

A study of the surgical outcome and impact on semen parameters after laparoscopic varicocelectomy and sub inguinal varicocelectomy

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Abstract

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 pampiniform plexus where dilatation is the result of retrograde blood flow through the internal spermatic veins. In young adults clinical evidence of varicocele is seen in 9% to 23% as suggested in most recent studies. In infertile males, varicocele is the finding in 40% of cases. **Materials and Methods:** This is prospective interventional study conducted from January 2020 to December 2020 in patients attending the OPD in the Department of General Surgery, Murshidabad Medical College and Hospital, Berhampore, Murshidabad, West Bengal. All the patients attending the department of general surgery, Murshidabad Medical College and Hospital, Berhampore underwent history elicitation, clinical examination, semen analysis (as per WHO manual 2010). Patients with abnormal semen parameters and clinical varicocele were selected. Doppler study of the scrotum (presence of varicocele graded using Sarteschi scale) was done for these patients. The patients fulfilling the selection criteria were counselled for varicocelectomy and consent for the study obtained. The patients were randomized into Group A (laparoscopic varicocelectomy) and Group B (sub-inguinal varicocelectomy) by random allocation method. **Results:** 50 patients were included in the study after they fulfilled the inclusion and exclusion criteria. The demographic parameters of the patients in both the arms were similar. Most of the patients belonged to age group 31-35 years followed by 26-30 years. There was no significant difference in both the arms when the grading of varicocele was compared both by clinical and by doppler examinations. **Conclusion:** Varicocelectomy improves the semen parameters. No significant variation was observed when the different surgical approaches of varicocelectomy were compared.

Key Words: Varicocele, laparoscopic varicocelectomy, sub-inguinal varicocelectomy.

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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 pampiniform plexus where dilatation is the result of retrograde blood flow through the internal spermatic veins. In young adults clinical evidence of varicocele is seen in 9% to 23% as suggested in most recent studies. In infertile males, varicocele is the finding in 40% of cases[1].

The incidence of infertility among couples attempting to conceive is 10-15 %, with male infertility contributing almost 50 % of cases[2].

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. Varicocele is a condition of the puberty and is rarely observed in boys < 10 years old[3].

Effect of varicocelectomy has been a matter of debate, but recent studies give a strong recommendation for varicocelectomy in infertile men. One study had reported a 33% pregnancy rates in patients who underwent surgical varicocelectomy and a 15.5% pregnancy rates in the controls who had no varicocelectomy[4]. Apart from fertility aspect varicocele repair has proved to decrease the amount of oxidative stress. Even in patients opting for assisted reproductive technology, varicocelectomy prior to ART increases the pregnancy rate and is cost-effective[5].

The various techniques of repair are as follows-

- Conventional open retroperitoneal- Palomo procedure.
- Laparoscopic varicocelectomy.
- Sub inguinal varicocelectomy.
- Microsurgical sub inguinal- varicocelectomy.
- Radiological procedures- percutaneous embolization of veins.

With the advances in technology and minimal access techniques, laparoscopy has been the preferred approach due to early recovery and better cosmesis. Sub inguinal procedure offers minimal scar and post-operative complications. With the aim of choosing a better

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surgical technique for restoration of fertility, we have analysed and compared the surgical outcome in terms of its impact on semen parameters post surgery: laparoscopic varicocelectomy and sub inguinal varicocelectomy.

Materials and methods

This is prospective interventional study conducted from January 2020 to December 2020 in patients attending the OPD in the Department of General Surgery, Murshidabad Medical College and Hospital, Berhampore, Murshidabad, West Bengal.

Inclusion Criteria

- Patients with documented infertility.
- Clinically palpable varicocele.
- Patients with abnormal semen parameters.
- No other attributable causes for infertility.
- No factor for infertility in the female partner.

Exclusion Criteria

- Previous surgery for inguinal hernia.
- Previous surgery for testicular pathology.
- Congenital abnormalities.
- Prior surgery for varicocele.

Patient Selection

- All the patients attending the department of general surgery, Murshidabad Medical College and Hospital, Berhampore underwent history elicitation, clinical examination, semen analysis (as per WHO manual 2010).
- Patients with abnormal semen parameters and clinical varicocele were selected.
- Doppler study of the scrotum (presence of varicocele graded using Sarteschi scale) was done for these patients
- The patients fulfilling the selection criteria were counselled for varicocelectomy and consent for the study obtained.

- The patients were randomized into Group A (laparoscopic varicocelectomy) and Group B (sub-inguinal varicocelectomy) by random allocation method.

The laparoscopic varicocelectomy was done by routine 3 transperitoneal ports, 1 in the umbilicus for camera and two working ports in right & left iliac fossa lateral to inferior epigastric vessels. Peritoneum over the spermatic vessels was incised, veins were identified, ligated with clips and cut, sparing the arteries. Port sites was closed with absorbable sutures and skin with staplers.

In subinguinal varicocelectomy, a small transverse incision is made just inferior to the level of the external ring. Scarpa's fascia is split, cord structures identified using blunt and sharp dissection. Cord is brought up to the level of the skin incision and secured with a vessel tape. With the help of surgical loupe, the cord structures were dissected, veins were identified, ligated with 3-0 silk and divided sparing the arteries and lymphatic channels. Cord was replaced and wound closed with absorbable sutures. The duration of hospital stay, post-operative analgesic requirement was noted for the patients.

Semen Analysis

We compared the improvement in semen parameters in all patients (combining both groups pre and post operatively), to assess the benefit of varicocele repair. Three vital parameters compared were sperm concentration, total motility and sperm morphology.

Statistical Analysis

The SPSS software (Statistical Package for the Social Sciences, version 13.0, SPSS Inc, Chicago, Illinois, USA) was used to analyse the data. Paired T-test and Wilcoxon signed rank test, Mann Whitney test were used to analyse as the data didn't have the normal distribution. A p value <0.005 was considered significant.

Results

50 patients were included in the study after they fulfilled the inclusion and exclusion criteria. The demographic parameters of the patients in both the arms were similar. Most of the patients belonged to age group 31-35 years followed by 26-30 years.

Table 1: Age distribution

S.No	Age of patients	Laparoscopic No. of Cases	Sub Inguinal	Total
1	21-25 years	0	0	0
2	26-30 years	12	6	18
3	31-35 years	10	12	22
4	36-40 years	2	8	10
5	41-45 years	0	0	0

Table 2: Doppler Grading as per Sarteschi Grading System

S.No	Grading of varicocele	Laparoscopic No. of Cases	Sub Inguinal	Total
1	Grade 3	12	14	26
2	Grade 4	8	6	14
3	Grade 5	4	6	10

There was no significant difference in both the arms when the grading of varicocele was compared both by clinical and by doppler examinations.

Semen Parameters

Semen analysis was done as per WHO (2010) standards pre-operatively. Seventy-two percentage of patients had oligospermia in both arms (36 patients) with a mean sperm concentration of 7.82 million/ml. The rest of them had normal sperm concentration with sub normal motility and morphology. 18 patients had asthenozoospermia in our study. 42 of the 50 patients (84%) had morphologic defects. The patients in both arms had similar seminal parameters before undergoing surgery.

Table 3: Distribution of Seminal Parameters in 2 Groups in Preoperative Status

	N	Mean	SD	Std error mean	P
Laparoscopic	24	16.7	12.94	3.478	0.614
subinguinal	26	13.48	18.473	5.123	
Total Motility					
Laparoscopic	24	46.58	12.94	5.623	0.399
subinguinal	26	40.54	15.634	4.336	
Morphology					
Laparoscopic	24	3.33	2.425	0.700	0.166
subinguinal	26	2.00	2.236	0.620	

Post-Operative Period

The following findings were noted. Immediate postoperative period.

Pain: Pain scale assessment and the analgesic requirements were similar in both groups.

Fever: One patient in group A had fever in the first post op day which subsided on continuation of antibiotics for 2 days and he was discharged on the 3rd post op day.

Wound Infection

One patient developed wound infection in Group B which was evident on the 3rd post day and it required hospital admission and was treated conservatively.

No hematoma was detected in any of the patients.

All patients were followed up regularly at the intervals of 3 months post-surgery and 6 months post- surgery. No significant complication occurred in any of the 50 patients. On Doppler study no patient had recurrence of varicocele.

Semen Analysis during 3rd and 6th Month Follow Up

We compared the change in semen parameters in terms of

1) An entire cohort of 50 patient’s pre and post-operative status and 2) Compared as cohorts undergoing the two surgical approaches.

No significant difference was seen in the macroscopic appearance of the semen post-operatively. Three vital microscopic parameters

compared were sperm concentration, total motility and sperm morphology. As the distribution was not normal, T-test and Wilcoxon signed rank test were used for statistical analysis.

Sperm Concentration

In the preoperative analysis, the mean concentration of sperm in the 50 patients was 15.02 Million/ml. Eighteen patients were oligospermic (concentration levels <15 mil/ml) with a mean sperm concentration of 7.42 million/ ml,

At 3 Months

The sperm concentration improved in all patients and the mean sperm concentration increased from 15.02 million/ml to 18.22 million/ml post-operatively. Among the 36 oligospermic patients, sperm concentration increased in 14 patients (38.8%) and the remaining 22 patients (61.2%) remained oligospermic. Even in this category their mean concentration increased to 9.32 million/ml.

At 6 Months

The sperm concentration further improved in all patients and the mean sperm concentration increased to 22.89 million/ml. Only 14 patients (38.8%) remained oligospermic with an increase in mean to 10.57 million/ml.

Table 4: Sperm Concentration Change in Both Groups

		Mean	N	SD	Std error mean	P
Pair 1	Pre OP	15.92	50	15.487	3.097	.001
	3 months	18.22	50	14.055		
Pair 2	Pre OP	15.92	50	15.487	3.097	.001
	6 months	22.86	50	14.54		

Total Motility

The mean total motility of sperm in the 50 patients was 43.44%. 18 patients (36%) had asthenozoospermia (total motility < 40%) with the mean total motility of this group being 25.2%.

At 3 Months

The mean total motility increased to 50.96%. In the asthenozoospermic group, 8 (44.44%) patients had improved motility to normal levels. In the rest of the 10 patients the mean total motility increased to 34.4 %.

6 Months

Further increase in total motility was observed with mean increased to 52.96. Only 2 patients who had decreased motility remained asthenozoospermic.

Table 5: Sperm Motility Change in Both Groups

		Mean Total Motility %	N	SD	Std error mean	P
Pair 1	Pre OP	43.44%	50	17.481	3.496	.001
	3 months	50.96%	50	11.851		
Pair 2	Pre OP	43.44%	50	15.487	3.496	.001
	6 months	52.96%	50	14.542		

Table 6: Sperm Morphology Change in Both Groups

		Mean Total Motility %	N	SD	Std error mean	P
Pair 1	Pre OP	2.64%	50	2.378	.476	.000
	3 months	5.24%	50	2.166		
Pair 2	Pre OP	2.64%	50	2.378	0.476	.000
	6 months	52.96%	50	4.542		

Table 7: Comparison of Sperm Concentration– Group A & Group B

	Group A- Laparoscopic Varicocelectomy N=24	Group B- Subinguinal Varicocelectomy N=26	P
	Mean S.D. Millions/ml	Mean S.D. Millions/ml	
Pre OP	16.70 12.048	13.48 18.473	0.201
3 months	19.42 10.113	17.12 17.281	0.156
6 months	23.88 11.021	21.92 17.195	0.327

Table 8: Comparison of Sperm Motility in Group A & Group B

	Group A- Laparoscopic Varicocelectomy N=24	Group B- Subinguinal Varicocelectomy N=26	P
	Mean SD	Mean SD	
Pre OP	46.58%, 19.477	40.54%, 15.634	.399
3 months	52.58%, 13.386	49.46%, 10.564	.522
6 months	52.33%, 12.478	53.54%, 13.402	.818

Table 9: Comparison of Sperm Morphology in Group A & Group B

	Group A- Laparoscopic Varicocelectomy N=12	Group B- Subinguinal Varicocelectomy N=13	
	Mean SD	Mean SD	P
Pre OP	3.33%, 2.45	2.00%, 2.236	.166
3 months	5.75%, 2.094	4.77%, 2.204	.267
6 months	8.67%, 3.420	8.15%, 5.352	.776

The increase in the mean of morphologically normal sperms between the two groups Group A laparoscopic varicocelectomy & group B sub inguinal varicocelectomy was not statistically significant. Group A laparoscopic varicocelectomy & group B sub inguinal varicocelectomy. Preop -months p value = 0.267; Pre op -6 months p value =0.776.

Discussion

There are various methods for varicocelectomy, but none has been superior in efficacy in relation to treatment of infertility in patients with varicocele. Shamsa et al compared 3 varicocelectomy methods on 3 groups comprising 30 patients each. In this study all had the same response in increasing the semen parameters. When comparing the post-operative complications like hydrocele, recurrence and operative time, sub-inguinal varicocelectomy under LA was found to be preferred method. Dr. Haluk So'ylemez et al in his claims that laparoscopic varicocelectomy is better in terms of patient comfort and early return to activity and advises laparoscopic to be gold standard[7].

In a meta-analysis of 33 studies, conducted in over 5000 patients, various current varicocelectomy techniques were analysed. The surgical outcome and improvement in semen parameters were calculated. They calculated that the overall pregnancy rate was 38.37% (954/2486). The incidence of recurrence of varicocele were more in radiological procedure when compared with surgical methods (12% Vs 9.6%)[8]. The increase in seminal parameters varied from 50 to 80% in operated patients with results more in favour of microsurgical inguinal surgery. In a case series, varicocelectomy using loupe-assisted inguinal technique could improve semen parameters and pregnancy rate with a low postoperative complication rate. In a review article varicocelectomy before assisted reproduction helps in improving the outcomes, irrespective of the technique of varicocelectomy[9].

In our study of 50 patients, post-operatively there was improvement in semen parameters in both groups with mean sperm concentration increase from 15.02 million/ml to 22.89 million/ml. Among the 36 patients in entire cohort who were oligospermic, 22 patients improved their sperm count to normal. The mean total sperm motility increased from 43.44 % to 52.96 %. The mean sperm morphology also improved from 2.64% to 8.4%. When the semen parameters were compared in the two surgical methods, no statistically significant difference was observed, the improvements were similar in both groups[10]. The limitations of this study were small sample size, short duration of patient's follow up, lack of information of the impact on pregnancy rates and non-usage of operating microscope.

Conclusion

There was no difference between laparoscopic varicocelectomy and sub-inguinal varicocelectomy when surgical outcome and sperm

parameters were compared. Post-operative complications by both techniques were minimal and insignificant.

Laparoscopic varicocelectomy does provide better cosmesis but sub-inguinal varicocelectomy is cost effective in low resource setting. There was no statistically significant difference observed when the sperm parameters were compared between both the arms. So, both laparoscopic and sub-inguinal varicocelectomy have same efficacy in terms of improvement in semen parameters post varicocele repair in infertile men with clinically detected varicocele.

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