

## CLINICAL STUDY OF THE EFFECT OF VARICOCELECTOMY ON PARAMETERS OF SEMEN ANALYSIS OF INFERTILE MEN

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### Abstract

**Background:** Varicocele is the most widely seen and reversible cause of infertility to the male component. Yet varicocele's precise pathophysiology is not known till date. Our study aimed to assessing the effect of varicocele on the semen composition characteristics by examining semen before and after varicocele ligation and also assessing changes in fertility status after varicocele ligation. The goal is to compare sperm counts, motility and morphology with teratozoospermia and asthenozoospermia in patients with varicocele. (where motility and morphology of the sperm is abnormal). **Methods:** Over a period of 1 year 61 cases of diagnosed varicocele associated with male infertility over a 5- year period were included. All the patients underwent pre-operative and post-operative study of semen analysis with 3 to 6 months interval after varicocelectomy surgery. **Results:** In baseline semen analysis the median sperm concentration of 51 patients was 8 million / ml, and the median overall sperm count was 18 million patients. The rate of sperm motility forward median (A + B percent) in 51 cases was 20 percent. In 51 patients the median normal sperm morphology was 8 per cent. Compared to other modalities such as inguinal surgery and laparoscopic surgery, post-operative sperm count and motility improvement were marginally better in sub-inguinal varicocelectomy surgery when compared with the results. **Conclusion:** Varicocelectomy gives the production of sperm, motility, and overall morphology a statistically significant increase. Both approaches to varicocelectomy (sub-inguinal, inguinal, or laparoscopic) have shown substantial improvement in seminal parameters, with the sub-inguinal approach being successful at improving motility parameters.

**Keywords---** Male infertility, oligospermia, motility of sperms, varicocele and varicocelectomia

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### INTRODUCTION

Varicocele is the most widely encountered and surgically reversible cause of infertility to the male component, this entity can be defined as tortuous and dilated veins of pamp iniform plexus where dilatation is the result of retrograde blood flow through the internal spermatic veins. [1] In young adults clinical evidence of varicocele is seen in 9% to 23% as suggested in most recent studies. [2,3]. In infertile males, varicocele is the finding in 40% of cases.

The incidence of infertility among couples attempting to conceive is 10–15 %, with male infertility contributing almost 50 % of cases. [4-6]. Although multiple factors may important play a role in male infertility, varicocele is the most common finding in male infertility, with a prevalence of 19–41% of males with primary infertility and 45–81% of males with secondary infertility. [7] Varicocele is a condition of the puberty and is rarely observed in boys < 10 years old.[8]

Work is underway to understand the etiology and pathophysiology of varicocele and its effect on spermatogenesis. The precise pathophysiology of varicocele is not understood for certain, but varicocele is thought to affect normal testicular function by elevating scrotal temperature by reflux of warm abdominal blood by incompetent venous sperm valves.[9-11]

The veins most commonly involved are the internal spermatic veins, but also the external spermatic veins and the cremasteric

veins. [12,13] Varicoceles are the most common abnormality recently found in men who are tested for infertility.[14] Varicocele is often considered responsible for early ejaculation and spontaneous abortion, although this has certainly not been proved.[15-19]

Repair of varicocele leads to enhancement in semen quality has been advocated for the first time by Barwell in 1885 followed by Bennett, in 1889; Macomber and Sanders, in 1929. [20-22]. Keeping in mind all these statements by above mentioned authors , surgical treatment of varicocele has lag behind until 1952 when a surgeon from Edinburgh named Sellboy Tulloch demonstrated excision of bilateral varicocele in an azoospermic patient which leads to restoration of patients fertility.[22]

By then, the literature has included thousands of articles on the treatment and surgical correction of varicoceles. Unfortunately, this entire body of experimental evidence has failed to either define the spermatogenesis dysfunction mechanism or explain why surgical correction enhances semen parameters. Infertile males with varicocele whose semen analysis suggestive of oligospermia, asthenospermia, teratospermia is an indication for performing varicocelectomy surgery. In patients with normal sperm density with teratospermia or asthenospermia utility of varicocelectomy surgery is doubtful.

Effects of varicocelectomy has been assessed in this study with reference to improvement in semen parameters.

**MATERIALS AND METHODS**

The present study was conducted in the Dept. of Surgery at Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi (Meghe), Wardha, Maharashtra, in collaboration with Datta Meghe Medical College and Shalinitai Meghe Hospital and Research Centre, Hingna, Nagpur.

Over a period of 1 year 61 cases of diagnosed varicocele associated with male infertility over a 5- year period were included. All the patients underwent pre-operative and post-operative study of semen analysis with 3 to 6 months interval after varicocelectomy surgery.

In our research were included all those patients with primary infertility with oligoasthenoteratospermia, with any grade of clinical varicocele, subclinical varicocele with oligoasthenoteratospermia diagnosed in the Doppler test and those men with a vein diameter > 2,4 mm with reflux in the Valsalva maneuver with no obvious female infertility factor.

**Exclusion criteria**

1. Patients with initial infertility,
2. Varicocele with normal semen parameters,
3. Initial varicocele,
4. Recurrent varicocele
5. Males with related female factor infertility.

**Inclusion criteria**

History exploring all aspects related to fertility. Clinical history is taken as an orientation from the SNAPPS technique which provides students with clear steps and the obligation to articulate their clinical reasoning voicing concerns and evaluating the preceptor which leads to the identification of issues for self-study in order to improve data quality.[23]This was required to eliminate other factors that might influence the fertility. Throughout the research, only patients with demonstrable varicocele (clinically or through investigations) and no other causes of infertility were taken in.

After 3 days of sexual abstinence a thorough semen analysis was performed. Within 1 h of collection the specimen was examined. Three specimens of each patient were examined over a 2-month period to provide a baseline sperm assessment. All the patients in the study underwent varicocele repair by sub-inguinal approach, inguinal approach, or laparoscopic approach. In bilateral varicoceles cases, both sides have been handled at the same time. All the patients underwent rigorous follow-up. The following criteria were assessed: history and clinical review at intervals of every 3 months, semen analysis at intervals of every 3 months.

**Statistical Analysis**

All estimated results were expressed as mean±SD. Mean values will be assessed for significance by paired student-t test. A statistical analysis will be performed using the Statistical Package for the Social Science program (SPSS, 24.0). Frequencies and percentages will be used for the categorical measures. Probability values p < 0.05 will be considered statistically significant.

**OBSERVATION AND RESULTS**

The present study was conducted in the Dept. of Surgery, contain total 51 patients in different age group.

**Table 1.** Distribution of patients according to age

Sr No	Age (In Years)	No of Patients	%
1	21-30 years	32	62.8
2	31-40 years	19	37.2
	Total	51	100

Table no 1. shows agewise distribution of study population where 62.8% i.e., 32 patients belong to their second to third decade.

**Table 2.** Duration Of Infertility

Sr No	Duration of Infertility Years	No of Patients	%
1	1 year	08	15.68
2	2 year	14	27.45
3	3 year	06	11.76
4	4 year	18	35.29
5	5 year	05	09.80

Table no 2. shows duration of fertility, where majority of the patients give history of infertility since 4 years (18 patients i.e.,35.29%).

**Table 3.** According to side of Varicocele

Sr No	Side of Varicocele	No of Patients	%
1	Right	05	09.80
2	Left	27	52.94
3	Bilateral	19	37.25
	Total	51	

Table no 3. shows most of the patients 27. i.e, 52.94% are diagnosed with left sided varicocele, followed by bilateral varicocele 37.25% and right being the least common 09.80%.

**Table 4.** Grades of Varicocele

Sr No	Grades	No Of Patients	%
1	Grade I	03	05.88
2	Grade II	33	64.70
3	Grade III	15	29.41
	Total	51	

Table No 4 shows distribution of study population according to grade of varicocele which reveals Grade II varicocele in majority of the patients 33 i.e., 64.70%, followed by Grade III which constitutes 29.41%.

**Table 5.** Type of Surgery Performed For Type Of Disease.

Sr No	Type of Surgery	Unilateral Varicocele	Bilateral Varicocele	Total
1	Inguinal Varicocele Ligation	20 cases	08 cases	28 cases (54.90%)
2	Subinguinal Varicocele Ligation	07 cases	05 cases	12 cases (23.52%)
3	Laparoscopic Varicocele Ligation	09 cases	02 cases	11 cases (21.56%)

Table 5 shows distribution of surgical procedures where 28 patients (54.90%) undergone Inguinal Variceal Ligation, 12 patients (23.52%) treated with sub-inguinal variceal ligation and 11 patients(21.56%) managed by doing laparoscopic variceal ligation. 08 cases were bilateral in the reconstruction of inguinal varicocele, and 20 were unilateral. In the reconstruction of sub-inguinal varicocele, 07 cases were unilateral varicocele,

and 05 were bilateral. In varicocele repair with laparoscopy, 02 cases were bilateral, and 09 were unilateral.

**Table 6.** Percentage of Improvement in Semen Analysis with reference to Type of Surgeries

Sr No	Parameters	Inguinal (%)	Sub-inguinal (%)	Laparoscopic (%)
1	Sperm Concentration (million/ml)	78.3	78.2	74.7
2	Total Sperm Count (million)	73.2	74.3	71.5
3	Motility (A+B)%	60.6	63.4	56.2
4	Morphology (normal%)	45.6	49.4	41.6

**Table 7.** Post Varicocelectomy Improvement in Semen Analysis

Sr No	Parameters	Pre-operative (Avg)	Post-Operative (Avg)	% Of Improvement
1	Sperm concentration (million/ml)	12.39	16.87	74.5
2	Total Sperm Count (million)	19.4	24.8	76.5
3	Motility (A+B)%	28.6	36.67	69.5
4	Morphology (normal%)	11.07	21.1	54.5

**Table 8 .** Percentage Improvements in Semen Parameters in Gradewise Varicoceles Post Varicocelectomy

Sr No	Parameters	Subclinical Varicocele (%)	Grade I, II Varicocele (%)	Grade III Varicocele (%)
1	Sperm Concentration (million/ml)	72.8	74.7	48.7
2	Total Sperm Count(million)	70.6	87.2	74.3
3	Motility (A+B)%	51.00	62.00	40.00
4	Morphology (normal%)	40.2	57.6	24.4

Table 6, 7 and 8 shows results of surgical interventions in different grades of varicoceles with type of surgical variations in terms of improvements ( in percentage) of parameters of semen analysis.

**Complications**

All were discharged after 48 h if complications were not present. The complications were noted below. Postoperative fever was found in 4 patients in laparoscopic repair on the 1st day. The fever had been subsidized by oral antipyretics. In three patients undergoing inguinal repair, wound infection was noted on the 7th postoperative day. This was subsidized as op basis by oral antibiotics and routine dressings.

**Follow-up**

All the patients were told to come after the surgery at 3, 6, 9 and 12 months for follow-up inquiries. The following parameters were evaluated during the follow-up: A complete history including the history of conception or pregnancy, a comprehensive clinical review, testing including semen analysis and a postoperative test of Doppler at 6 months.

**DISCUSSION**

Varicocele has been known for several decades, and its association with infertility. In De Medicina, written during the first century A.D., Celsus credits the Greeks with the first account of a varicocele and then remarks on veins that are swollen and twisted over the testicle, which is smaller than its fellow, insofar as its nutrition has become deficient. [24]

Varicocele therapy is widely agreed to boost semen parameters, with improvement rates varying from 60% to 80%. Varicocele was clearly established as an significant detectable cause of male infertility in the WHO study.[25]

Improvement in fundamental parameters following varicocele correction ranges from 8 percent to 55 % in the literature. Schlesinger et al. reviewed 16 studies evaluating the impact of varicocelectomy on sperm density and recorded substantial post-operative changes in 12 studies and sperm motility was noted in 5 of these studies.[1]

In our sample the total number of cases was 51 patients, 32 patients (62.74%) had a unilateral varicocele, and 19 patients (37.25%) had a bilateral varicocele.

Tables 6-8 represent percentage of varicocele grade development. The highest improvements in grade I and II varicocele are seen in seminal parameters such as sperm concentration, total sperm count, motility, and morphology as opposed to the percentage of improvement in different grades of varicocele. The percentage of improvement in subclinical varicocele and Grade III varicocele is smaller as compared with Grade I and II. This means that significant progress after surgery can be expected in varicocele Grade I and II.

Moazzam et al. reported seminal improvement in sperm density, sperm motility, and sperm morphology in 60-80% of patients.[26]. 43 of the 51 patients (84.1%) in our sample showed improvement in seminal parameters during the post-operative follow-up.

Madgar et al. and Nieschlag et al. these two authors conducted prospective randomized controlled trials and showed a statistically significant increase in sperm density after varicocele repair.[24] [27]

Madgar et al. reported a statistically significant 60 percent increase in the rate of pregnancy and Nieschlag et al. reported a 29 percent pregnancy rate. [27]

Matthews and colleagues found that 55% of men with azoospermia, and 69% of men with zero mobile sperm, had mobile sperm in their ejaculate following varicocele surgery. [14]

Sperm motility is another significant factor considered for the explanation of the semen sample's fertilizing potential. Studies by Tinga et al., Okuyama et al., and Goldstein showed improved motility following varicocelectomy, as well as improved sperm concentrations. [9-11]. Similar results were seen in our study.

**CONCLUSIONS**

Varicocelectomy gives the sperm production, motility, and overall morphology a statistically significant increase. The increase in semen parameters has had little impact in the

capacity for fertility. Varicocelectomy does not increase all men's sperm parameters, but it does increase the chances of conception and decreases early ejaculation and scrotal pain. Both approaches to varicocelectomies (sub-inguinal, inguinal, or laparoscopic) have shown substantial improvement in seminal parameters, with the sub-inguinal approach being successful at improving parameters of motility.

We need more studies to establish the appropriate criteria that can be used to recommend varicocelectomy as a modality of treatment. Hence we conclude that surgical interventions in any grades of varicocele proved to be a measure to arrest the disease progression.

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