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A prospective observational study of laparoscopic varicocelectomy and open inguinal varicocelectomy in tertiary care hospital in Kashmir

Aasim Shafi Salroo[1] , Hanief Mohamed Dar[2] ,Gowher Ahmad Mir[3] , Naseer Ahmed Awan[4] ,Mufti Mehmood Ahmad[5]

ABSTRACT

Background: Varicocele is the most common cause of male infertility characterised by pathological dilatation of veins draining the testicles leads to increased temperature of seminiferous tubules which progressively affects the testicular growth, histology and function resulting in progressive decline in fertility. 40% of males evaluated for infertility have varicocele. Surgery relieves the symptoms associated with the disease and improves the semen quality. Surgery is done by open and laparoscopic methods. The aim of this study is to compare the open and laparoscopic varicocelectomy in terms of , Operating time, Hospital stay, Improvement in semen analysis and Post operative complications (Hydrocele, Hematoma formation, Recurrence).

Material and Methods

This study is a prospective, randomized, single-center observational study which was conducted in Government Medical College, Srinagar from September 2020 to September 2022. Patients were divided into two groups, group A and group B. In Group A laparoscopic Varicocelectomy was done and in Group B open varicocelectomy was done and different parameters were compared.

Results

This Study included total of 75 patients, 42 patients underwent laparoscopic varicocelectomy and 33 patients underwent open varicocelectomy. Mean operating time in group A was 25.2±3.583 minutes while in group B it was 36.7±4.326 minutes ($p<0.001$). The mean duration of hospital stay was 2.1±0.42 days in group A and 3.2±0.49 days in group B ($p<0.001$). In group A, 18 (42.9%) patients showed improvement in semen analysis while as in group B, 13 (39.4%) patients had showed improvement in semen analysis. In group A, SSI, hydrocele formation and scrotal hematoma was found in 4, 3 and 2 patients respectively. While as in group B, 7, 5 and 1 patients developed these complications respectively. This was found to be statistically insignificant ($p \leq 0.05$).

Conclusion

Results of laparoscopic varicocelectomy were comparable to open technique with minimum morbidity, shorter hospital stay, and early return to work and there was an advantage of treating bilateral varicoceles without any additional incisions.

Key Words: varicocele, laparoscopic varicoclectomy, infertility, hydrocele.

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***Corresponding author**: 2. Hanief Mohamed Dar Assistant Professor in the Department of Surgery Government Medical College Srinagar, darhaniefsurgeon@gmail.com, 917006536321; 1.Aasim Shafi Salroo; Postgraduate scholar in Department of Surgery Government Medical College Srinagar. 3. Gowher Ahmad Mir; Postgraduate Scholar in Department of Surgery Government Medical college Srinagar 4. Naseer Ahmed Awan; Professor in the Department of Surgery Government Medical college Srinagar 5. Mufti Mehmood Ahmad; Professor in the Department of Surgery Government Medical college Srinagar

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INTRODUCTION

Varicocele being the most common cause of male infertility is defined by dilated and tortuous veins within the pampiniform plexus. This pathological dilatation of veins draining the testicles leads to increased temperature of seminiferous tubules [1], which progressively affects the testicular growth, histology and function resulting in progressive decline in fertility[2]. The incidence of varicocele increases rapidly in the age group of 10 to 18 years[3]. Overall incidence of varicocele is 5 to 20%. 40% of males evaluated for infertility have varicocele[4,5].Left sided varicocele is more commonly observed than right side and is present in 78% to 93% of the cases[6].

The approach of choice for majority of adolescents with varicocele until a surgical intervention is needed is observation. The main indications for surgery are significant testicular hypotrophy, Testicular Pain or discomfort, and Abnormal semen analysis[7]. The various surgical approaches for the correction of varicocele include; Inguinal, Subinguinal, Laparoscopic, Retroperitoneal and Venographic. Laparoscopic varicocelectomy is performed using three ports. The peritoneum above the internal ring is opened and the vascular bundle and surrounding tissues are mobilized. The vessel may be ligated using the permanent sutures or clips and transacted using the harmonic scalpel or vessel sealing device. The aim of my study is to compare the open and laparoscopic varicocelectomy in terms of, Operating time, Hospital stay, Improvement in semen analysis, and complications (Hydrocele, Hematoma formation, Recurrence).

MATERIAL AND METHODS

Study design

A prospective, randomized, single-center observational study to compare laparoscopic and open inguinal varicocelectomy. The study was conducted in Government Medical College, Srinagar from september 2020 to september 2022. Patients were divided into two groups, group A (laparoscopic group) and group B (open group) by simple randomization.

In group A, surgery was performed under general anesthesia in supine position with trendelenburg position. After bladder catheterization or preoperative voiding and using 3 port configuration was established [10mm, 5mm, 5mm]. The peritoneal leaf was elevated over the spermatic cord starting from deep ring, the dilated spermatic veins were severed or clipped while sparing the testicular artery and lymphatics. Hemostasis was confirmed and trocars were removed. Intra operative time was measured from trocar insertion to port closure.

In group B, surgery again was performed under general anesthesia in supine position. Subinguinal 3-4cm incision at the level of external inguinal ring was made, Wound deepened and scarpa's fascia opened. Spermatic cord was identified and brought out, spermatic fascia opened, dilated testicular veins were isolated and ligated with silk sutures then divided fascia closed, subcutaneous tissues approximated and the skin incision was closed. Intra operative time was measured from skin incision to skin closure. Outcome of techniques was analyzed in terms of operating time, Hospital Stay, improvement in semen analysis and post-operative complications.

STATISTICAL METHOD

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar diagrams. Student's independent t-test or Mann-Whitney U-test, whichever feasible, was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A P-value of less than 0.05 was considered statistically significant.

RESULTS

Our study was conducted over a period of two years from september2020to september 2022. We divided the patients into two groups. Group A (laparoscopic group) and group B (open group). Our study included total of 75 patients. 42 patients underwent laparoscopic varicocelectomy and 33 patients underwent open varicocelectomy. The mean age of patients in group A was 29.3 years while as in group B, it was 27.1 years. The difference in mean age of patients compared between two groups was statistically insignificant (p = 0.211). Group A included 18 (42.9%) unmarried patients, 21 (50%) married patients and 3 (7.1%) divorced patients. Group b included 14 (42.4%) unmarried and 19(57.6%) married patients. When the marital status of study patents in two groups was compared,

the difference was statistically insignificant (p = 0.278). Pain was the presenting symptom in 16 patients in group A and 10 patients in group B, while as infertility was presenting symptom in 27 patients in group A and 23 patients in group B. Group A included 20 patients with Grade II varicocele and 22 patients with grade III varicocele while as group B included 13 patients with grade II varicocele and 20 patients with grade III varicocele. In our study, the mean operating time in group A was 25.2±3.583 minutes while as in group B mean operating time was 36.7±4.326 minutes. When mean operating time between two study groups was compared it was found to be statistically significant (p<0.001). Table 1

Table 1: Comparison of operative time between open and laparoscopic surgeries.

Operative time (Minutes)	N	Mean	SD	Range	P-value
Group A	42	25.2	3.583	18-34	<0.001*
Group B	33	36.7	4.326	26-45	

**** Statistically Significant Difference (P-value<0.05)***

In our study, the mean duration of hospital study was 2.1±0.42 days in group A and 3.2±0.49 days in group B. when the duration of hospital stay was compared between two groups, it was found to be statistically significant (p<0.001). Table 2.

Table 2: Comparison of Hospital stay (Days) in open and laparoscopic group.

Hospital Stay	Group A		Group B		P-value
	No.	%age	No.	%age	
2 Days	33	78.6	2	6.1	<0.001*
3 Days	9	21.4	25	75.8	
4 Days	0	0.0	6	18.2	
Total	42	100	33	100	
Mean±SD	2.1±0.42		3.2±0. 49		

****Statistically Significant Difference (P-value<0.05)***

The mean duration for return to work in **group A** was 5.1±0.56 days and in group B was 6.9±0.84 days. When the duration for return to work between two groups were compared, it was found to be statistically significant (p <0.001). Table 3

Table 3 : Comparison of Return to work (Days) in open and laparoscopic surgeries.

Return to work	Group A		Group B		P-value
	No.	%age	No.	%age	
4-5 Days	35	83.3	2	6.1	<0.001*
6-7 Days	7	16.7	25	75.8	
≥ 8 Days	0	0.0	6	18.2	
Total	42	100	33	100	
Mean±SD	5.1±0.56		6.9±0.84		

Statistically Significant Difference (P-value<0.05)

Various post-operative complications like surgical site infection, hydrocele formation and scrotal hematoma were studied. In group A, SSI, hydrocele formation and scrotal hematoma was found in 4, 3 and 2 patients respectively while as in group B, 7, 5 and 1 patient developed these complications respectively. When these post-operative complications were compared between two groups, they were found to be statistically insignificant (p >0.05). Table 4.

Table 4: Comparison of Postoperative complications in open and laparoscopic surgeries.

Complications	Group A		Group B		P-value
	No.	%age	No.	%age	
SSI	4	9.5	7	21.2	0.156
Hydrocele formation	3	7.1	5	15.2	0.265
Scrotal hematoma	2	4.8	1	3.0	0.704

During this study, we compared the semen analysis of all patients in pre and post-operative period. All those patients where surgery resulted in improvement in semen analysis were identified. In group A, 18 (42.9%) patients showed improvement in semen analysis while as in group B, 13 (39.4%) patients showed improvement in semen analysis. When improvement in semen analysis was compared between two groups, the difference was found to be statistically insignificant (p=0.762). Table 5

Table 5 : Comparison of Improvement in semen analysis in open and laparoscopic surgeries.

Improvement in sperm analysis	Group A		Group B		P-value
	No.	%age	No.	%age	
Yes	18	42.9	13	39.4	0.762
No	24	57.1	20	60.6	
Total	42	100	33	100	

DISCUSSION

Laproscopic approach for varicocelectomy has gained much attention owing to its various advantages over open approach like shorter intra operative time, less scars and better cosmesis. Many studies have been conducted in this regard, some going in favour of laparoscopy and some against it[8]. The pathology of varicocele has been attributed to absence or incompetence of valves in internal spermatic veins[9] . However, with the help of spermatic venography, bypassing collateral channels have been found in about 20% of patients with varicocele despite competent venous valves[10,11] . There are different surgical methods for varicocele treatment. The first surgical method for varicocele was explained by Celsus in the first century (ipsilateral orchiectomy of an atrophic testis)[12]. These include: the Ivanissevich method, Palomo method, subinguinal method, laparoscopic method, and sclerotherapy. The most effective and least invasive method is yet unknown and many studies conclude that microscopic one is of less complications as SSI, pain and analgesia requirement and shorter hospital stay Group A included 42 and Group B included 33 patients. The main indication for surgery was infertility. 64.3% of patients in Group A and 69.7% of patients in group B presented with infertility as chief complaint and got operated. Rest of the patients were operated for pain inguino-scrotal area. **Telkar S et al.** [14]conducted a study on 30 patients with varicocele and found that pain and infertility was the main reason for seeking surgery.In our study we operated only patients with grade II and grade III. Most of the patients in our study were of grade III nature. 52.4% of patients in group A and 60.6% of patients in group B were operated as grade III. The mean operating time in Group A was significantly shorter than in group B. our results were in accordance with the study of **Rahat H et Al**[15]**.** However opposite results were found by **Sangrasi AK et al**[16]. Our results in favor of laparoscopic approach could be explained by the expertise of the surgeon in laparoscopy. When hospital stay and return to work were compared between two groups significant differences were noted with patients operated with laparoscopic approach had a shorter hospital stay and returned early to routine work. These results were in accordance with **Telkar S et al**[14]. The most significant complication following varicocelectomy is recurrence. However, we could not find any recurrence in either group. **Bebars GA et al**[17] found a recurrence rate of 4% in the open group and no recurrence in the laparoscopic group. In our study the incidence of consecutive hydrocele was 7.1% in the laparoscopic group and 15.2% in open group. **Telkar S et al**[14]found 3 patients with hydrocele in the open group and no patient developed hydrocele in the laparoscopic group. **Borruto FA et al**[18] found the same incidence of hydrocele formation in both the groups.

Semen analysis of all the patients undergoing surgery was compared pre and post-operatively. Preoperative analysis was done 5 days prior to surgery and post-operative analysis was done 3 months after surgery. In group A 42.9% of patient showed improvement in semen analysis and in group B 39.45% of patients showed improvement in semen analysis. **Hargreave TB et al**[19]reported significant improvement in semen parameters in both laparoscopic and open group.

CONCLUSION

Laparoscopic varicocelectomy being minimally invasive is a simple procedure. The laparoscopic approach also allows diagnostic laparoscopy to be performed to rule out other abdominal pathologies. We conducted our study on 75 patients and found that the results of laparoscopic varicocelectomy were comparable to the open technique. There was a significantly shorter hospital stay and early return to work with laparoscopic surgery. Additionally, there was an advantage of treating bilateral varicoceles without any additional incisions with less pain, fewer scars, and better cosmesis. The improvement in semen analysis in the two groups was the same in our study. No recurrence was found in any patient of either group. However, long-term follow-up of these patients is needed to ascertain the result.

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