Section: General Surgery

Original Research Article

PROSPECTIVE STUDY IN COMPARING LAPAROSCOPIC VARICOCELECTOMY VERSUS OPEN VARICOCELECTOMY

K Rani[1], Shiva Kumar R[2], K Anantha Babu[3], Meghana Vadlamudi[4]

[1]*Associate Professor, Department of General Surgery: Government Medical College, Vikarabad, Telangana, India.*
[2]*Assistant professor: Department of General Surgery Government Medical College, Vikarabad, Telangana, India.*
[3]*Professor and HOD: Department of Pharmacology: Government Medical College, Ramagundam, Telangana, India.*
[4]*12th class; Global Indian International School, Uppal, Hyderabad, India*

Received *: 13/04/2025*
Received in revised form *: 20/05/2025*
Accepted *: 12/06/2025*

Corresponding Author:
Dr. K Rani,
Associate Professor, Department of General Surgery: Government Medical College, Vikarabad, Telangana, India.
Email: drranikmsgenerasurgery@gmail.com

DOI: 10.70034/ijmedph.2025.3.26

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (3); 144-149

ABSTRACT

Background: The aim is to assess safety and efficacy of laparoscopic to open varicocelectomy in terms of duration of surgery, hospital stay, postoperative analgesia requirement, postoperative recovery and complications.

Materials and Methods: Single centre, prospective study was conducted on 50 Patients admitted in the Department of General Surgery with varicocele requiring surgical intervention, for a period of 2 years in All patients with clinical or radiological evidence of varicocele, Patients with Primary varicocele. cases were randomly grouped in to two groups as Group A patients had Open Varicocelectomy and Group B had Laparoscopic Varicocelectomy.

Results: In our study we noted, in laparoscopic varicocelectomy group mean operative time was 58min and in open varicocelectomy group mean operative time was 93.3min. In both the groups, no vascular or intestinal complications are noted. Conversion from laparoscopic to open approach also didn't occur either. In our study of 50 patients, 3 patients from group A and 1 patient from group B developed hydrocele. Scrotal oedema was noted in 4 patients from group A and 2 patients from group B. Wound infection was noted in 2 patients from group A and none developed any wound infection group B. 22 patients from group B stayed for 2 days and 7 patients for 3 days. In group A zero patients for 2 days, 12 patients stayed for 3 days and 13 patients stayed for 4 days. We have analysed the mean sperm count and mean % motility of sperm in preoperative period and 3 months after the surgery. We have noted improvement in sperm count and motility in post operative period. Duration to return to normal activity after surgery was 6-7 days in group A and 3-4 days in group B.

Conclusion: Laparoscopic varicocelectomy is safe and effective procedure when compared to open varicocelectomy with significant reduction in operative time, minimal post-operative complications and decreased hospital stay, increasing the patient satisfaction and comfort towards the procedure.

Keywords: Laparoscopic varicocelectomy, open varicocelectomy, wound infection, post-operative complications.

INTRODUCTION

Varicocele is defined as an abnormal dilatation and tortuous Pampiniform plexus of veins. The diseases are having left sided predominance. This is explained by turbulent venous flow related to the insertion of left testicular vein at right angle into the left renal vein. The prevalence of varicocele is as high as 10~15% in the general population, 30~35% are men with primary infertility, and 69~81% are with secondary infertility. Classical description of varicocele is the consistency of "Bag of Worms" that can be decompressed when patient is in supine position. Some present with scrotal or inguinal aching discomfort or dragging pain. In 95% cases no cause for varicocele could be found. This is called

primary varicocele. Secondary varicocele is secondary to obstruction of testicular vein may be due to retroperitoneal tumour or kidney tumour.

Only mode of treatment is surgical correction. Indication of surgical intervention are for medical fitness, Grade II and above varicocele, symptomatic patient and treating infertile couple with male partner detected having varicocele with qualitatively poor semen examination findings.[1,2]

Surgical procedure can be performed by open scrotal approach, open inguinal approach microinguinal or subinguinal approach, laparoscopic ligation or embolization of testicular vein by intervention radiologist. Open varicocelectomy can be sub inguinal, inguinal or retroperitoneal. Commonly it is retroperitoneal approach through iliac incision. Laparoscopic approach can be performed using the intraperitoneal, pre-peritoneal approaches whereas embolization may antegrade or retrograde embolization. Advantages of laparoscopic varicocelectomy includes, safe, increased magnification, facilitating more accurate identification of vessels, lymphatics and the internal spermatic artery. An additional incision can be avoided in bilateral cases. In this study we compared Laparoscopic varicocelectomy versus open varicocelectomy for pros and cons.

MATERIALS AND METHODS

Single centre, prospective study was conducted on 50 Patients admitted in the Department of General Surgery with varicocele requiring surgical intervention, in Government General Hospital, Kadapa from December 2019 to December 2021.

Inclusion Criteria

All patients with clinical or radiological evidence of varicocele, Patients with Primary varicocele

Exclusion Criteria

Patients with secondary Varicocele and recurrent Varicocele.

Institute Ethical Committee clearance was obtained before the start point of the study. Patients admitted to the Department of General Surgery with Clinical or Radiological evidence of Varicocele were selected for the study using Simple Random Technique. Thorough History, clinical examination and investigations including semen analysis were obtained and the results were recorded in a proforma. Patients' fitness for surgery was obtained and cases were randomly grouped in to two groups.

Group A patients had Open Varicocelectomy

Group B had Laparoscopic Varicocelectomy.

Patients were managed with post operative analgesics and antibiotics. Post operative analgesic requirements, complications like hydrocele, pain, oedema, Total hospital stay and improvement in the semen parameters were compared in both the Groups and were analysed.

Statistics: The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp).To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in independent groups the Unpaired sample t-test was used. To find the significance in categorical data Chi-Square test was used similarly if the expected cell frequency is less than 5 in 2×2 tables then the Fisher's Exact was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS

In the present study comparing the advantages of Laparoscopic Varicocelectomy over Open varicocelectomy the following results were obtained. Most of the patients presented in the 3rd and 4th decades. Mean age of Group A is 31.9years and SD is 8.5. Mean age of Group B is 32.8years and SD is 8.4. Most common presentation of patient with varicocele as Swelling, which was noted in 32 patients, followed by pain in 25 patients. In 11 patients it was noted infertility as complaint. left sided varicocele was the most familiar presentation, which was seen in 38 patients followed by bilateral varicocele in 8 patients and right sided varicocele in 4 patients.

Table 1: Demographic Distribution in the Study Groups.

Age in Yrs	**Group A (n=25)**	**Group B (n=25)**
<20 yrs	3 (12%)	3 (12%)
21- 30 yrs	8 (32%)	8 (32%)
31- 40 yrs	9 (36%)	9 (36%)
>41 yrs	5 (20%)	5 (20%)
Pearson Chi-Square .000 P value 1.000		
Complaints		
Swelling	14 (56%)	18 (72%)
Pain	12 (48%)	13 (52%)
Infertility	6 (24%)	5 (20%)
Pearson Chi-Square 3.350 P value 0.646		
Side Involved		
Right Side	2 (8%)	2 (8%)
Left Side	19(76%)	19(76%)
Bilateral	4(16%)	4(16%)
Pearson Chi-Square .000 P value 1.000		

Table 2: Ultrasound Grading in the Study Groups.

USG Grading	Group A (n=25)	Group B (n=25)
Grade 1	3	3
Grade 2	9	10
Grade 3	13	12
Pearson Chi-Square 0.93 P value 0.955		

Laparoscopic group- 3 patients ha grade 1, 10 patients had grade 2 and 12 patient had grade 3 varicocele. In open group: 3 patients had grade 1, 9 patients had grade 9 and 13 patients had grade 13 varicocele.

In our study we noted, in laparoscopic varicocelectomy group mean operative time was 58min and in open varicocelectomy group mean operative time was 93.3min. The p value for mean operative time was significant (0.005).

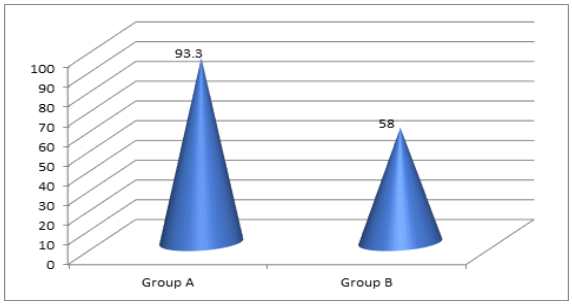

Figure 1: Mean Operative time in the Study Groups

Table-3: Post Operative outcomes in the Study Groups

Post operative pain	Group A	Group B
Mild	1	18
Moderate	22	4
Severe	3	2
Post Op Complications		
Pain	7	4
Hydrocele	3	1
Scrotal Odema	4	2
Wound Infection	2	0

In both the groups, no vascular or intestinal complications are noted. Conversion from laparoscopic to open approach also didn't occur either. During post operative period, pain was not assessed with visual pain analogue scale. Patients were given analgesics on demand on the day of surgery.

In our study of 50 patients, 3 patients from group A and 1 patient from group B developed hydrocele which was managed by rest, nonsteroidal anti-inflammatory drugs and scrotal support.

Scrotal oedema was noted in 4 patients from group A and 2 patients from group B. Wound infection was noted in 2 patients from group A and none developed any wound infection group B. Wound infection was managed with oral antibiotics and nonsteroidal anti-inflammatory drugs. No recurrence noted in both the groups.

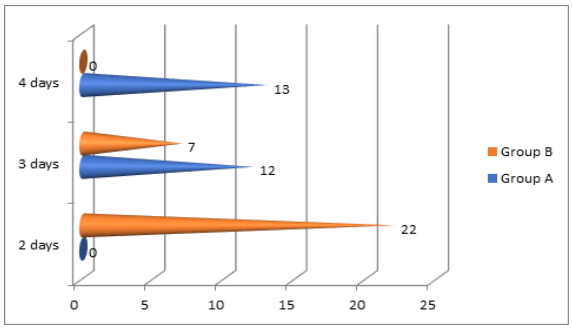

Figure 2: Post Operative Hospital Stay in the Study Groups

In our study, 22 patients from group B stayed for 2 days and 7 patients for 3 days, mean hospital stay in group B was 2.3 days. In group A zero patients for 2 days, 12 patients stayed for 3 days and 13 patients stayed for 4 days. Mean hospital stay in group A is 3.6 days. The p value is significant (0.0005).

Table 4: Pre and Post Operative Semen Analysis in the Study Groups

Semen Parameters	Group A (n=25)		Group B (n=25)	
	Pre Op	Post Op (3months)	Pre Op	Post Op (3 months)
Mean Sperm Count	34.9	39.9	37	41.9
Mean % Motility	28	35	30	35.2
P value for sperm count 0.27 p value for sperm motility 0.953				

In our study, we have analysed the mean sperm count and mean % motility of sperm in preoperative period and 3 months after the surgery. We have noted significant improvement in sperm count and motility in post operative period. The results were shown in the following table. It was noted no significant difference between group A and group B in sperm count and mean sperm motility. In the present study, duration to return to normal activity after surgery was 6-7 days in group A and 3-4 days in group B. Motivation to patients and reassurance was needed to get them to normal activity.

Table 5: Cross tabulation for statistics

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	p-value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age	Equal variances assumed	.002	.966	-.351	48	.727	-.8400	2.3911	-5.6476	3.9676
Operative Time	Equal variances not assumed	13.030	.001	13.716	31	.0050*	35.3600	2.5780	30.0999	40.6201
Hospital Stay	Equal variances not assumed	4.658	.036	8.954	46	.0005*	1.3200	.1474	1.0232	1.6168
Pre Count	Equal variances assumed	.859	.359	-1.202	48	.235	-2.4000	1.9964	-6.4140	1.6140
Post 3 Count	Equal variances assumed	.677	.415	-2.287	48	.027*	-1.9600	.8571	-3.6834	-.2366
Pre Motility in %	Equal variances assumed	.813	.372	-1.741	48	.08	-1.9600	1.1256	-4.2231	.3031
Post 3 Motility in %	Equal variances not assumed	4.701	.035	.059	38	.953	.0400	.6764	-1.3286	1.4086

Statistical analysis of the observations revealed that in the laparoscopic varicocelectomy group there was significant reduction in the operative time and hospital stay compared to open procedure. There was no statisticaaly significance in the age, semen analysis results in the pre-operative and in the post-operative follow up between the two groups.

DISCUSSION

Three open surgical approaches are currently used: subinguinal (Marmar), inguinal (Ivanissevich), and retroperitoneal (Palomo). The subinguinal (Marmar) method- incision made at the level of the superficial inguinal ring, spermatic cord is freed and exteriorized. The spermatic veins are identified and separated from the remaining cord structures with loupes. These are then double ligated with a non-absorbable suture. A study by Shindel et al,[3] demonstrated an association with the number of veins and its effect on sperm motility. There is a chance of recurrence of 0-4%.[4] In an RCT by Al-Kandari,[5] and team demonstrated the superiority of sub-inguinal microsurgery over open inguinal/laparoscopic varicocelectomy in improving sperm count and pregnancy outcome. The inguinal (Ivanissevich) method- incision between the internal and external inguinal rings made along the inguinal ligament. In this, enlarged Cremasteric veins are ligated followed by ligation of the spermatic artery. The recurrence rate with this method is about 13.3%. Majority of the patients in our study presented in 4th decade. Mean age of incidence of varicocele in our study was 30. The mean age of incidence in studies conducted by Dr. Vinod Atreya et al,[6] is noted in 3rd decade, which is similar to study by Shaukat Jeelani et al,[7] however this in contrast to study conducted by Siddarth Singh et al.[8]

In our study of 50 patients, 32 patients presented with scrotal swelling which is similar to study conducted by Shaukat Jeelani and Atif Naeem Raja et al,[7] with 50 % and 87.1% respectively. The results of study by Sunil Telkar et al,[9] contrast with our study with 26% of patients with scrotal swelling.

In our study 25 (50%) patients presented with pain as the complaint, which is similar to study conducted by Sunil Telkar et al,[9] with 60% of patients with pain as symptom. However, our study results contrast with study conducted by Dr. Vinod Atreya et al.[6]

Out of 50 patients in our study 11 patients presented with infertility as complaint, this was similar to study conducted by Sunil Telkar et al,[9] with 23.3%. However, noted 12.8% patients with infertility as complaint in study conducted by Atif Naeem Raja et al,[7] this is in contrast to our study.

We have observed in our study that left varicocele was the most familiar presentation, which was seen in 76% of the patients followed by bilateral varicocele in 16% of patients, this is in similar to study conducted Siddarth Singh et al,[8] and Dr. Vinod Atreya et al,[6] with 72.5% and 92.3% respectively. Results of our study contrasted with study conducted by Atif Naeem Raja et al,[7] with Right sided Varicocele as most common presentation of 70.9%.

In our study of 50 patients noted 25 patients (50%) with grade III varicocele followed by grade II varicocele in 19 patients (38%) and grade I in 6

patients. A study conducted by Dr. Vineeth Choudary et al,[11] showed Grade III varicocele in 26 patients (52%), Grade II in 21 patients (42%) and Grade I in 3 patients (6%), which is almost equivalent to our study parameters. Our study results were in contrast to study conducted by Siddarth Singh et al,[8] with predominant Grade II varicocele in 52.5% of patients. In study conducted by until Telkar et al,[9] noted 11 patients (36.66%) with grade II and grade III varicocele and 8 patients (26.66%) with grade I varicocele.

The operation time was calculated from trocar insertion to trocar extraction for laparoscopic varicocelectomy. Mean operative time for laparoscopic varicocelectomy in our study was 58min and 93.3min for open varicocelectomy. The mean operative time for laparoscopic varicocelectomy was 56.3min in study conducted by Dr. Vineeth Choudary et al,[11] which is similar to our study. The results of study conducted by Bharathidasan et al,[12] contrast with our study results with 20min as mean operative time. The mean operative time for laparoscopic varicocelectomy are 37.5min, 48min and 48.4min in studies conducted by Sunil telkar et al,[9] Shaukat Jellani et al,[7] respectively. Study by Ali Shamsa et al,[10] showed 30 +/-5min for laparoscopic varicocelectomy.

Mean operative time for Open varicocelectomy from skin incision to skin closure on 25 patients. In our study mean operative time is 93.3min, which is equivalent to studies conducted by Sunil Telkar et al,[9] with 75min and SHAUKAT Jeelani et al,[7] with 57min as mean operative time. The results of study by Bharathidasan et al and Dr. Vineeth Choudary et al,[11] are in contrast to our study with mean operative time for open varicocelectomy 30min and 40min respectively.

In our study of 50 patients with 25 patients in each group, in group A who underwent open varicocelectomy, it was noted 3 patients (12%) developing hydrocele as post operative complication, which is similar to study conducted by Shaukat Jeelani et al,[7] with 12% incidence of hydrocele in post operative period. Study by Siddharth Singh et al,[8] and Sunil Telkar et al,[9] has equivalent results like 15 % and 20 % incidence of hydrocele. Least incidence of hydrocele was noted in study by Dr. Vineeth et al,[11] with 4% incidence of hydrocele.

In group B patients who underwent laparoscopic varicocelectomy, it was noted least incidence of hydrocele as post operative complication. Our study results are similar to study conducted by Siddharth sing h et al,[8] Ali Sharma et al, Dr. Vinod Atreya et al,[6] and Dr. Vineet et al.[11] Study by Shaukat Jeelani et al,[7] showed 20% patients with hydrocele in group B and 12 % in Group A which is in contrast to our study.

Out of 25 patients in group A, 4 patients developed scrotal oedema as complication, this is similar to study by R.Bharathidasan et al,[12] and Siddharth Singh et al,[8] with 8.33%, 10 % and 10% incidence of scrotal oedema.

In group B patients, in our study 2 patients (8%) developed scrotal oedema, which is similar to study by Shaukat Jeelani et al,[7] R. Bharathidasan et al, Ali Sharma et al and Siddharth Singh et al.[8]

In our study of 50 patients, with 25 patients in Group A only 2 patients developed wound infection. In study conducted by Siddharth Singh et al,[8] Shaukat Jeelani et al,[7] R. Bharathidasan at al noted 10%, 24% and 8.53% incidence of wound infection. Study conducted by Dr. Vineet et al,[11] showed no wound infection in both groups.

In group B patients who underwent laparoscopic varicocelectomy noted nil incidence of wound infection. These results are same as study conducted by Shaukat Jeelani et al,[7] R. Bharathidasan et al,[12] Dr. Vinod Atreya et al,[6] Dr. Vineet et al,[11] and Siddharth Singh et al.[8]

In our study mean hospital stay in Group A was 3.6 days. It was noted 12 patients (48%) with 3 days duration of stay and 13 patients (52%) with 4 days duration of stay. This was similar to study conducted by Siddharth Singh et al,[8] with 50% patient's foe 3 days stay and 40% patients for 4 days hospital stay.

In our study of 50 patients, group A who underwent open varicocelectomy, were evaluated for mean sperm count and mean % of sperm motility and post op evaluation of same parameters after 3 months, it was noted post of improvement in sperm count and sperm motility, which was similar to study by Shaukat Jeelani et al.[7] In study by Ali shamsa et al,[10] showed no significant improvement in post operative sperm count and motility after 3 months, which is in contrast to our study.

Group B patients who underwent laparoscopic varicocelectomy showed minimal improvement in mean sperm count after 3 months when compared to preoperative values and significant improvement in sperm motility. These results are similar to study conducted by Shaukat Jeelani et al,[7] Ali shamsa et al,[10] and Dr.Vinod atreya.[6] Overall the comparative studies and literature is suggestive of improvement in sperm count, motility and morphology is noted in post operative period and enhanced chances of spontaneous conception was also seen. Return to routine activity after surgery involved reassurance to patients and motivation as anxiety noted during the post operative period. Both the groups were encouraged for the early return to regular routine work. In our study group A returned to regular routine in 6-7 days and group B returned to normalcy in 3-4 days as they had minimal. Our study results were same as study by R.Bharathidasan et al,[12] and similar to study by Atif Naeem raja et al.[8]

CONCLUSION

From the present study comparing the advantages of Laparoscopic Varicocelectomy over Open varicocelectomy the following conclusions were made Varicocele was common in the 3rd and 4th decades and a significant cause of male infertility and

common on left side. Laparoscopic varicocelectomy is safe and effective procedure when compared to open varicocelectomy with significant reduction in operative time, minimal post operative complications and decreased hospital stay, increasing the patient satisfaction and comfort towards the procedure. There was no much significant in open and lap surgery over the pre operative and post operative semen parameters.

REFERENCES

1. Lyon RP, Marshall S, Scott MP. Varicocele in childhood and adolescence: implication in adulthood infertility? Urology. 1982; 19(6):641-4.
2. Campbell-Walsh, text book of urology (9th edn). (International ed.), Saunders Elsevier publishers, 127:3794-3797.
3. Shindel AW, Yan Y, Naughton CK: Does the number and size of veins ligated at left-sided microsurgical subinguinal varicocelectomy affect semen analysis outcomes? Urology 2007; 69: 1176–1180.
4. Goldstein M, Kim FY, Mathews GJ: Miniincision microsurgical subinguinal varicocelectomy with delivery of the testis. J Urol 1996; 155(suppl) abstract videotape: 305A.
5. Al-Kandari AM, Shabaan H: Comparison of outcomes of different varicocelectomy techniques: open inguinal, laparoscopic, and subinguinal microscopic varicocelectomy: a randomized clinical trial. Urology 2007; 69: 417–420.
6. Vinod Atreya et.al. Clinical Study of Laparoscopic Management of Varicocele International Journal of Research & Review (www.ijrrjournal.com) 415 Vol.6; Issue: 11; November 2019
7. Jeelani S, Naeem A, Gilkar I, Peer J, Mushtaq U. Laparoscopic Versus Open Varicocelectomy: An Observational Study. World. 2018;11(2):76-80.
8. Mishra, Vikrant: comparison of laparoscopic vs open varicocelectomy,2020: volume9-issue11(4)-2020 IJMER.
9. Sunil Telkar, et al., Laproscopic Versus Open Varicocelectomy Journal of Clinical and Diagnostic Research. 2012 April, Vol-6(2): 271-273.
10. Shamsa A, Mohammadi L, Abolbashari M, Shakeri MT, Shamsa S. Comparison of open and laparoscopic varicocelectomies in terms of operative time, sperm parameters, and complications. Urol J. 2009 Summer;6(3):170-5. PMID: 19711270.
11. Choudhary V, Mathur RK, Sharma BK. Comparative study of laparoscopic varicocele ligation versus inguinal varicocelectomy. Int.j.med.sci.educ. Oct-December 2017; 4(4):323-327
12. R. Bharathidasan, Reny Jayaprakash, Subith P. Bhaskar, G. Ambujam. Laparoscopic varicocelectomy now the gold standard procedure for varicocele - A comparative study with open technique based on our experience. IAIM, 2017; 4(7): 218-221.
13.
14. Thomas AJ: Surgery for male infertility; in Novick AC (ed): Operative Urology at the Cleveland Clinic. Totowa, Humana Press,2006.
15. Bassi R, Radice F: Surgical treatment of varicocele. Our experience in the last 10 years. Minerva Chir 1996; 51: 533–536.
16. 75.Miersch WD, Schoeneich G, Winter P, Buszello H: Laparoscopic varicocelectomy: indication, technique and surgical results. Br JUrol 1995; 76: 636–638.
17. 76.Clinical study of varicocele: Statistical analysis and the results of long-term follow-up International Journal of Urology (2002)9,455–461