# The Role of Varicocelectomy on Semem Parameters and Fertility

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## ABSTRACT

**Background:** The most common cause of male infertility is varicocele, and varicocele is the most common correctable cause of male factor infertility. In this article we reviewed the concept of varicocele in terms of its diagnosis, method of treatment, indications for treatment, treatment outcomes.

**Objectives:** The main purpose of this study is to evaluate the effect of varicocelectomy on male semen parameters and infertility.

**Material & Methods:** This observational, prospective study was conducted in the Department of Surgery, Medical Teaching Institute Mardan Medical complex KPK as well as in the private clinical practice, from Feb 2017 to December2017, 98 consecutive patients having large size varicocele were included for the study.

The records and database of 98 patients who underwent varicocele repair for subfertility were reviewed prospectively. All men had at least 2 preoperative semen analyses as well as semen testing at 3 and 6 months postoperatively.

**Results:** Those 98 patients who met the study inclusion criteria mean sperm counts increased significantly by 3 and 6 months after varicocelectomy (by 49% and 31% by 3 and 6 months, p = 0.02 and 0.04, respectively). After 6 months there were no further statistically significant differences in the improvement in semen volume, motility, count or total motile count comparing the results at 3, 6 months postoperatively.

**Conclusions:** Sperm parameters and chances of pregnancy improve by 3 and 6 months after varicocele repair.

***Key Words:*** *varicocele, sperms parameters, pregnancy.*

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## INTRODUCTION

Infertility is a major cause of marital disharmony and instability, and may be able to lead to divorce. Male infertility is a growing concern in developing countries around the world. The most common correctable cause of male infertility is varicocele .Varicocele is a common scrotal condition characterized by the abnormal elongation and enlargement of the network of veins leaving the testis, that join to form the testicular vein. The incidence is reported to be as high as 20-24% in the adult male population[1], with a higher prevalence in the left side. The condition is more common in infertile men, in which it affects 25-40% of men with abnormal semen analysis[2, 3, 15].

A number of theories have been proposed to explain the observed pathophysiology of varicoceles. These include disordered testicular thermoregulation[4, 5] hypoxia resulting from blood 'stagnation' in the spermatic veins[6], and elevated levels of sperm-derived reactive oxygen species.[7] The exact association between reduced male fertility and varicocele is not known because prospective randomized studies on varicocele treatment in adults have given conflicting results [8,9]. The largest study indicated a benefit[9,10] . Whereas meta-analysis of most of the prospective randomized trials did not.

Based on current evidence, both the American Urological Association (AUA) and the American Society for Reproductive Medicine (ASRM) have recommended varicocele repair for infertile men with a clinical varicocele and one or more abnormal semen parameters [11,12.] However in previous studies, selection criteria based on the clinical and ultrasonographic grade of varicocele did not take into consideration a homogeneous population. It would be probable that a lower grade of varicocele does not affect fertility as well as the quality of seminal parameters.

For this reason, our purpose was to study a series of infertile males with high grade varicocele before and after surgical treatment. Our aim was to obtain reliable results from a homogeneous and selected patient population.

## MATERIALAND METHODS

From February 2017 to December 2017, we studied 98 patients with high grade (left>right) varicocele who presented with infertility.

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The inclusion criteria for patients were: (a) infertility persisting for more than 1 year despite regular, unprotected intercourse; (b) abnormal semen parameters as assessed by World Health Organization (WHO) guidelines 2010; (c) no other infertility-related disease; and (d) no obvious causes of infertility in the Female's partner. Men with recurrent varicocele, maledescended testis, azoospermia, severe oligozoospermia (<5 million sperm/mL), evidence of genital tract infection were excluded. The partner was studied in all cases to rule out any cause of infertility (such as anovulation, endometriosis, tubal blockage, etc.) The study was approved by the ethics review board of the institution and all men signed an informed consent prior to participating. Patient information for this study remained confidential and within the institution.

As per the American Society for Reproductive Medicine and Society for Male Reproduction and Urology's Practice Committee report , varicoceles should be treated when each of the following criteria are met [11, 12].

I. The varicocele is palpable on physical examination of the scrotum.
II. The couple has known infertility.
III. The female partner has normal fertility or a potentially treatable cause of infertility.
IV. The male partner has abnormal semen parameters.

All men underwent a standard diagnostic infertility evaluation, including a detailed history and a thorough physical examination, blood tests, including hormonal assay like testosterone, FSH, LH level when needed according to seminal and clinical features and color Doppler ultrasound of the scrotum. The examination was performed after the patient stood for various minutes in a warm room; the scrotum was inspected and palpated in the upright position. Based on a physical examination, The varicocoeles were classified into right, left or bilateral and graded according to the system of Dubin and Amelar as follows: grade 3, visible and palpable at rest; grade 2, palpable at rest, but not visible; grade 1, palpable during Valsalva maneuver but not otherwise; and subclinical varicoceles, not palpable or visible at rest or during Valsalva maneuver but demonstrable by special tests not detectable on clinical examination (Doppler ultrasound studies) [13].

Infertility was defined, according to the WHO, as the inability of a sexually active, non-contracepting couple to achieve pregnancy in one year [14]. At least two preoperative semen analyses with two week apart, were obtained by masturbation after 3-5 days of abstinence from sexual activity, and the average value was considered.

The patients underwent spermatic vein ligature through a sub- inguinal approach under spinal anesthesia. In bilateral cases both side at the same operation. About 3-4 cm incision given above the medial attachement of inguinal ligament without opening of inguinal canal by standard dissection spermatic cord identified and the veins identified, isolated and ligated as high as possible.hemostasis secured and wound closed in layers.

All the enrolled patients fulfilled the study inclusion criteria, were counseled to have unprotected intercourse during the ovulation period in order to maximize the probability of getting pregnancy during post intervention. The achievement of pregnancy and semen parameters were recorded during the postoperative period. Postoperative semen analyses were obtained 3, 6 months after surgery.

**Statistical analysis**

All the information and data obtained were entered into a structured proforma, constructed for the purpose of the study. This included the patient's demographics, duration of infertility, frequency of coitus, history of previous conception, use of drugs and contraceptives. The data was analyzed using the SPSS 20.Categorical data were examined by the chi-square test; continuous variables were tested by t-test assuming $p < 0.05$ as significant.

## RESULTS

All 98 patients had 3rd grade varicocele. Majority patients have varicocele on left side (left side-84, right side-10, bilat-4). The patients' mean age was 33.5 years (range 18-49 years). The mean age of the partners was 24.3 years (range 16-43 years). The mean infertility period was 31.1 months (range 12-50 months).The mean study follow-up time was 8.4 months (range 06-18 months). No patient reported previous episodes of cryptorchidism, hydrocele, or testicular trauma, nor had they undergone surgery of the urogenital tract. No other causes of infertility were found.

During postoperative period 8 patients were dropout from study,3 patient developed recurrent varicocele(one at 2.5 month and other two at 5 months) and 5 patients gone abroad to gulf countriese and they did not came at 3 and 6 months for semen testing.The remaining 90 patients characteristic were as follow:

The mean preoperative sperm count was $16.7x10^6$/mL compared to $20.5x10^6$ /mL in the postoperative period ($p < 0.02$). The mean preoperative percentage of progressive sperm motility was 13% compared to 18.7% in the postoperative period ($p < 0.01$). The mean preoperative percentage of normal sperm morphology was 9.2% compared to 18.4% in the postoperative period ($p < 0.001$) (Table-1).

During the first 3-month postoperative period, 14 couples got pregnancy (15.5%). In the following 3 months (total upto 6 months) 5 more pregnancies occurred. The stratification of pregnancies by semester showed a significantly higher rate during the first postoperative period ($p< 0.001$).
After surgery, 3 patients developed recurrent varicocele within 6 months of surgery,which was excluded from the study, No others minor or major postoperative complications were registered. All patients were discharged within 24 hours of surgery.

**DISCUSSION**

Our findings confirm that there was an improvement in semen parameters following varicocelectomy in infertile males, in this resource challenged region, this could be one of the most cost effective methods for achieving spontaneous pregnancy. Fertility is the natural capacity to produce offspring while infertility is defined as one year of inability to conceive in spite of non contraceptive, unprotected intercourse in the fertile phase of the maternal cycle [15].
The main findings from this study were that varicocelectomy did improve the count, motility, morphology, volume, and density of semen in infertile males. This is in agreement with several other studies done in, Asia, Africa and other continents [16,17,18].

Varicocelectomy provides a cheaper (natural) method of achieving conception. Improvement in semen parameters was observed after high ligation varicocelectomy. A study that evaluated the clinical outcomes of 118 infertile couples with isolated asthenospermia (less than 50% motile sperm) reported a significant increase in sperm motility by 9.8% ($p=0.0002$)[19]. Agarwal et al,[20] performed a meta-analysis to determine the efficacy of surgical varicocelectomy (high ligation or inguinal microsurgery) in improving semen parameters from 17 studies including both RCTs and observational studies. The study population was infertile men with clinically palpable unilateral or bilateral varicocele and at least one abnormal semen parameter. The results showed that the sperm concentration increased by $12.03\times10^6$/mL (95% CI, 5.71-18.35; $p=0.0002$) and motility increased by 11.72% (95% CI, 4.33-19.12; $p=0.002$) after high ligation varicocelectomy. The improvement in World Health Organization sperm morphology was 3.16% (95% CI, 0.72 to 5.60; $p<0.01$) after both microsurgery and high ligation varicocelectomy. These objective improvements in semen parameters might support the idea that varicocelectomy could increase the spontaneous pregnancy rate.

Table- 1 - Pregnancies and sperm characteristics before and after operation

| Patients characteristic | Pre-op period | post-op period(3&6months) | P |
|---|---|---|---|
| Pregnancies | 0% | 19 (21.1%) | NA |
| Mean sperm count | $16.7x10^6$/mL | $20.5x10^6$/mL | < 0.02 |
| Mean percentage of progressive sperm motility | 13% | 18.7% | < 0.01 |
| Mean percentage of normal sperm morphology | 9.2% | 18.4% | < 0.001 |

NA-not applicable

In our study 14 couples got pregnancy in first 3months post intevention and 5 more couples achieved pregnancy in the following 3months(total 19 couples in 6 months postop) which make 21.1%,this is similar to the study of other researcher on this topic. The pregnancy rate in patients who have undergone varicocelectomy increases substantially from 14% with no treatment to 29.7% after varicocelectomy [21]. Varicocelectomy eliminates venous stasis and returns testicular blood flow to the original state [22].

Diegidio et al, [23] reviewed 33 studies and calculated the overall pregnancy rate to be 38.37% (954/2486) by using simple addition and division. In the review, they compared cost-effectiveness and concluded that varicocelectomy is a cost effective treatment modality for infertility.

Recently, a well-designed randomized clinical trial (RCT) was introduced in 2011 and, subsequently, a novel meta-analysis was provided in 2012 [24,25,6]. These studies could be important evidence that varicocele repair in men from couples with otherwise unexplained subfertility may improve pregnancy outcome [25]. At present, varicocele repair is regarded in influential clinical guidelines as a standard treatment modality in infertile men with clinical varicocele and abnormal semen parameters.

Most of the patients in our study presented in the third and fourth decade of their lives. This may be because the study was targeted at the infertile male and that age is the usual age in the study environment was culturally accepted for marriage and procreation. The age statistics are similar to those published from similar studies in other part of the word [26].

In this study, three patients developed recurrent varicocele which make 3.2% while in literature the various surgical techniques for treating varicocoeles included the retroperitoneal approach, conventional inguinal, laparoscopic, radiographic, microscopic inguinal and subinguinal approach. The failure rate for most of these procedures range from 3-15%, except for the microscopic approach with a failure rate of 1%, this necessitated the choice of this procedure, [27,28].

## CONCLUSION

Sperm parameters and the chances of procreation improve by 3 and 6 months after varicocele repair. This finding should allow physicians to decide quickly if varicocelectomy has been effective and then if required, plan on the use of other therapies to manage the couples' infertility.

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