

Evaluation of Clinical Aspects of Varicocele and its Laparoscopic Management

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Abstract:

Introduction: Varicocele is the growth of twisted male reproductive veins, impacting 15% of men. It induces male infertility, and diagnosis pertains to physical exams or ultrasounds. Surgery alternatives differ, with laparoscopic transperitoneal Palomo varicocelectomy being famous. Testosterone disruption is related to varicoceles. Standards for ideal surgery comprise cost-effectiveness, minimal complications, and testicular process preservation.

Aims and Objectives: The study examine Clinical Features and Laparoscopic Treatment of Varicocele through a Comprehensive Assessment.

Method: The study focus of this examination was on a cohort of 31 individuals diagnosed with varicocele, a situation involving enlarged veins within the scrotum. The investigation followed a coming and observational analysis methodology, striving to reveal the multifaceted effect of varicocele on various parameters. By assuming this methodological strategy, the investigators pursued to verify a holistic understanding of how varicocele impacts various aspects, spanning from the initial physical signs to the diagnostic insights and the results of the surgical intervention.

Result: The study's results reveal the distribution of age groups among participants, along with symptom profiles and varicocele factors. Left-sided varicoceles were most familiar (77.19%), while Grade III (45.16%) was the predominant type. Ultrasound measures demonstrated pampiniform plexus vein diameter dilation and Valsalva manoeuvre flow reversal. After varicocelectomy, statistically significant improvements were pointed out in sperm density, motility, and pain scores. Laparoscopic ligation was the introductory approach (93.54%), with a mean operative time of 34.5 minutes for unilateral.

Conclusion: Laparoscopic varicocelectomy shows a clearer perspective, quicker recovery, and a useful solution for enhanced quality of life.

Keywords: Varicocele, Laparoscopic Management, Male Reproductive System, Testosterone.

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Introduction

Abnormally enlarged and twisted male reproductive veins is known as a varicocele. All ages of men are susceptible to the illness, which affects 15% of all males. Additionally, it affects 19 – initial infertility affects 41% of males, while subsequent infertility affects 45 to 81% of men, making it the most prevalent correctable factor causing male infertility [1]. There are only a few unexplored possibilities explaining the etiology and pathophysiology of varicoceles. In the past, Varicoceles is treated by changing the properties of the semen that are associated to male factor infertility, as well as the pain and shrinking of the testicles [2]. Although research has linked varicocele treatment to an improvement in semen parameters, there remains considerable disagreement about the best patients and the best methods of repair. Additionally, there is still debate on the time and criteria for treating a teenager with

a varicocele. Consultation with a urologist is recommended when deciding whether to treat a patient having a varicocele, particularly when there is a worry about the patient's fertility [3].

Providers must comprehend the presentation and varicoceles diagnostic criteria, the essential examination, the reasons and options for change, as well as the proper monitoring and/or follow-up of individuals with treated & untreated varicoceles before they can diagnose and treat them. Varicoceles are normally asymptomatic, however some men may have scrotal pain. While teenage varicoceles are frequently found accidentally during a physical examination, adult males with varicoceles are typically detected during investigation of male factor infertility [4].

A complete sexual & reproductive history must be provided gathered as part of the first examination.

The typical diagnostic procedure for varicoceles is a physical examination. The exam should be done in a warm setting in order to promote relax in the cremasteric and dartos muscle fibres, which will facilitate examination and palpation [5]. The investigation is carried out by inspecting and palpating the patient's scrotum while they are standing, relaxed, and with Valsalva induced [6]. The capacity to see Alternatively, you might feel the varicocele when calm and while inducing Valsalva is the basis for grading varicoceles. Varicoceles of Grade I are only felt when Valsalva, grade II may be felt even when there isn't Valsalva, & grade III can be seen plainly on the scrotal skin. Ultrasonography is often used incidentally to identify subclinical varicoceles since they are neither felt nor visible [7]. Due to drainage of the left-hand spermatic vein into the left kidney vein, which has a larger impedance than the vena cava for drainage most the right spermatic vein, the majority Left-sided varicoceles are present. Right-sided varicoceles often appear before bilateral varicoceles. But solitary or irreducible right-sided varicoceles in the supine position call for more research into any underlying retroperitoneal disease [8].

Adjunctive diagnostic testing is used

Despite being extremely sensitive (97%) and specific (94%), scrotal ultrasonography should not be regularly requested just to confirm to look for subclinical varicoceles, one must first find clinically perceptible varicoceles [9]. But where a physical examination proves challenging or ambiguous, like when a patient is obese, has had scrotal surgery within the past, has a small scrotum, or has thick scrotal skin, ultrasonography can be helpful. Spermatic criteria are among the ultrasonography criteria for diagnosing the presence of a varicocele vein enlargement and colour Doppler flow demonstration of flow reversal [10]. Other diagnostic techniques, including thermography, radioisotope scanning, as well as Spermatic venography shouldn't be utilised frequently to diagnose a patient's subclinical varicocele who does not have a palpable varicocele during physical examination. This is in addition to the use of ultrasound. Varicoceles not only affect fertility, but there is evidence that they also disrupt the Leydig cells in the testicles, which in turn affects testosterone synthesis [11]. In several of these trials, individuals with hypogonadism showed substantial increases in testosterone levels following the repair for a clinical varicocele. The patient should have access to hormone testing services as part of the diagnosis of a varicocele in order to characterise any level of androgen insufficiency and to check for further possible endocrine reasons of infertility. These laboratory tests measure the levels of prolactin, oestrogen

(E2), luteinizing and follicle-stimulating hormones, total and free testosterone, and other substances [12].

The best procedure for varicocele surgery is still up for debate. The following criteria have been proposed for the ideal procedure: cost-effectiveness, limited recurrence of the varicocele, minimum intraoperative and postoperative complications, and preservation and enhancement of testicular function [13]. Early in the 1990s, the laparoscopic transperitoneal Palomo varicocelectomy was developed. Since then, adults as well as kids have come to regard it as a straightforward, safe, and minimally intrusive process. Hydrocele is the most frequent surgical complication, that impacts as much as 25% of cases. Comparing the method to the more popular non-microsurgical inguinal technique, it offers several advantages over benefits [14]. It provides good transperitoneal spermatic vessel visualisation, which is particularly useful in obese individuals. In comparison to the inguinal exposure, there are fewer veins that need to be tied off and fewer arteries that need to be protected, but their calibre is bigger. In 89% to 100% of instances, spermatic artery protection is achievable. It is simple to locate and ligate communicating venous branches that originate from the the kidneys to iliac veins, and sigmoid colon. They could cause the varicocele to come back or stay the same if addressed. The laparoscopic method enables simultaneous treatment of both sides of a bilateral varicocele without the need for extra intervention [15].

Method

Research Design

The study was carried out at a tertiary hospital's Department of Surgery from November 2017 to October 2018. During the specified time frame, a cohort of 31 individuals who had been diagnosed with varicocele was subjected to a prospective evaluation. A thorough evaluation was conducted, which included physical examinations, relevant diagnostic tests, observations during surgery, and the identification of any difficulties that occurred after the operation. The objective of the study was to examine the influence of varicocele on the aforementioned parameters. The study employed an observational and prospective research approach, with a specific emphasis on collecting and analyzing real-time data. By employing this methodology, it became possible to establish a connection between the physical, diagnostic, and operative observations, so revealing noteworthy insights into the consequences of the situation.

Inclusion and Exclusion Criteria

Inclusion

- Patients with varicocele confirmed by clinical examination and imaging investigations were included.
- Patients between 18 and 50 were eligible.
- People who gave informed consent and participated in the study by taking the relevant tests and following up.

Exclusion

- Varicocele patients who were not diagnosed by clinical examination and imaging were excluded.
- Those under 18 and over 50 were excluded from the study.
- Pre-existing medical problems or comorbidities that could affect study outcomes or procedure risks were excluded.
- Hormonal variations could alter research parameters, hence pregnant or potentially pregnant people were eliminated.

Statistical analysis

The study presented quantitative information such as age, sperm density, motility, postoperative hospital stay, operation time, and VAS score as Mean \pm S.D. Category factors such as symptoms, varicocele categorization, side, USG Parameter, CDU Parameter, Maximum Vein Diameter, and Change of flow velocity were expressed in

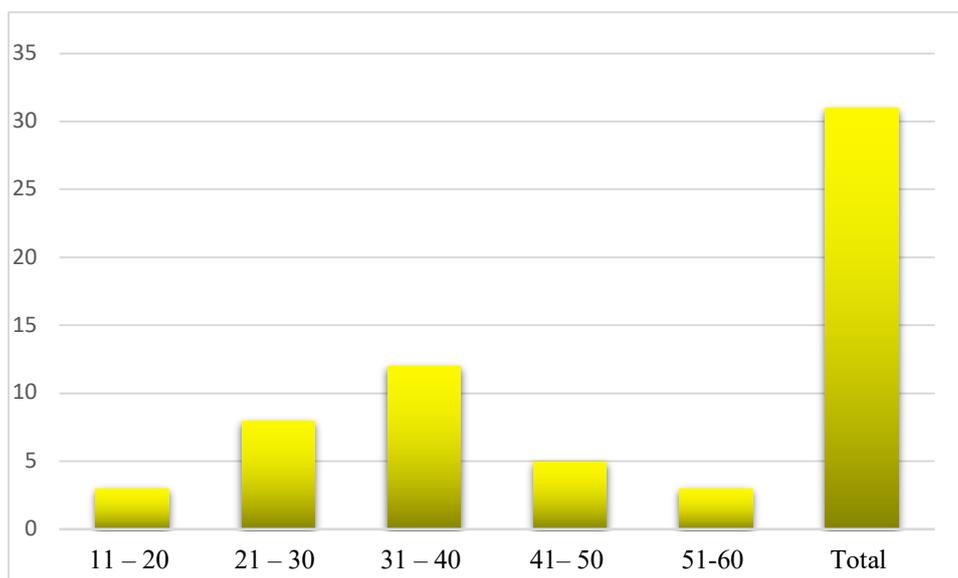
frequency and %. An ANOVA was used to compare three normally distributed groups (sperm density and motility) and three non-parametric groups (pain score, VAS score) using the Wilcoxon signed-rank test and the Post Hoc Dunnett t-test. An unpaired t-test was used to compare the two means. We used a significance level of $P < 0.05$.

Ethical Approval

This study followed the Declaration of Helsinki and Ethics Committee monitoring. Ethical permission was acquired before the study began to protect participants' rights, privacy, and well-being.

Result

Below figure 1 shows how the study participants' ages broke down. Patients between the ages of 31 and 40 were the largest age group (38.71%), followed by those between the ages of 21 and 30 (25.80%) and 41 and 50 (16.13%). Younger people (aged 11-20) and older people (aged 51-60) had lower rates (9.68%). We also detail the symptom profiles that might arise from a varicocele. A whopping 83.87% of patients complained of scrotal swelling, with scrotal pain coming in as a close second. A total of 16.12% of patients presented with infertility as a symptom. These results show the wide age range of patients and emphasize the importance of scrotal symptoms, especially swelling and pain, as indications of varicocele.



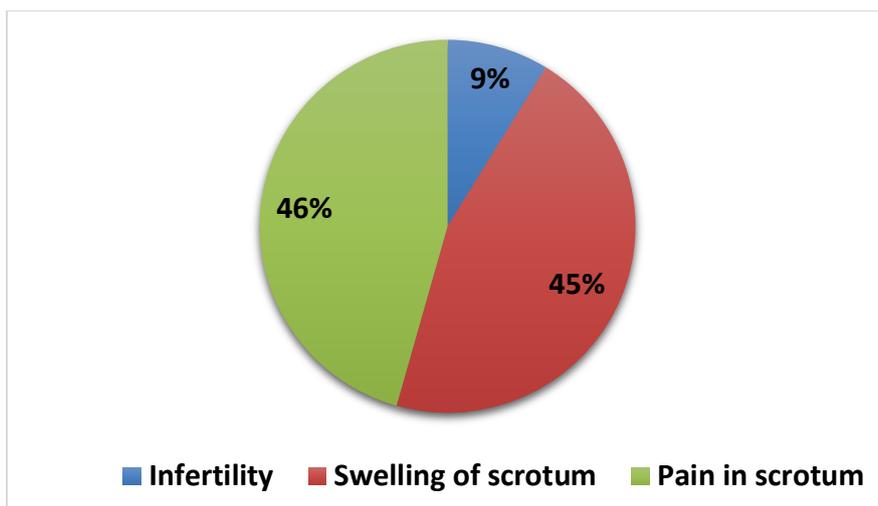


Figure 1: Symptoms associated with varicocele (above); Showing age distribution of the patients in this study (below)

Table 1 shows the study participants' varicocele features. Left-sided varicoceles were more common (77.19%), right-sided were nonexistent, and bilateral instances made up 22.35%. Grade III varicoceles were the most common (45.16%), followed by Grade II (38.70%) and Grade I (16.12%), with no subclinical instances. Ultrasound measurements showed that 83.87% of patients had pampiniform plexus vein diameter dilatation of

more than 2-3.5mm and 90.32% were serpiginous. Valsalva manoeuvre flow reversal occurred 93.54% of the time. Colour Doppler Ultrasonography showed a maximal vein diameter of 2.5–3.9 mm and fluctuations in plexus diameter and flow velocity upon the Valsalva manoeuvre. These findings show the distribution of varicocele characteristics and the prevalence of specific parameters among study participants.

Table 1: Showing Side of Varicocele

Detection of Varicocele	No. of patients	Percentage
Left sided	25	77.19
Right sided	0	0
Bilateral	6	22.35
Total	31	100
Classification of varicocele	No. of patients	Percentage
Subclinical	0	0
Grade I	5	16.12
Grade II	12	38.70
Grade III	14	45.16
Total	31	100
USG Parameter	No. of patients	Percentage
Dilatation of pampiniform plexus veins diameter More than 2-3.5mm	26	83.87
Serpiginous Appearance	28	90.32
Flow reversal with the Valsalva Manoeuver	29	93.54
Colour Doppler Ultrasonography Parameter	No. of patients	Percentage
Maximum vein diameter (mm)		
Less than 2.5	3	9.67
2.5–2.9	12	38.70
3.0-3.9	14	45.16
More than equal to 4.0	2	6.45
Plexus/sum of diameter of veins		
No plexus identified	NIL	NIL
Plexus (+) with sum diameter < 3 mm	3	9.68
Plexus (+) with sum diameter 3–5.9 mm	20	64.51
Plexus (+) with sum diameter more than equal to 6 mm	8	25.81
Change of flow velocity on Valsalva maneuver		
< 2 cm/s or duration < 1 s	0	0
2–4.9	14	45.16
5–9.9	17	54.84

The study found statistically significant improvements in different measures after varicocelectomy. The average sperm density increased from 24.2 ± 1.28 million/ml preoperatively to 35.09 ± 1.44 and 41 ± 1.71 million/ml at 3 and 6 months postoperatively ($P < 0.001$). Sperm motility significantly increased from $28.87 \pm 1.31\%$ to $39.74 \pm 1.82\%$ at 3 months and $50.83 \pm 1.80\%$ at 6 months post-op ($P < 0.001$) in Table 2. VAS pain scores considerably decreased

from 6 ± 2.81 preoperatively to 3.5 ± 2.52 postoperatively ($P < 0.001$). Pain outcomes were 70.96% complete remission, 22.58% partial response, and 6.45% persistent pain. Laparoscopic ligation (93.54%) and bulk ligation (6.45%) were the main surgical methods. The mean operational time was 34.5 ± 0.707 minutes for unilateral and 44.83 ± 6.91 minutes for bilateral procedures ($P < 0.001$). Postoperative hospital stays averaged 1.93 days, with 80.6% discharged within 1-2 days.

Table 2: Showing Classification of varicocele

Average Sperm Density(million/ml)			P value		
Pre- operative	Post op (3 months)	Post op (6 months)	<0.001, significant		
24.2 ± 1.28	35.09±1.44	41± 1.71			
Average sperm motility (%)			P value		
Pre -operative	Post op (3 months)	Post op (6 months)	P <0.001, sig.		
28.87±1.31	39.74±1.82	50.83±1.80			
VAS score			P value		
Pre- operative	Post-operative	P<0.001 Significant			
6±2.81	3.5±2.52				
Pain	Number of patients	Percentage			
Completely resolved	22	70.96			
Partial response	7	22.58			
Persistent pain	2	6.45			
Approach of procedure		No. of patients	Percentage		
Laparoscopic Ligation of internal spermatic vein sparing lymphatics and testicular artery		30	93.54		
Mass ligation of spermatic vessels		1	6.45		
Total		31	100		
Time taken by operative procedure (in minutes)	No. of patients	Percentage	Mean time taken	P VALUE	
Unilateral (left side) 30-35 (minutes)	25	74.19	34.5±0.707		
Bilateral					
45-50(minutes)	6	19.35	44.83±6.91		
TOTAL	31	100		<0.001, SIGNIFICANT	
Postoperative hospital Stay (days)		No. of patients	Percentage	Mean hospital stay	
1 - 2		25	80.6	1.93 DAYS	
3 - 4		6	19.35		
Total		31	100		
POST OPERATIVE COMPLICATIONS					
Complications	Patients	Percentage			
SCROTAL PAIN	1	3.22%			
EPIDIDYMOORCHITIS	1	3.22%			
HYDROCELE	1	3.22%			

Discussion

A study was conducted to determine if laparoscopic varicocelectomy is effective in treating persistent scrotal discomfort. With a low risk of complications, The treatment for symptomatic varicoceles is laparoscopic varicocelectomy. However, it appears that those who arrive with acute, radiating testicular discomfort or at least Low-grade varicocele patients are less likely to gain from this operation, thus careful choosing of patients is crucial [16].

Postoperative morbidity and discomfort in individuals receiving subinguinal varicocelectomies and those having laparoscopic varicocele repair were compared in order to assess the relative benefits of the laparoscopic method to varicocelectomy. With less risk of complications than laparoscopic methods, the repair of subinguinal varicocele can be done under local anaesthesia. Compared to subinguinal techniques, laparoscopic repairs could have a quicker recovery

time than traditional inguinal varicocelectomies, but vice versa [17].

A study conducted in the past to compare and evaluate objectively the postoperative parameters for varicocele ligation for infertile men using both laparoscopic as well as open subinguinal procedures. These findings indicate that there is no Laparoscopic techniques provide an advantage over the conventional open subinguinal procedure terms of length of hospital stay, need for pain medication, or ability to return to work. Laparoscopic procedures cannot be used frequently for varicocele ligation because of the length of the procedure, potential complications, and need for general anaesthesia. The laparoscopic method, however, could be useful when other laparoscopic operations are being done at the same time [18].

There is continuous debate concerning the usual treatment of varicocele repair. To identify the least intrusive and most efficient surgery, we looked back at three surgical treatments for varicocele. In comparison to the other two procedures, we came to the opinion that subinguinal micro varicocelectomy would be a less invasive operation that is worthwhile for addressing male infertility caused by clinical varicocele [19].

Among the most typical reasons for infertility is varicocele. In a study, they compared and evaluated three distinct comparing open & laparoscopic varicocelectomy methods their operating times, results and issues of sperm analysis[20]. They chose 30 instances of each of the following procedures at random from among both bilateral varicocelectomies performed in our facility. Surgical subinguinal varicocelectomy under general anaesthesia, open subinguinal varicocelectomy under local anaesthesia, and laparoscopic varicocelectomy are all examples of this procedure [21]. They contrasted these three groups' operating times, the outcomes of the sperm analysis, and any problems. In terms of the production, recurrence, and duration of hydrocele varicocelectomy performed under local anaesthesia is superior to laparoscopic varicocelectomy. The laparoscopic procedure has a lower complication rate than the subinguinal method while also taking less time to perform than the other two methods [22].

A study contrasted the results of the various varicocelectomy surgical procedures. The research comprised 120 individuals who had varicocelectomy and had 147 clinically evident varicoceles. The patients were divided into one of three equal groups at random for the varicocelectomy surgery, which involves an open inguinal technique, a laparoscopic method, and subinguinal microscopic varicocelectomy [23]. Operative and postoperative data, the examination

covered both the semen analysis and the pregnancy rate. With a range of 11 to 26, the average follow-up was 18 months. The results of the study have shown that subinguinal microsurgical varicocelectomy provides the greatest outcome when compared to open inguinal as well as laparoscopic varicocelectomy [24].

selecting the most effective open, non-microsurgical, laparoscopic, and microsurgical varicocelectomy method for infertile guys operations. Amongst the three varicocelectomy procedures, the most efficient and least morbid way for treating varicocele of infertile men is microsurgical varicocelectomy, according to the most recent research. To confirm the results, further Long-term, high-quality, multicenter RCTs are necessary [25].

Conclusion

In conclusion, the application of imaging techniques plays a vital role in the precise diagnosis of varicocele, as it helps overcome potential constraints associated with clinical evaluations. There are numerous benefits associated with laparoscopic varicocelectomy. These advantages encompass enhanced visual clarity and magnification, which facilitate accurate manipulation of damaged blood veins, consequently reducing the probability of recurrence following the surgical procedure. The aforementioned procedure additionally provides expedited recuperation periods, enabling patients to promptly return to their regular activities, while concurrently mitigating the frequency of surgical difficulties. The efficacy of laparoscopic varicocelectomy has been demonstrated in efficiently resolving both infertility and varicocele-induced discomfort. In general, this strategy demonstrates itself as a very efficacious and streamlined solution for the management of varicocele-related concerns, offering the potential for enhanced outcomes and improved quality of life for individuals.

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