotum and around spermatic cord due to inversion of blood flow.³ For normal spermatogenesis scrotal temperature should be 1-2 °C less as compared to body temperature, which is regulated by pampiniform plexus. In varicocele this temperature regulation mechanism is disturbed which affects badly the process of spermatogenesis and results in male infertility.^{4,5} It affects about 20-24% of general population while in infertile male its prevalence

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is 30-40%.⁶ It results in progressive decline in the semen quality.⁷

Varicocelectomy is a commonly performed surgical procedure in infertile male patients who present with abnormal semen parameters. The role of the surgery to improve quality of semen and thus pregnancy rate in couples.^{8,9} The aim of this study was to find out the effect of varicocelectomy on semen parameters and to document fertility rate after the procedure.

METHODOLOGY:

This cross sectional study conducted in the Department of Urology at Jinnah Postgraduate Medical Center Karachi, from January 2015 to December 2019 with minimum of six months follow up. Approval of ethical review board was taken. A total of 95 male patients were included after written and signed consent. All patients with primary infertility of more than one year duration with regular, unprotected intercourse, having oligoasthenospermia, with clinically demonstrable varicocele (Grade II and III) were included. Female related infertility factors in spouse of these men were ruled out. Patients with secondary infertility, recurrent varicocele, secondary varicocele, undescended testis or history of orchidopexy, patients with azoospermia or with severe oligo-zoospermia (<5million/ml) were excluded. Detailed history and examination were performed. Doppler color ultrasound was used to assess the diameter of varicocele (diameter > 2.4mm) and reversal of venous flow. Dublin and Amelar classification was used for grading the varicocele.¹⁰ The method of semen collection was by masturbation after 3 days of abstinence from sexual intercourse and examined within one hour after collection. From each patient two pre operative semen samples were collected for testing at least two weeks apart and baseline semen parameters noted.

All patients underwent varicocelectomy. Of the total, 54 patients underwent open conventional inguinal surgery while in 41 laparoscopic approach was used. After two weeks rest for wound healing, all patients were counseled for unprotected intercourse especially during ovulation period of their partner. They were also requested to report immediately if pregnancy occurred. Postoperative semen analyses were performed at 3 and 6 months interval. The sample obtained at 6th month was taken as reference. The percentage of progressively motile sperms were obtained by summation of rapid and slowly progressive motilities. The value of total motility count (TMC) was measured by a standard

formula: $TMC = \text{volume (ml)} * \text{concentration (millions per ml)}$

Data were collected and analyzed on SPSS version 21. Seminal parameters were recorded as volume in ml, concentration in million/ml, total sperm in million/ ejaculate, motility in percentage (%) of progressive motile spermatozoa, morphology in percentage (%) of normal sperm morphology. For categorical variables, frequency (percentage) was used, and for continuous variables mean + SD was calculated. Paired sample t test was used to find change in pre operative parameters after surgery. Effect modifiers like age, and laterality of varicocele were controlled through post stratification and independent sample t-test was applied for statistical significance. A $p < 0.05$ were taken as significant.

RESULTS:

Ninety-five patients were included in this study with age from 18 years to 45 years and mean age of 32.63±7.97 year. Fifty-five patients (58%) were more than 30 years of age. Eighty (84.2%) men had unilateral left sided varicocele while 15 (15.8%) patients had bilateral varicocele. Sixty-six (69.4%) patients had Grade II and 29 (30.6%) Grade III varicocele. All bilateral cases were operated laparoscopically. Mean hospital stay was 3.06±1.35 days.

There was little change in sperm volume after varicocelectomy but significant difference was observed in sperm concentration, motility as well as in morphology. Mean change of semen parameters before and after surgical correction of varicocele are presented in the Table I which was clinically significant ($p < 0.001$). There was no significant difference in the improvement in semen parameters in patients below and above 30 years of age (Table II). During the first three months of follow up after surgery, nine couples conceived, making the fertility rate of 9.4%. In subsequent three months, five more pregnancies occurred which further improved the rate to 14.7% in six months. Postoperative complications included wound infection (n=2), development of secondary hydrocele (n=2) and recurrence of varicocele in four (4.21%) patients.

DISCUSSION:

The most common and correctable cause of male infertility is varicocele.¹¹ This is associated in 40% of men with primary infertility and 80% of men with secondary infertility, but it can also occur in 12% of men with normal semen parameters.¹² The presence of varicocele does not always affect spermatogenesis.¹³ Age range in our study was from 18 years - 25 years which is similar to other

Table I: Comparison of Mean Change of Seminal Parameters Before and After Six Months of Surgery

	Pre (n=95)	Post (n=95)	Paired Differences			t value	P-value
			Mean Difference	95% Confidence Interval of the Difference			
				Lower	Upper		
Sperm volume (ml)	3.6+1.13	3.86+0.78	0.26+1.41	0.1	0.5	2.59	p=0.005
Sperm concentration (million/ml)	24.21+6.19	38.7+14.76	14.49+15.38	12.3	16.7	13.156	p=0.001
Sperm motility (%)	12.84+4.62	24.23+9.35	11.38+10.53	9.9	12.9	15.095	p=0.001
Sperm morphology	16.96+7.75	20.89+10.59	3.93+14.05	1.9	5.9	3.908	p=0.001
Total motility count (TMC)	6.87+1.39	26.27+5.27	p=0.001	p=0.001	p=0.001	p=0.001	p=0.001

studies.^{14,15} Third decade is the usual age of marriage and procreation in our society and diagnosis of infertility. In this study majority of men had left sided primary varicocele which is similar to other study.¹⁴

Varicolectomy has been reported to improve the semen parameters in patients with impaired semen profile and palpable varicocele.¹⁶ This effect has been observed in our study. However there was little improvement in the volume of semen. This has been observed in other studies as well.¹⁷ Abdel-Meguid et al did randomized control trial and found significant improvement in sperm parameters in varicolectomy group compared to control group favoring our results.¹⁸ Several other studies also mentioned that lower baseline sperm density was correlated with less dramatic improvements after varicocele repair.¹⁹ Another study by Acar H et al found that men with baseline sperm concentration of <5 million/mL were less likely to see improvements in semen parameters after varicocele repair.²⁰

In our study there was no significant difference in improvement in semen parameters in patients below and above 30 years of age. This observations was also reported by Resorlu et al study in which there was no significant alterations in sperm count and motility rates after varicocele surgery between different age groups.²¹ However Zini et al found that sperm parameters and spontaneous pregnancy rate following varicolectomy in couples with advanced paternal age group > 40 years showed better results when compared to younger couples.²²

In our study fertility rate six months after surgery was 14.7% while other studies reported much higher fertility rate. In one study six months fertility rate

was 21.1%, while other study showed the conception rate of 28.1%.²³ In our study 4.21% patients developed recurrent varicocele. Recurrence rate after open and laparoscopic varicocelectomy in most of the studies was 3-7%, which is almost similar to our study.¹²

CONCLUSION:

Varicolectomy significantly improved the semen parameters and increased chances of fertility.

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Table II: Comparison of Seminal Parameters Among Age groups Before and After Six Months of Surgery

Age Groups	n=95	Seminal Parameters	After 6 Months of Surgery	Before Surgery	Comparison of Mean Difference Before and After Surgery Within Age Groups	
			Mean+SD	Mean+SD	t-value	p-value
<30 Years	n=40	Sperm volume (ml)	3.75+0.75	3.59+1.18		
>30 Years	n=55	Sperm volume (ml)	3.94+0.79	3.61+1.10		
Among Age Groups		t-value	1.18	0.08	0.72	0.47
		p-value	0.24	0.93	1.87	0.07
<=30 Years	n=40	Sperm concentration (million/ml)	37.04+13.4	24+6.12		
>30 Years	n=55	Sperm concentration (million/ml)	39.88+15.6	24.22+6.26		
Among Age Groups		t-value	0.92	0.17	6.36	0.001*
		p-value	0.35	0.86	6.9	0.001*
<30 Years	n=40	Sperm motility (%)	24.38+9.09	12.86+4.92		
>30 Years	n=55	Sperm motility (%)	24.11+9.56	12.82+4.42		
Among Age Groups		t-value	0.13	0.01	7.04	0.001*
		p-value	0.89	0.96	7.94	0.001*
<30 Years	n=40	Sperm morphology	21+10.55	15.04+7.89		
>30 Years	n=55	Sperm morphology	20.82+10.67	17.67+7.60		
Among Age Groups		t-value	0.08	1.63	2.86	0.005*
		p-value	0.93	0.1	1.78	0.07
<30 Years	n=40	Total motility count (TMC)	26.11+5.37	6.79+1.37		
>30 Years	n=55	Total motility count (TMC)	26.39+5.21	6.92+1.42		
Among Age Groups		t-value	0.25	0.44	22.04	
		p-value	0.79	0.65	26.73	

*** Significant difference**

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Received for publication: 09-10-2020

Accepted after revision: 04-01-2021

Author's Contributions:

Muhammad Mansoor: Concept, manuscript writing and data analysis.

Ahmed Nawaz: Data collection & literature search.

Saeed Ahmed Khan: Data analysis & manuscript writing.

Conflict of Interest:

The authors declare that they have no conflict of interest.

Source of Funding: None

How to cite this article:

Mansoor M, Nawaz A, Khan SA: Improvement in semen parameters and fertility rate after varicocelectomy. *J Surg Pakistan*. 2020;25 (4):143-7. Doi:10.21699/jsp.25.4.3.