

## Efficacy of different approaches of varicocelelectomy for symptomatic varicocele

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### Abstract:

**Introduction:** Varicocele is the most common, surgically correctable cause of male infertility. The ideal indication for varicocelelectomy is male infertility due to poor semen parameters, but varicocelelectomy may also be performed for testicular pain, androgen deficiency, and progressive testicular atrophy and non-obstructive azoospermia. The purpose of the study is check efficacy of different approaches of varicocelelectomy on Semen parameters (sperm morphology and sperm counts).

**Material and methods:** This was an observational study, comparing sperm morphology and sperm counts before and after different approaches of varicocelelectomy. Study was conducted in the three hospitals affiliated to a medical college in South India over a period of 2 years. A total of 24 cases of varicocele were included in the study. The study results were analysed by Mann-Whitney U test.

**Results:** Of the observed surgical techniques, the Sub inguinal approach for varicocelelectomy was used among 10 (42%) patients followed by inguinal approach in 7 (29%) patients. The mean increase in sperm count was 150% in the subinguinal approach which was higher than all other techniques. The symptomatic relief was similar in all approaches.

**Conclusion:** Sub inguinal approach of varicocelelectomy is better compared to other techniques with respect to sperm counts with good symptomatic relief post operatively.

**Keywords:** varicocele, palomo operation, subinguinal approach, male infertility

### Introduction:

Varicocele is an abnormal dilatation of the pampiniform venous plexus surrounding the spermatic cord in the scrotum. It develops from reflux of blood flow within testicular veins. It is the most common surgically correctable cause of male infertility. It is associated with decreased testicular volume, impaired sperm quality and a decline in Leydig cell function(1,2).

The standard varicocele treatment should be safe, effective, and minimally invasive. The ideal indication for varicocelelectomy is male infertility due to poor semen parameters, but varicocelelectomy may also be performed for testicular pain, androgen deficiency, and progressive testicular atrophy and non-obstructive azoospermia, even in men who have undergone microdissection testicular sperm extraction(3). Various surgeries are available for varicocele repair and there exists a doubt as to the superiority of a single technique. Hence, we conducted this study to compare the efficacy of different approaches of varicocelelectomy with respect to improvement in semen parameters.

**Materials and methods:****Study design:**

It was an observational study, comparing sperm morphology and sperm counts before and after different approaches of varicocelectomy.

**Study setting:**

Study was conducted in the three hospitals affiliated to a medical college in South India.

**Study Period:**

November 2019 to September 2021

**Sample size:**

Total of 24 cases were included during the study period.

**Inclusion Criteria:**

Male patients aged between 18 -50 years diagnosed with varicoceles graded by physical examination with the patient in a supine, standing at rest and during Valsalva manoeuvre and confirmed with ultrasound examination.

**Exclusion Criteria:**

Patients below 18 years or above 50 years, those with current or previous urogenital diseases or systemic diseases that would lead to testicular alterations, such as cancer and chemotherapy and endocrinopathies were excluded.

**Data Collection:**

Patients were subjected to routine clinical evaluation with detailed history and examination. Routine pre-operative laboratory investigations were done. For semen analysis, all semen specimens were collected and analysed pre-operatively and post-operatively at 45 days from surgery. Specimens are collected by masturbation after a 3-day period of sexual abstinence and masturbation.

**Approaches for varicocelectomy:**

- Scrotal approach: (4)  
Incision is given lateral to the median raphe near the root of scrotum. The spermatic veins are individually clamped and ligated. The scrotal pampiniform plexus is extremely complex making this approach time consuming and fraught with failure as involved tributaries may be missed. Also, there is possibility of causing damage to all the three major sources of blood supply to the testes and epididymis (i.e., the spermatic, deferential and cremasteric arteries). Hence this approach is not commonly used now.
  - Subinguinal approach (Marmar's approach): (4,5)  
An oblique or transverse incision is made at level of external ring. Here external Oblique fascia is not incised and the cord is approached before it enters the superficial ring. Morbidity is lesser compared to Inguinal and retroperitoneal. As internal spermatic venous system is more branched at this level, this approach is more tedious than inguinal. Identification of testicular artery branches is also more difficult due to their smaller size
- Inguinal approach (Ivanissevich's approach): (4)

Incision is as same for an inguinal hernia with an intention of tackling the dilated veins in the inguinal canal.. The testis is delivered and all external spermatic and gubernacular veins are ligated and the spermatic artery and accompanying lymphatics are identified and spared.

- Retroperitoneal (Polomo approach): (4)

The retroperitoneal approach has the advantage of isolating the internal spermatic veins proximally, near the point of drainage in to the left renal vein. At this level, only one or two large veins are present. In addition, the testicular artery has not yet branched and is often separate from the internal spermatic veins.

- Microsurgical varicocelectomy:(6)

Microsurgical sub inguinal/inguinal approach is preferred for varicocele ligation.

The spermatic cord is elevated into the incision providing excellent exposure, and with use of microscope providing 6x to 25x magnification the small periarterial and cremasteric veins can be readily ligated, as can extraspermatic and gubernacular veins when testis is delivered into the wound.

Outcomes assessment:

Semen analysis was done to assess the following parameters pre and post-operatively.

- Change of sperm concentration
- Change of sperm motility
- Change of sperm morphology

Relief of pain postoperatively was assessed subjectively as patient satisfaction with symptom relief

**Statistical Analysis:**

The data was analysed using SPSS version 22.0. Frequencies and percentages were calculated for binary data and mean for continuous variables. P value <0.05 was considered statistically significant.

**Results:**

Total of 24 patients satisfying the inclusion and exclusion criteria were included in the study for final analysis. The distribution of surgical approaches used for treatment is given in table 1. Subinguinal approach was the most common with 42% of total cases being treated with this technique.

The Pre and post operative total sperm count and increase in the count has been shown technique wise in table 2. All the techniques showed an increase in the post op sperm count with the highest increase seen with the subinguinal approach. However, the difference between the techniques was not found to be statistically significant (p 0.8).

There was a decrease in the abnormal forms in the sperm analysis in all techniques ranging from 20-60% (Table 3) but the change was not found to be statistically significant (p 0.6)

Majority of the patients had symptomatic relief after the surgery from all approaches with the satisfaction being highest in those who underwent subinguinal approach (Table 4) but this difference was not statistically significant (p 0.3).

Approach	Frequency	Percentage of cases
Inguinal	7	29.2
Polomo	5	20.8

Scrotal	2	8.3
Sub Inguinal	10	41.7
Total	24	100.0

Table 1 : Distribution of cases by approaches used

Approach	Pre op count Mean ( $\pm$ SD) (10 <sup>6</sup> )	Post op count Mean ( $\pm$ SD) (10 <sup>6</sup> )	Difference (10 <sup>6</sup> )	Percentage increase (%)
Sub inguinal	242 (22.70)	607 (60.70)	365	150
Inguinal	246 (35.14)	467 (66.71)	221	89
Polomo	122 (24.40)	245(49)	123	100.8
Scrotal	22 (11)	42 (21)	20	90

Table 2 : Mean sperm count preoperatively and post operatively (45 days) after varicocelectomy by procedure

Approach	Mean Abnormal forms pre op (SD)	Mean Abnormal forms post op (SD)	Difference	Percentage decrease
Sub inguinal	134 (13.40)	80 (8.00)	54	40.2
Inguinal	87 (12.43)	50 (7.14)	37	57.5
Polomo	84 (7.14)	54 (10.80)	30	64.3
Scrotal	30 (15.00)	24 (12.00)	6	20

Table 3 : Mean abnormal sperm forms preoperatively and post operatively (45 days) after varicocelectomy by procedure

Approach	Symptom relief		Percentage
	Yes	No	
Subinguinal (10)	9	1	90
Inguinal (7)	6	1	86
Polomo (5)	2	3	40
Scrotal (2)	1	1	50
Total (24)	18	6	

Table 4: Percentage of symptom relief by approach

**Discussion:**

Varicocele is the abnormal dilatation with or without increased tortuosity of the scrotal pampiniform venous plexus (7). It is considered to be the most common correctable cause for male infertility although majority of males with this condition are fertile(2). Conservative management is sometimes proposed among patients who are asymptomatic and fertile. But the treatment options are varied and have been a matter of debate for decades with each author proposing different outcomes(3,8). Medical treatment of varicocele with hormonal therapy and antioxidants was studied but did not meet with clinical success and is rarely used(9). Embolisation has been shown to be useful for grade 1 and 2 varicoceles and those where only pain is the major complaints. For infertility treatment, surgery remains the treatment of choice(10,11).

Infertility, reduced testicular size, pain, increasing sperm counts before assisted reproductive techniques, androgen deficiency and azoospermia have been the indications for varicocele repair(12). Various techniques including sclerotherapy and surgical ligation have been studied and both of these seem to have similar outcomes(3). Amongst the various open approaches of varicocelectomy, sub inguinal (Marmar's approach) was most commonly performed in this study (Table 1) due to easier approach to pampiniform plexus. Literature also suggests the recurrence rates with the subinguinal approach is lower as compared to other techniques due to better access to spermatic veins (13).

Symptomatic relief has been better in sub inguinal approach when compared to other approaches which may be due to small incision, easy access to venous plexus, single ligature to all the veins, less retraction on soft tissues and less chances of lymphatic injury. Microsurgical subinguinal approach has been advocated as the best treatment for varicocelectomy due to excellent outcomes and pregnancy rates with lowest complications(14).

Apart from hemorrhage and surgical site infection, few complications are specific to varicocelectomy and include hydrocele formation, testicular artery injury and recurrence. Hydrocele formation occurs in around 7% cases and is reduced with the microsurgical approach as compared to inguinal and subinguinal approaches (6). Injury or ligation of testicular artery carries with it the risk of testicular atrophy and or impaired spermatogenesis. However, fortunately, testicular atrophy is rarely seen due to alternate blood supply via the cremasteric, vassal vessels(12). The incidence of varicocele recurrence after surgical repair varies from 0.6-45% and are higher after retroperitoneal operations as compared to inguinal/sub inguinal operations as it doesn't tackle the external spermatic vein(13).

Our study was limited by the sample size and absence of expertise of microsurgical techniques amongst the team. However, the commonly used techniques have been evaluated and the heterogenous mix of patients represents the general population presenting to a secondary or tertiary level hospital and the results should be generalizable to them.

### **Conclusion:**

There is increase in sperm count, reduction of abnormal forms and abnormal sperm morphology in all approaches with no statistically significant difference. The symptomatic relief is better with subinguinal approach. Microsurgical techniques are the new development and may soon become the standard of care for varicocelectomy. Further studies with a larger sample size are needed to establish significance among the approaches.

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