

## Comparison of Outcome (in Terms of Duration of Surgery, Pain Score and Improvement in Sperm Count) in Subinguinal Varicocelectomy versus Inguinal Varicocelectomy Approach

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### ABSTRACT

**Objective:** To compare the outcome in subinguinal varicocelectomy versus inguinal varicocelectomy approach.

**Study Design:** Quasi-experimental study.

**Place and Duration of Study:** Department of Surgery, Combined Military Hospital, Multan, Pakistan from Jan 2023 to Jan 2024

**Methodology:** In Group-A patients, subinguinal varicocelectomy was done while in Group-B patients, an inguinal approach was employed. All patients were given intramuscular diclofenac sodium 75 mg 12 hourly. Patients were followed post-operatively by the researcher himself after 4 months of surgery while the final pain score was noted at 24 hours postoperatively.

**Results:** Of these 66 study cases, grade 1 varicocele was noted in 12.1 % (n=8), grade 2 varicocele were noted in 62.1 % (n=41) and grade 3 varicocele in 25.8 % (n=17). The left side was involved in 81.8% (n=54) and the right side in 18.2 % (n=12). The mean duration of surgery was 34.95±6.98 minutes, in Group-A the duration was 40.12±5.96 minutes versus 29.79±2.92 minutes in Group-B ( $p<0.001$ ). The median postoperative pain score in Group-A was 2(2-2) versus 4(4-3) in Group-B ( $p<0.001$ ). Improvement in sperm count was noted in 57.6 % (n=38), with improvement in Group-A was 72.7 % (n=24) while in Group-B was 42.4 % (n=14) ( $p=0.013$ ).

**Conclusion:** Subinguinal varicocelectomy was found superior in terms of postoperative pain relief and improvement in sperm count

**Keywords:** Inguinal, Outcome, Subinguinal, Varicocele.

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### INTRODUCTION

Varicoceles affect approximately 10-20% of males. Varicocele is far more common among men struggling with infertility, impacting 30-40% of this Group.<sup>1,2</sup> For men with secondary infertility the incidence of varicocele can be 60-80%. Although most varicoceles occur on the left side (due to anatomical reasons), 10 to 15% of cases are bilateral, which may require a more involved surgical approach.<sup>3</sup> Varicocelectomy is commonly performed, particularly in men with infertility problems. The procedure is more common in men with primary or secondary infertility, and many urologists recommend it to improve sperm quality and boost fertility.<sup>4</sup> The microsurgical subinguinal varicocelectomy is increasingly popular due to its high success rates, fewer complications, and quicker recovery times.<sup>5</sup>

In the Inguinal approach, surgeon make an

incision in the groin area, directly over the inguinal canal and it is a very effective method in treating the varicocele and improving sperm quality for men dealing with fertility issues.<sup>6</sup> Since the surgery involves cutting into the groin area, patients may feel more discomfort and pain afterwards compared to other approaches.<sup>7</sup> In the subinguinal approach, the surgeon makes a cut just below the groin crease, which avoids entering the inguinal canal altogether. It's just as effective as the inguinal method in resolving varicocele and improving sperm quality.<sup>8</sup> As this method has low recurrence rate, therefore it may have better outcomes, especially when done with microsurgery, which allows for more precise work.<sup>9,10</sup> Post-operative pain following any surgical procedure is very important as it has physical as well as psychological implications on the sufferers, therefore this study was planned to compare the median postoperative pain score, duration of surgery and improvement in sperm count after the subinguinal versus inguinal approach.

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## METHODOLOGY

This quasi-experimental study was conducted at the Department of Surgery, Combined Military Hospital Multan, Pakistan from January 2023 to January 2024 using a non-probability purposive sampling technique after obtaining approval from the Hospital Ethics Committee (ERC No. 53/2024).

**Inclusion Criteria:** All patient having age 18-50 years with duration of disease >1 month were included. Patient with all grades of varicocele on clinical examination were included.

**Exclusion Criteria:** Patients with recurrent varicocele, with a history of previous lower abdominal surgery and the presence of concurrent painful scrotal conditions e.g. orchitis, epididymo-orchitis and trauma were excluded from our study.

The sample size was calculated using the mean duration of surgery in the subinguinal Group  $22.48 \pm 4.45$  minutes versus  $17.33 \pm 2.18$  minutes in inguinal Group,<sup>11</sup> at 95 % CI and 80 % power of the test. The calculated sample size was 16, however we recruited 66 patients with varicocele undergoing varicocelectomy. After informed consent, all selected cases were divided into Group-A and B by lottery method. All patients were asked to pick any one slip (half-slips indicated with the letter 'A' while remaining slips marked with the letter 'B') and subjects were allotted their Groups accordingly. In Group-A patients, subinguinal varicocelectomy was done and in Group-B patients, an inguinal approach was employed. The surgery in both the Groups was done under spinal anesthesia. Furthermore, only one consultant surgeon (at least 3 years of post-fellowship experience) performed the surgeries in both Groups. All patients were given intramuscular diclofenac sodium 75mg 12 hourly. Patients were followed post-operatively by the researcher himself for assessment of postoperative pain, duration of surgery and improvement in sperm count after 4 months of surgery while the final pain score was noted at 24 hours post-operatively. All data (age, duration of varicocele, side of varicocele (left/right), grade of varicocele (I/II/III), place of living (rural/urban), BMI, diabetes mellitus and postoperative pain) were recorded. Varicocele was diagnosed clinically as the presence of all following i.e. heaviness in the scrotum (assessed on history), testicular pain and on clinical examination as follows; Grade I: only palpable on Valsalva maneuver on standing position, Grade II: palpable in standing position without Valsalva

maneuver, Grade III: visible through scrotal skin in standing position. Post-operative Pain was assessed by a visual analog scale (VAS) 24 hours post-operatively. Score 0 was taken as no pain and 10 was taken as worst pain (Figure).

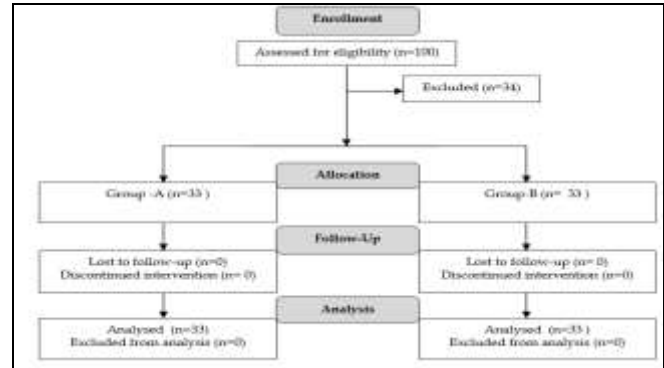


Figure: Patient Flow Diagram (n= 66)

Statistical Package for Social Sciences version 25 was employed for analysis purpose. Mean±SD was calculated for age, duration of surgery and BMI. Frequency and percentage was calculated for side of varicocele (left/right), grade of varicocele (I/II/III) and place of living (rural/urban). Median and IQR was calculated for postoperative pain score (VAS) for the two Groups. Mann Whitney U test was applied to compare post-operative pain and t-test was applied for duration of surgery. The *p*-value of  $\leq 0.05$  was considered as significant.

## RESULTS

Sixty-six patients with varicoceles undergoing varicocelectomy were included in this study. The mean age of these male patients was  $25.20 \pm 6.10$  years (range; 18 - 42 years) and 84.8 % (n= 56) were aged up to 30 years. Mean body mass index was  $23.62 \pm 2.09$  kg/m<sup>2</sup> and 28.8% (n=19) were obese. A significant increase in improvement of sperm count was found in Group-A. Baseline characteristics of the two Groups are shown in Table-I. A significant difference was found between the two Groups when compared according to duration of surgery and postoperative pain (*p* < 0.001) as shown in Table-II.

## DISCUSSION

The inguinal and subinguinal approaches are two commonly used surgical techniques for varicocelectomy (surgical repair of varicoceles). Both techniques are effective, with the choice depending on the surgeon's expertise and patient-specific factors. Fewer complications are expected with subinguinal

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approach. The risk of nerve damage or hydrocele formation is lower compared to the inguinal approach.<sup>12,13</sup>

**Table-I: Baseline Characteristics of Both Groups (n=66)**

Characteristics	Groups		p-value
	Group-A (n=33)	Group-B (n=33)	
<b>Age Groups</b>			
≤ 30 Years (n= 56)	27 (81.8%)	29 (87.9 %)	0.492
> 30 Years (n= 10)	06 (18.2 %)	04 (12.1 %)	
<b>Residential Status</b>			
Rural (n= 23)	12(36.4 %)	11 (33.3 %)	0.796
Urban (n= 43)	21 (63.6 %)	22 (66.7 %)	
<b>Socioeconomic Status</b>			
Poor (n=24)	11 (33.3 %)	13 (39.4 %)	0.609
Middle Income (n=42)	22 (66.7 %)	20 (60.4 %)	
<b>Obesity</b>			
Yes (n=19)	08 (24.2 %)	11 (33.3 %)	0.415
No (n=47)	25 (75.8 %)	22 (66.7 %)	
<b>Grades of Varicocele</b>			
Grade - 1 (n=08)	05(15.2 %)	03 (20.0 %)	0.747
Grade - 2 (n=41)	20 (60.6 %)	21 (80.0 %)	
Grade - 3 (n=17)	08 (24.2%)	09 (27.3%)	
<b>Side of Varicocele</b>			
Left (n=54)	26 (78.8 %)	28 (84.8 %)	0.523
Right (n=12)	07 (21.2 %)	05 (15.2 %)	
<b>Outcome</b>			
<b>Improvement in Sperm Count</b>			
Yes (n=38)	24 (72.7%)	14 (42.4%)	0.013
No (n=28)	09 (27.3%)	19 (57.6%)	

**Table-II: Mean Duration of Surgery and Post-Operative Pain Score (n=66)**

Outcome		Group-A	Group-B	p-value
Duration of Surgery	Minutes, Mean±SD	40.12±5.96	29.79±2.92	< 0.001
	Median (IQR)	2.00(2.00-2.00)	4.00(4.00-3.00)	< 0.001*

\* Mann-Whitney U test

Inguinal approach involves making an incision near the inguinal canal, providing easy access to the testicular veins. Recurrence rates typically range from 5-15%. Subinguinal approach is performed closer to the scrotum without entering the inguinal canal, this approach has a slightly lower recurrence rate of 2-7%, likely due to better visualization of smaller venous branches.<sup>14</sup> In the inguinal approach, there is a moderate risk of complications such as hydrocele formation due to lymphatic vessel ligation, along with higher levels of postoperative pain. In the subinguinal approach, there are fewer complications, particularly a reduced risk of hydrocele, as it allows for better preservation of lymphatics and the testicular artery.<sup>15</sup>

Sixty six patients with varicoceles undergoing varicocelectomy were included in our study. Mean age of these male patients was 25.20±6.10 years (range; 18 -

42 years) and 84.8 % (n=56) were aged up to 30 years. Hameed *et al.*<sup>16</sup> from Khair Pur Sindh reported 30.25±5.19 years (range; 22 to 40 years), similar to our results. Similarly, Gontero *et al.*<sup>17</sup> from Italy has also reported 25.13±6.58 years mean age in patients with varicoceles. Turkish study conducted by Demirdogen *et al.*,<sup>18</sup> has also reported 28.14 (20-41 years, age range) mean age of the patients with varicoceles, similar to our results. Shahzad *et al.*<sup>19</sup> has reported 31.76±5.35 years mean age in patients with varicoceles, similar to our results. Kotb *et al.*<sup>20</sup> has reported 27 years (range; 22-30 years) mean age, similar to our results.

Of these 66 study cases, 34.8% (n=23) were rural while 65.2 % (n=43) were from urban localities and 63.6% (n=42) belonged to middle income families. Mean body mass index was 23.62±2.09 kg/m<sup>2</sup> and 28.8% (n=19) were obese. Hameed *et al.*<sup>16</sup> from Khair Pur Sindh reported 23.44±1.28 kg/m<sup>2</sup> mean body mass index in patients undergoing varicocelectomy, similar to our results. Shahzad *et al.*<sup>19</sup> has reported 26.76±5.45 kg/m<sup>2</sup> mean BMI in patients with varicoceles, similar to our results. Kotb *et al.*<sup>20</sup> has reported 22 kg/m<sup>2</sup> (range; 18-28 kg/m<sup>2</sup>) mean BMI, similar to our results. Grade 1 varicocele were noted in 12.1 % (n=8), grade 2 varicocele were noted in 62.1% (n= 41) and grade 3 varicocele in 25.8% (n=17). Hameed *et al.*<sup>16</sup> from Khair Pur Sindh reported 73 % grade 2 varicoceles and 23% grade 3, similar to our results. Similarly, Gontero *et al.*<sup>17</sup> from Italy has also reported 8% grade 1 varicocele, 39% grade 2 and 53% grade 3 in patients with varicoceles. Turkish study conducted by Demirdogen *et al.*<sup>18</sup> has also reported grade 1 varicocele in 5.9%, grade 2 varicocele in 20.6% and grade 3 in 73.5% patients with varicoceles, similar to our results.

Left side was involved in 81.8% (n=54) and right side in 18.2% (n=12). Similarly, Gontero *et al.*<sup>17</sup> from Italy has also reported that left side was involved in 84% patients with varicoceles.

Mean duration of surgery was 34.95±6.98 minutes. In Group-A duration was 40.12±5.96 minutes versus 29.79±2.92 minutes in Group-B ( $P<0.001$ ). Hameed *et al.*<sup>16</sup> from Khair Pur Sindh reported similar results. Similarly, Gontero *et al.*<sup>17</sup> from Italy has also reported 39.7±9.36 minutes mean duration of surgery in subinguinal Group versus 35.4±7.92 in inguinal Group in patients with varicoceles. Turkish study conducted by Demirdogen *et al.*<sup>18</sup> has also reported 65.53 minutes versus 47.09 minutes in Group-A and B patients respectively, similar to our results.

In Group-A median postoperative pain score was 2(2-2) versus 4(4-3) in Group-B ( $P<0.001$ ). Gontero *et al.*<sup>17</sup> from Italy has also reported  $2.7\pm 2.52$  mean pain score (VAS) in subinguinal Group versus  $3.32\pm 2.15$  in inguinal Group in patients with varicoceles. Turkish study conducted by Demirdogen *et al.*<sup>18</sup> has also reported mean pain score of 2.67 versus 3.34 in Group-A and B respectively, similar to our results.

Improvement in sperm count was noted in 57.6% ( $n=38$ ). Improvement in sperm count in Group-A was noted in 72.7% ( $n=24$ ) while improvement in Group-B was 42.4% ( $n=14$ ). ( $P=0.013$ ). Hameed *et al.*<sup>16</sup> from Khair Pur Sindh reported 100% Improvement in sperm count in group A versus 93% Improvement in sperm count in Group-B patients, similar to our results. Shahzad *et al.*<sup>19</sup> has reported 72% versus 52% in Group-A and Group-B, respectively which is similar to our results.

#### LIMITATIONS OF STUDY

The surgery was operator dependent so it can affect the result of the study. Moreover, the per-operative findings can differ from patient to patient which can affect the outcome of the study. Lastly, the patients can become confused while assessing their pain through the VAS scoring system.

#### CONCLUSION

Subinguinal varicocelectomy was found superior in terms of postoperative pain relief and improvement in sperm count as there was statistically significant difference in these parameters as compared with inguinal approach. Mean duration of surgery was higher in subinguinal Group. All clinicians who are managing varicoceles can effectively employ subinguinal approach to achieve desired clinical outcomes of varicocelectomy.

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**Authors Contribution:**

Following authors have made substantial contributions to the manuscript as under:

AR & AS: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

AAK & RSM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SAA & SR: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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