

# Comparison of the result of Doppler sonography before and after laparoscopic artery and lymphatic sparing varicocelectomy with microsurgical subinguinal varicocelectomy

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## ABSTRACT

**Background:** Based on the importance of varicocele, the aim of this is to compare the comparison between doppler sonography before and after laparoscopic lymphatic sparing varicocelectomy and microsurgical subinguinal varicocelectomy. **Patients and Methods:** Patients with primary varicocele who were referred to Ahvaz Imam Khomeini Hospital after informed consent were included. Primary information included varicocele severity, pain intensity, latency, Doppler sonography (Resistive index (RI), venous return, venous diameter before and after Valsalva) were obtained, and then patients were entered into one of the two groups of surgery. The admission duration, return to work duration, the pain and analgesic consumption, and the length of anxiety were recorded in patients. Patients were examined 3 months later, and the severity of varicocele in the examination, pain score, latency, Doppler sonography indices, sperm indices in both groups were registered. In the end, the information is entered into Statistical Package for the Social Sciences (SPSS) statistical software and evaluated. **Results:** We observed that the severity of varicocele ( $P = 0.34$ ), pain ( $P = 0.45$ ), latralite ( $P = 0.56$ ), RI ( $P = 0.65$ ), intravenous diameter ( $P = 0.75$ ) did not show statistically significant difference between the two groups, also in evaluating these indices after surgery, there were significant differences between the two groups in pain ( $P = 0.04$ ) and time for return to work ( $P = 0.036$ ). **Conclusions:** The methods used in varicocelectomy did not have any effect on the outcome of the treatment. Accordingly, using any of these methods can improve the post-surgical state of the patients and promote the fertility performance and reduction of complications due to surgery in patients.

**Keywords:** Doppler sonography, laparoscopic artery and lymphatic sparing, microsurgical subinguinal, varicocelectomy

## Background

Varicocele is an abnormal dilation of testis cord veins, 90% of cases are present on the left side and 10% were bilateral cases. Although the cause of the increased severity of varicocele in children and adolescents is not clear, this is probably due to the genetic, physical,

and abnormal state of the venous drainage system. Varicocele is associated with impaired sperm quality and subsequent infertility.<sup>[1]</sup> Varicocele treatment is performed by closing the testicular veins through surgery. Success in treatment is defined by the impact on sperm quality in terms of motility, morphology, count and, eventually, the occurrence of pregnancy. Of course, many factors such as hormonal, genetic, and environmental factors can affect the sperm quality and successful pregnancy.<sup>[2,3]</sup>

Different methods are used to treat this condition. Some studies have suggested that the best and lower complicated surgical

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procedure for this disease is the microsurgery method. The gold standard procedure for varicocelectomy is the microscopic subinguinal method. In this method, a small incision of the abdomen near the outside of the penis and over the testis and with the aid of a microscope is performed.<sup>[4,5]</sup> The advantage of this method is to maintain artery, lymphatic and nerve, and the rate of relapse is also lower (about 1 to 2%). The next method is inguinal surgery, which is almost the same as the first one, but without a microscope, and so its complications are higher (recurrence 9 to 16% and hydrocele 3 to 39%).<sup>[6]</sup> The third method as retroperitoneal surgery is performed with a shear above the previous method, with recurrence of 11 to 15% and hydrocele of 7%. Also, we can use the laparoscopic procedure for varicocelectomy. But in this way, it is possible to damage the large vessels, intestines, or the bladder and other parts, although these complications are uncommon. Accordingly, each of the described methods has its advantages and disadvantages that make their efficacy different in patients with varicocele.<sup>[7,8]</sup> The aim of this study was to compare the results and complications of laparoscopic varicocelectomy with subinguinal microsurgical varicocelectomy in patients who were referred to Imam Khomeini Hospital of Ahvaz.

## Objectives

The aim of this evaluation is to compare the result of Doppler sonography before and after laparoscopic artery and lymphatic sparing varicocelectomy with microsurgical subinguinal varicocelectomy.

## Patients and Methods

### Study setting

This hospital-based study was conducted on patients with varicocele who were referred to Imam Khomeini Hospital of Ahvaz.

### Study population

Study population was all patients with varicocele. Based on this, 38 patients with these conditions were considered as the study group and 19 patients were grouped based on surgery type.

### Measurements

After confirming the design and obtaining the ethical and clinical trial code (IRCT), patients with primary varicocele who referred to Ahvaz Imam Khomeini Hospital after knowledge and informed consent were enrolled in the study. Initial information including varicocele severity, pain intensity, varicocele side, and Doppler ultrasonography (RI, venous return, venous diameter before and after Valsalva) were recorded and then the patients were randomly assigned to one of two groups A (laparoscopic) or group B (subinguinal microsurgical). Duration of admission, duration of return to work, the severity of pain and analgesic consumption were recorded in patients. Patients were examined one month later and the severity of varicocele in the examination,

pain rate, pain laterality, and Doppler ultrasonography (RI, venous return, intravenous diameter before and after Valsalva) were recorded in both groups. Finally, the obtained data were entered into Statistical Package for the Social Sciences (SPSS) software version 23 and all variables were compared in two groups A and B. Finally, the results of the study were presented as the final report.

## Ethical considerations

This study was conducted on patients with varicocele and used in collecting information from the checklist, and no names were given from the completing subjects. Accordingly, the explanation was provided to the participants whose information is complete and only the results are presented in general. They were then asked to complete the informed consent of the study and then carefully fill in the checklist. The study was approved with ethical code as IR.AJUMS.REC.1398.139 and IRCT code as IRCT20190519043633N1.

## Statistical analysis

To assess the statistical significance of this study, SPSS software version 23 was used. For statistical analysis, frequency and percentages with charts were used. In addition, T-test, Chi-square, and analysis of variance (ANOVA) were used to compare the two groups.

## Results

We evaluated 38 patients with varicocele as our study group, of these, 19 patients were in microsurgical subinguinal and 19 patients in laparoscopic group. Before the operation of patients with varicocele, none of the evaluated indices were statistically significant. Indicators included varicocele severity ( $P = 0.34$ ), pain ( $P = 0.45$ ), varicocele side ( $P = 0.56$ ), RI ( $P = 0.65$ ), intravenous diameter with Valsalva ( $P = 0.75$ ) and without ( $P = 0.87$ ) Valsalva had no significant statistical difference between the two groups [Table 1].

In addition, we observed that there was no significant difference in the duration of hospitalization between the two groups ( $P = 0.6$ ). However, there was a significant difference in pain score ( $P = 0.45$ ) and surgical duration, on the other hand, the time required to return to work was shorter in the laparoscopic group ( $P = 0.01$ ) [Table 2].

In addition, we observed that of the evaluated indicators after the operation of patients with varicocele, some of them had a statistically significant difference between the two groups, while most of them did not show significant differences between the two groups. Indices with significant differences included as pain severity ( $P = 0.04$ ) and involvement side ( $P = 0.02$ ), which was better in the laparoscopic group, as well as other indices without significant difference included as varicocele severity ( $P = 0.1$ ), RI ( $P = 0.08$ ), and vein diameter with and without Valsalva [Table 3].

**Table 1: Comparison of pre-surgical varicocele indices in two groups**

Variables	Groups		P
	Laparoscopic	Microsurgical	
Severity of varicocele			0.34
I	1 (5.2)	0 (0)	
II	8 (42.1)	9 (47.3)	
III	10 (52.7)	10 (52.7)	
Pain Severity			0.37
Mean±SD	4.2±1.1	4.1±1.2	
Side			0.67
One sided	6 (31.6)	7 (36.8)	
Two sided	13 (68.4)	12 (63.2)	
RI			
Mean±SD	0.53±0.12	0.54±0.1	
Intravenous diameter without Valsalva			0.87
Mean±SD	3.35±0.88	3.36±0.85	
Intravenous diameter with Valsalva			0.75
Mean±SD	3.76±0.94	3.78±0.88	

**Table 2: Comparison of postoperative indices in two groups of patients**

Variables	Groups		P
	Laparoscopic	Microsurgical	
Duration of admission			0.6
Mean±SD	1.5±0.6	1.0±0.3	
Duration of surgery			0.01
One sided	20±7	15±45	
Two sided	35±11	74±23	
Time of back to work (day)			0.01
Mean±SD	10±3.2	17±3.5	
Severity of pain			0.45
Mean±SD	4.1±1.1	4.3±1.2	

**Table 3: Comparison of varicoceles related indexes one month after surgery in two groups**

Variables	Groups		P
	Laparoscopic	Microsurgical	
Severity of varicocele			0.1
I	1 (5.2)	1 (5.2)	
II	0 (0)	2 (10.5)	
III	0 (0)	0 (0)	
Pain Severity			0.04
Mean±SD	1.7±0.8	2.0±0.7	
Side			0.02
One sided	1 (5.2)	3 (15.8)	
Two sided	0 (0)	1 (5.2)	
RI			0.08
Mean±SD	0.29±0.09	0.32±0.06	
Intravenous diameter without Valsalva			0.06
Mean±SD	2.5±0.43	2.4±0.42	
Intravenous diameter with Valsalva			0.06
Mean±SD	2.34±0.56	2.4±0.60	

## Discussion

We found that in varicocele patients, none of the evaluated indices have significant statistical differences between the two groups before the surgery procedure. These indices included as varicocele severity ( $P = 0.34$ ), pain ( $P = 0.45$ ), varicocele side ( $P = 0.56$ ), RI ( $P = 0.65$ ), venous diameter with ( $P = 0.75$ ) and without ( $P = 0.87$ ) Valsalva. However, some of these indices had significant statistical differences between the two groups after the operation. These indices included as pain intensity ( $P = 0.04$ ), time needed for return to work ( $P = 0.5$ ), and side of conflict ( $P = 0.02$ ). Also, other indices that did not show significant statistical differences between the two groups included varicocele severity ( $P = 0.1$ ) and RI ( $P = 0.08$ ), other studies have shown different results in this regard. Another study was conducted where this diagnostic method was discussed.<sup>[9,10]</sup> Ding *et al.* evaluated patients with varicocele and, after their evaluation, stated that in follow-up stages, patients undergoing microscopic surgery had a significant benefit compared to those who were exposed to laparoscopic varicocelectomy in terms of the rate of pregnancy. They also stated that there was no significant difference between laparoscopic varicocelectomy and open microscopic varicocelectomy. On the other hand, they stated that postoperative pain after microscopic surgery was significantly less than laparoscopic or open-ended varicocelectomy, and the time to return to work after microscopic surgery and laparoscopic varicocelectomy was significantly shorter than that of varicocelectomy. They also mentioned that the surgery duration of microscopic varicocelectomy was longer than laparoscopic or open-ended varicocelectomy.<sup>[6]</sup> This is consistent with the present results. We also observed that laparoscopic is more effective in treating patients, and this method is based on the therapeutic outcomes and various related indicators.. Al-Sayed *et al.* mentioned that the results of the three techniques of varicocelectomy were evaluated in infertile patients with varicocele. Accordingly, at the end of their study, they stated that the time of operation in the microscopic group was significantly longer. They also stated that postoperative complications were statistically significant in the three groups. In the follow-up, none of the patients in the microsurgery group needed hydrocele surgery, while 4 (2.8%) of 143 patients in the other group and in 8 (5.4%) of 148 patients in the laparoscopic group needed surgery. This indicates a significant difference in microsurgery,<sup>[11]</sup> accordingly, they evaluated three therapeutic approaches in this assessment, while in our assessment two methods of surgery were evaluated. Also, Tadayon *et al.* compared the incidence of complications from each of these methods in patients with varicocele. They stated that the frequency of recurrence of varicocele in inguinal and peritoneum surgery was 7.5% and 16%, respectively ( $P < 0.01$ ). The incidence of testicular atrophy was 15.1% and 10.6%, respectively, in the two methods ( $P > 0.05$ ). Finally, the incidence of hydrocele was 13.6% in the inguinal method and 10.6% in the peritoneum method ( $P > 0.05$ ). Accordingly, they stated that the inguinal method had a lower risk of recurrence than the peritoneal method. But the probability of damage to the testicular artery

and the possibility of hydrocele formation are the same in two methods.<sup>[12]</sup> Accordingly, these results were not consistent with the results observed in this evaluation, this difference is due to the use of different therapeutic approaches in two studies. Accordingly, most studies in this field have been consistent with the results of our assessment, which indicates that these methods of surgery were equal in results, so based on the points outlined in this section, the importance of using these methods in the treatment of patients with varicocele is indicated.

## Conclusions

The methods used in varicocelectomy did not have any effect on the outcome of the treatment. Accordingly, using any of these methods can improve the post-surgical state of the patients and promote the fertility performance and reduction of complications due to surgery in patients.

## Authors' contribution

Study concept and design were done by HM and DK. Analysis and interpretation of data by HM and SE and drafting of the manuscript were done by SE and MRD.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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