

The Role of Varicocele Grade on Seminal Fluid Parameters Post Varicocelectomy: Experience at Prince Hussein Urology Centre

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ABSTRACT

Objectives: To assess the role of varicocele grade on seminal fluid parameters improvement post varicocelectomy.

Methods: This retrospective study was conducted at Prince Hussein Urology and Organ Transplant Center from the period of January 2011 to December 2014. Two hundred and seventy five male patients with clinical varicocele who underwent varicocele surgery for abnormal seminal fluid parameters were involved in the study. Forty five patients had grade I varicocele, 132 patients had grade II varicocele and 98 patients had grade III varicocele. Two seminal fluids analysis tests were obtained from each patient preoperatively and another two (3-6) months postoperatively to assess the improvement in both sperm count and total sperm motility postvaricocelectomy.

Results: The sperm count improved in all three grades of varicocele postoperatively. Grade III varicocele patients had the highest improvement from (21.5± 13.8 million/ml) to (39.8 ± 10.2million/ml), P value <0.05 in 81% of patients. The mean sperm count improvement for grade I, II and III varicocele was 10.1, 12.3 and 13.5 million/ml respectively. Also the total sperm motility improvement was the highest in patients with grade III varicocele from (34.5± 13.6 %) to (55.3 ± 11.9 %), P value <0.05 in 83% of patients. The mean sperm motility improvement postvaricocelectomy was 14.2% , 18.1% and 23.6% for grade I, II and III varicocele respectively.

Conclusion: The grade of varicocele has a direct impact on sperm parameters improvements post varicocelectomy with grade III varicoceles had the greatest improvement.

Key words: Varicocele ; Sperm ;Grade ;Seminal fluid.

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Introduction

Varicocele is an abnormal dilatation and tortuosity of the pampiniform plexus (the testicular veins).^(1,2) It affects 15 % of normal male population, 30 - 40 % of primary infertile men and about 70 – 80 % of secondary infertile men.^(3,4) It is located in the left side in more than 90% of cases.^(5,6)

Varicocele has a direct effect on sperm function , shape and count . It mainly affects the motility and morphology initially, but

later on sperm count is affected too.^(7,8) The duration of varicocele may have a negative impact on sperm count improvement and rate of pregnancy postoperatively.⁽⁹⁾

Varicocele can be subclinical that needs imaging technique for the diagnosis,⁽¹⁰⁾ or clinical which is detected by physical examination and it is divided into three grades:

Grade I: palpable during valsalva maneuver at room temperature.

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Grade II: palpable during upright position at room temperature.

Grade III: visible during upright position at room temperature. ^(11, 12)

Varicocele alters the sperms by several mechanisms, mainly by heat stress, oxidative stress, toxic metabolites effect and antisperm antibodies formation. ^(13, 14)

The aim of our study is to assess the role of varicocele grade on seminal fluid parameters improvement post varicocelectomy.

Methods

This retrospective study was conducted at Prince Hussein Bin Abdullah the Second Center for Urology and Organ Transplant, Amman - Jordan. The medical records of 275 patients with clinical varicocele who underwent varicocele surgery for abnormal semen parameters from January 2011 to December 2014 were reviewed. An approval from the Royal Medical Services Ethical committee was obtained to conduct the study. All patients were diagnosed to have clinical varicocele by physical examination by two urologists at least in both supine and standing positions at room temperature. The patients' age was between (16 – 43) years. The patients were divided into three groups according to varicocele grade; 45 patients had grade I varicocele, 132 patients had grade II varicocele and 98 patients had grade III varicocele. Two seminal fluid analysis tests were obtained from each patient preoperatively with one to three weeks interval between each test. All patients had three to five days of sexual abstinence before giving the sample. Two additional tests were obtained three to six months postoperatively to evaluate the results. The seminal fluid parameters were analyzed according to World Health Organization (WHO) 2010 criteria. ⁽¹⁵⁾ Sperm count less than 15 million/ml and total motility less than 40% were considered abnormal. Patients with azoospermia or abnormal sex hormones levels (follicular stimulating hormone, luteinizing hormone and testosterone) were excluded from the study. All patients were treated surgically with 239

patients underwent high ligation varicocele, 24 patients and 12 patient underwent laparoscopic varicocele and low ligation varicocele respectively. Statistics were analyzed by the student's t test with the continuous variables expressed as mean \pm standard deviation and categorical variables as numbers and percentages. P value $<$ 0.05 was considered statically significant.

Results

The mean age of the patients was 31 years (ranging from 16 – 43 years). In all patients the varicocele was resolved post operatively with no recurrence on the postoperative follow-up period (3 - 6 months).

The sperm count improved in 69% of patients with grade I varicocele, in 72% of patients with grade II varicocele and in 81% of patients with grade III varicocele. The sperm count improvement post varicocelectomy was statically significant (P value $<$ 0.05) in all grades of clinical varicocele. Table I. although patients with grade III varicocele had the lowest sperm count preoperatively (21.5 ± 13.8 million/ml), they showed the highest improvement postoperatively (39.8 ± 10.2 million/ml) with the mean sperm count rise was 13.5 million/ml. While in patients with grade I and II varicocele the mean sperm count rise was 10.1 million /ml and 12.3 million/ml respectively. Also the total motility of sperm improved in all three grades. The sperm motility improvement was higher in both grade II and III varicocele than grade I varicocele as shown in Table I. patients with grade I had preoperative sperm motility of ($56.6 \pm 22.1\%$) that improved postoperatively to ($67.2 \pm 20.3\%$) this rise was statistically significant (P value $<$ 0.05) with a mean rise of total sperm motility of 14.2%. 60% of patients with grade I varicocele showed sperm motility improvement . Patients with grade II varicocele had a mean rise of sperms motility by 18.1% in 67% of the treated patients, the preoperative sperm motility of ($47.2 \pm 18.3\%$) rose to ($59.5 \pm 17.4\%$) P value $<$ 0.05 (Table I) .

Table I: The relation of varicocele grade to semen parameters pre & postvaricocelectomy.

Varicocele Grade	Preoperative		Postoperative		P value
	Sperm count (million/ml)	Motility %	Sperm count (million/ml)	Motility%	
Grade I	31.1±18.6	56.6±22.1	46.1±17.3	67.2±20.3	<0.05
Grade II	29.3±16.7	43.2±18.3	44.2±14.6	59.5±17.4	<0.05
Grade III	21.5±13.8	34.5±13.6	39.8±10.2	55.3±11.9	<0.05

Table II: The relation of varicocele grade to semen parameters represented as median.

Varicocele Grade	Preoperative		Postoperative		P value
	Sperm count (million/ml)	Motility %	Sperm count (million/ml)	Motility%	
Grade I	13 (3 -53)	36 (10-80)	21 (2-65)	58 (12-88)	<0.05
Grade II	11 (2 -49)	23 (15-64)	23 (3-61)	46 (19-78)	<0.05
Grade III	11(2 -39)	25 (11-51)	26 (3-52)	49 (16-69)	<0.05

Table III : Percentage of parameters improvement postoperatively in relation to varicocele grade.

Varicocele Grade	Sperm count			Sperm motility		
	Improvement	Remained same	Got worse	Improvement	Remained same	Got worse
Grade I	69 %	19 %	12%	60 %	21 %	19%
Grade II	72 %	11 %	17%	67 %	16 %	17%
Grade III	81 %	14 %	5%	83 %	10 %	7%

Grade III varicocele patients showed the highest improvement in total sperm motility from (34.5 ± 13.6%) to (55.3 ± 11.9%) in 83% of patients which was statically significant (P value <0.05).The mean sperm total motility improvement in patients with grade III varicocele post surgery was 23.6%.

Discussion

Varicocele management improves seminal parameters in about two-thirds of patients and it may enhances spermatogenesis in azoospermic and sever oligospermic patients^(8,16). However some investigators like Kamischke et al showed that varicocele repair is of limited help in oligozospermic and subfertile men. ⁽¹⁷⁾Hamadi et al showed that varicocele management improves sperm count in both clinical and subclinical varicocele while sperm motility is improved significantly in clinical varicocele group only. ⁽¹⁸⁾

There are various options for varicocele treatment such as open surgical, laparoscopic , embolization and sclerotherapy which makes the comparison of outcome slightly complicated, nevertheless there is no significant difference in post treatment semen improvement. ⁽¹⁹⁾ Ligouri *et al* showed that varicocele sclerotherapy can improve sperm count in 82% of patients while sperm motility

is improved in 73% of patients ⁽²⁰⁾ These results are relatively similar to our results in our surgically treated patients.

The relationship between varicocele grade and semen parameters improvement postvaricocele management was investigated in the literature. Pasqualotto et al conducted a study on a 61 patients with varicocele and demonstrated that men with large varicoceles have poorer semen parameters preoperatively, but have a greater improvement post operatively than small and medium sized varicoceles. ⁽²¹⁾

Shabana et al demonstrated that there is no cut-off value for semen parameters in the literature that predicts the success of the treatment ; their patients mean sperm count and progressive motility improvement post operatively was 10.4 million/ml and 25.4% respectively and they showed that patients with grade II and III varicoceles had the most improvement. ⁽²²⁾

Two separates studies conducted by Steckel et al and Takahara et al showed that patients with grade III(large) varicoceles had the greatest improvement in both sperm count and motility post management more than small varicoceles , which is similar to our results. ^(23,24)

In the contrary Wang et al showed that varicocele grade dose not predict the sperm count or motility improvement post varicocelectomy.⁽²⁵⁾

A recent study conducted by Reddy et al showed that in patients with grade III varicocele not only the semen parameters improves post surgery more than both grade I and II, but also significantly rises the testicular volume that correlates with the sperm parameters improvement.⁽²⁶⁾

Many studies in the literature showed the beneficial effect of varicocele surgery in improving pregnancy rate in infertile couples. Grasso et al showed that 42.5% of infertile couples got pregnant following varicocele surgery with a significantly higher rate in the first postoperative period.⁽²⁷⁾, while Ghanaie et al showed that varicocele repair not only improves pregnancy rate compared to expectant management 44.1% to 19.1% respectively, but also significantly decreased miscarriage rates.⁽²⁸⁾

Conclusion

The grade of varicocele has a direct impact on sperm parameters improvement post varicocelectomy with grade III varicoceles had the greatest improvement.

Limitations of the study

This study has not addressed the effects of varicocelectomy on the pregnancy rate with or without assisted reproductive techniques.

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