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Comparative Study between Subinguinal Varicocelectomy and Laparoscopic Varicocelectomy

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ABSTRACT

Background: surgical correction of varicocele is the corner stone of its therapy and varicocelectomy is the most commonly performed operation for the treatment of male infertility. **Aim:** to compare the outcome of the most common surgical approaches; sub-inguinal varicocelectomy and laparoscopic varicocelectomy as regards: operative difficulties & time, complications and efficiency. **Patients and Methods:** This randomized controlled study was conducted on 40 patients, divided into two groups: group I included 20 patients, were operated upon through the subinguinal approach and group II included 20 patients, were operated upon through the laparoscopic approach, and comparison between two groups as regard outcomes and complications. **Results**: It was found from this study that the operation time was relatively shorter with the laparoscopic technique ($p<0.01$), while the length of hospital stay and post-operative complications did not differ in both methods. Follow up of patients at 3 and 6 months showed a marked improvement in semen analysis in terms of concentration, the percentage of abnormal forms, movement, and also there was a marked improvement in testosterone hormone.

Conclusion: In both methods, results were almost the same, but the sub inguinal approach is qualitatively better in terms of the lack of complications, but with delayed return to work compared with laparoscopic technique.

Keywords: varicocele, varicocelectomy, sub-inguinal, laparoscopy, male fertility.

INTRODUCTION

Varicocele is defined as an abnormal tortuosity and dilatation of the testicular veins [(1)]. Some consider varicocele as an anatomical variant rather than a disease since the general incidence of varicocele in the population has been reported to be as high as 15% [(2)]. Its significant pathologic aspect comes out from the fact that it is generally agreed that a varicocele represents the most common identifiable pathology in infertile men. The incidence in men presenting for infertility is about 35% and in that subset of men with secondary infertility it is 70- 80% [(3)]. There are different surgical approaches for varicocelectomy: scrotal, subinguinal, retroperitoneal or Palomo's procedure and inguinal [(4)]. Subinguinal varicocelectomy is reported to be an effective procedure to either eliminate the pain of varicocele or improve the semen quality in infertility patients. The low procedure-related complication rate seems to be in accordance with inguinal and subinguinal techniques [(5,6)].Laparoscopic varicocelectomy is a simple, safe and effective surgical procedure which could be proposed as an alternative to open surgical or percutaneous embolization approaches [(7)].

AIMS OF THE STUDY

This study aims to compare the outcome of the most common surgical approaches; sub-inguinal varicocelectomy and laparoscopic varicocelectomy as regards: operative difficulties, time, complications and efficiency.

PATIENTS AND METHODS

Forty patients were treated for varicocele by either subinguinal varicocelectomy approach or laparoscopic varicocelectomy approach at Al-Azhar University Hospitals (Al-Hussain University Hospital and Sayed Galal University Hospital), Cairo, Egypt, during the period from March 2018 to November 2018, after obtaining the local Ethics Committee approval. After obtaining the local ethics committee approval, all patients admitted to the Surgery Department signed a written informed consent.

They were randomized using close-envelope into two groups: **Group I:** 20 patients, operated upon through the subinguinal approach. **Group II:** 20 patients, operated upon through the laparoscopic approach.

A) **Inclusion criteria**: Patients with primary varicocele, symptomatic (scrotal pain and/or infertility), refluxing in clinical examination and duplex assessment.

B) **Exclusion criteria**: Patients were excluded if: Have secondary or recurrent varicocele, asymptomatic, azoospermic patients, female partner factors of infertility, or medically unfit for surgery.

Surgical Techniques: Patients were randomized to undergo either the subinguinal approach or the laparoscopic approach using closed envelopes opened before surgery. Operations were carried out under spinal or general anaesthesia.

Group I: the subinguinal approach

Under spinal anaesthesia the patient was placed in a supine position. The incision was made transversely with a length of approximately equal to 2.5 cm at the level of external inguinal ring, just outside the pubic tubercle. By retracting the edges of the wound, the spermatic cord was dissected subinguinally without breaching the inguinal canal and could be identified by the appearance of the blue colour of the spermatic veins.

The external spermatic vein was assessed and if dilated a double ligature was applied. Then the internal spermatic fascia was approached through meticulous dissection. The dilated internal spermatic veins were identified and dissected carefully with mosquito clamps. With careful manipulation, each dilated vessel was isolated and a double ligature of 3-0 Vicryl was used to control the vessel and then cut with a sharp scissor. The wound was closed with 3-0 Vicryl sutures.

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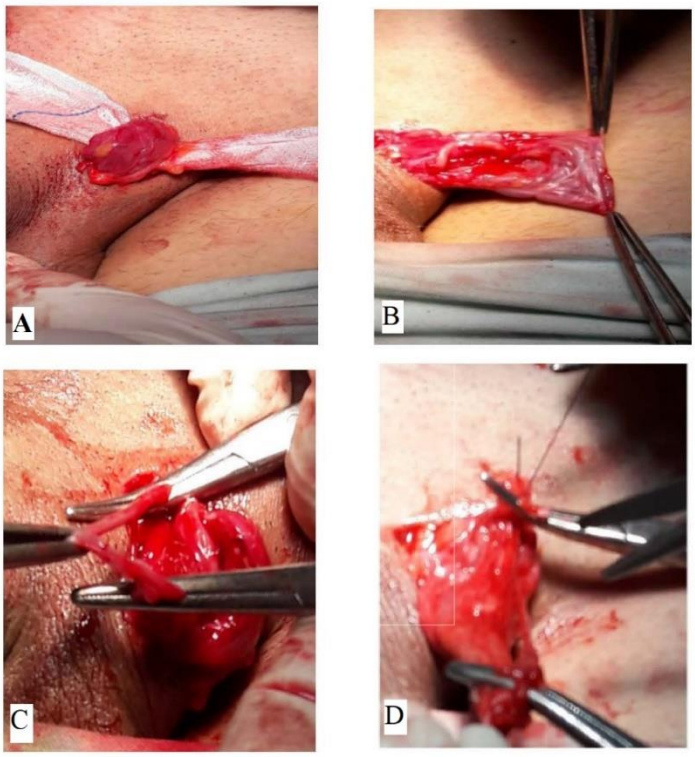

Figure (1): Subinguinal Approach (A) Delivery of the spermatic cord. (B) Identification of dilated internal spermatic veins. (B) Clamping of tortious veins after its dissection. (D) Double ligation of dilated vein by Vicryl sutures.

Group II: The laparoscopic approach

The procedure was carried out under general anaesthesia. The patient was placed in a slight Trendelenburg position to displace the bowel in the cephaled direction. An initial 10 mm incision was made sub-umbilically in the midline with camera attached. A second operating 10 mm trocar was inserted laterally at the edge of rectus abdominis muscle approximately 5-10 cm inferiorly. A third 5 mm trocar is then inserted in the opposite lower quadrant. The operator stands on the contralateral side of the operating table and manipulates the midline and ipsilateral instruments, while an assistant on the ipsilateral side controls the laparoscope and stabilizes the instrument ports during instrument exchange.

The anatomy of the area was identified and then while grasping the overlying peritoneum, scissors are used to make a 5 cm incision parallel and lateral to the spermatic vessels, a second peritoneal incision is made at a right angle to the first extending medially over the spermatic vessels to produce a (T) shaped incision and expose the lateral and medial borders of the spermatic vascular pocket. The artery and veins are separated with sharp and blunt dissection; the veins and collaterals are doubly ligated, clipped, usually within 1 to 2 cm from the internal ring and then divided with the scissors. Pneumoperitoneum is aspirated, all trocars were removed, and wounds closed in layers.

Figure (2): Laparoscopic Approach (A) Identification of the spermatic vessels (B) Identification and dissection of testicular vein from the testicular artery. (C) Clipping of testicular vein.

Statistical Analysis

Data were analysed using IBM SPSS software package version 20.0. Quantitative data were presented as mean and SD. Qualitative data were presented as number and percentage. Logistic regression analysis was used to calculate odds ratio and P value. P value less than 0.05 was considered significant.

RESULTS

Preoperative characteristics were well balanced in the two randomized groups, as shown in (table 1).

The operative time was calculated from incision to skin closure in both groups. The mean± SD min. and range min. of operative times were 37±10 (20-53) and 32±13 (18-65) in unilateral cases in both groups respectively. Meanwhile, the mean± SD min. and range min. of operative time were 67±17 (50-130) and 62±15 (45±115) for bilateral cases with p< 0.01.

There was no significance in the mean-time of hospital stay (p=0.8) in both groups (table 2). Patient's return to normal activities occurred after a mean of 6.2 and 5.5 days after subinguinal and laparoscopic surgery, respectively.

There was a significant difference between spermatic veins diameter in the right and left side in both groups. For subinguinal, the right side was 2.9 ± 0.66 (range 1.3 – 4.7 mm) and the left side was 3.8 ± 0.98 (range 2.2 – 8.9mm) with p= 0.0001. While in laparoscopic group the right side was 2.8 ± 1.11 (range 1-5 mm) and the left side was 3.8 ± 0.94 (range 2.6-8.9 mm) with p= 0.0001. The two groups had comparable results regarding the diameter of right and left veins (p=0.665 and p= 0.585) in both groups respectively.

There was a significant difference between testicular volume in the right and left side in both groups. For subinguinal group, the volume was 16.5 ± 1.1 and 13.8 ± 1.2 (ml) preoperatively and became 17.9 ± 1.75 and 15.7 ± 1.7 (ml) for right and left side respectively (p=0.0001). For laparoscopic group, the volume was 16.6 ± 1.1 and 13.9 ± 1.27 (ml) preoperatively and became 17.4 ± 1.3 and 14.9 ± 1.3 (ml) for right and left side respectively (p= 0.0001).

No intra-operative complications were seen in both groups. Complications of these two methods are summarized in (table 3).

The two study groups were comparable regarding the preoperative semen parameters, including sperm count, motility, and morphology (table 4, 5, 6).

The hormonal evaluation included assay of serum follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin and testosterone at preoperative and 3, 6 months after operation (tables 7, 8). There is a significant decrease is serum FSH and a significant increase in the level of serum testosterone before and after treatment at both group.

Table (1): Patients characteristics

Variables	Subinguinal ligation (N=20)	Laparoscopic clipping (N=20)	p-value
Varicocele side			
▪ Left	2(10%)	2(10%)	
▪ Bilateral	18(90%)	18(90%)	
Age(year)			
▪ Mean± SD	28.56±4.8	28±4.9	0.428
▪ Range	20-40	20-40	
Colour duplex U/S			
▪ Grade1	1(5%)	0(0%)	0.891
▪ Grade2	4(20%)	3(15%)	
▪ Grade3	15(75%)	17(85%)	

Table (2): Operative and postoperative outcomes.

Variables	Subinguinal ligation	Laparoscopic clipping	p-value
Operative time (minute -range)			
▪ Unilateral	37±10(20-53)	32±13(18-65)	0.01
▪ Bilateral	67±17(50- 130)	62±15(45-115)	0.01
Hospital stay(days)	1.7±0.8	1.5±0.7	0.8
Time to return to work	6.2±3.4	5.5±3.2	0.6

Table (3): Postoperative complications.

Variable	Subinguinal ligation No. (%)	Laparoscopic clipping No. (%)	
Hydrocele	0 (0%)	0(0%)	--
Scrotal oedema	1(5%)	0 (0%)	0.311
Orchitis	0(0)	0(0%)	--
Wound infection	0(0)	0(0%)	--
Recurrence	0 (0)	0(0%)	--

Table (4): Preoperative semen characters of all patients in both groups.

Variables	Subinguinal ligation	Laparoscopic clipping	p-value
Sperm count (10^6/ml)	12.95±5.19	12.1±5.1	0.2788
Sperm motility (%)	33.5±3.95	34.1±3.9	0.2567
Sperm morphology (%)	33.3±2.2	33.3±3.3	0.7635

Table (5): Semen analysis results at 3 months postoperative.

Variables	Before treatment	After treatment	p-value
Subinguinal ligation			
Sperm count (10^6/ml)	12.95±5.19	34.3±7.9	0.0001
Sperm motility (%)	33.5±3.95	38.96±6.8	0.0001
Sperm morphology (%)	33.5±2.2	35.6±2.1	0.0001
Laparoscopic clipping			
Sperm count (10^6/ml)	12.1±5.1	33.5±6.6	0.0001
Sperm motility (%)	34.1±3.9	37.7±5.3	0.0001
Sperm morphology (%)	33.3±3.3	36.2±2.9	0.0001

Table (6): Semen analysis results at 6 months postoperative.

Variables	Before treatment	After treatment	p-value
Subinguinal ligation			
Sperm count (10^6/ml)	12.95±5.19	36.5±8.9	0.0001
Sperm motility (%)	33.5±3.95	41.3±9.2	0.0001
Sperm morphology (%)	33.5±2.2	38.8±5.1	0.0001
Laparoscopic clipping			
Sperm count (10^6/ml)	12.1±5.1	35.8±7.3	0.0001
Sperm motility (%)	34.1±3.9	40.3±7.6	0.0001
Sperm morphology (%)	33.3±3.3	39.2±5.4	0.0001

Table (7): Hormonal assay at 3 months in comparison to preoperative values.

Variables	Before treatment	After treatment	p-value
Subinguinal ligation			
FSH(µIU/ML)	5.65±1.1	4.4±1.7	0.0001
LH(µIU/ML)	4.75±1.25	4.5±1.1	0.0001
Prolactin(ng/ml)	10.7±2.9	10.4±2.9	0.0001
Testosterone(ng/ml)	22.5±3.3	26.1±3.4	0.0001
Laparoscopic clipping			
FSH(µIU/ML)	5.8±1.85	4.9±1.6	0.0001
LH(µIU/ML)	4.8±1.2	4.6±1.1	0.0001
Prolactin(ng/ml)	10.6±2.9	9.9±2.7	0.0001
Testosterone(ng/ml)	19.3±3.6	22.4±3.9	0.0001

Table (8): Hormonal assay at 6 months in comparison to preoperative values.

Variables	Before	After treatment	p-value
Subinguinalligation			
FSH(µIU/ML)	5.65±1.1	4.2±1.6	0.0001
LH(µIU/ML)	4.75±1.25	4.4±1.0	0.0001
Prolactin(ng/ml)	10.7±2.9	10.1±2.7	0.0001
Testosterone(ng/ml)	22.5±3.3	28.2±3.5	0.0001
Laparoscopicclipping			
FSH(µIU/ML)	5.8±1.85	4.7±1.6	0.0001
LH(µIU/ML)	4.8±1.2	4.5±1	0.0001
Prolactin(ng/ml)	10.6±2.9	9.7±2.5	0.0001
Testosterone(ng/ml)	19.3±3.6	23.6±3.7	0.0001

DISCUSSION

In this study the mean ages of the patients were 28.6±4.8 years (ranges, 20 to 40 years), 28±4.94 years (range, 20 to 39 years) in groups 1 and 2, respectively. Bilateral cases represent 82% of cases.

Preoperative CDUS grading system for varicocele showed that 15 patients (75%) and 17(85%) patients had a grade 3 varicocele in both group respectively. While 4 (20%) patients and 3 (15%) patients showed grade 2 varicocele in both groups. Only a minority of patients (5%) had a grade 1 varicocele in group 1. Similar to our study, **Tefekli *et al***. [8] found reflux on scrotal colour Doppler in all patients with bilateral varicocele. **Cayan *et al***. found that grade III was more common in bilateral varicocele, while grade I was common on RT side and grade III was common on LT side in bilateral cases [9].

In this study, the mean operative times were 37±10 (20-53) and 32±13 (18+65) in unilateral cases in both group respectively. While the operative time was 67±17 (50-130) and 62±15 (45±115) for bilateral cases. The mean time of hospital stay was 1.7 and 1.5 days in both groups respectively. Patient's return to normal activities occurred after a mean of 6.2 and 5.5 days after subinguinal and laparoscopic surgery, respectively.

Several studies concluded that varicocele causes progressive loss of testicular volume and that its repair improves this condition [10, 11]. In this study, there was a significant effect of varicocelectomy on testicular volume. For subinguinal group, the volume was 16.5 ± 1.1 and 13.8 ± 1.2 (ml) preoperatively and became 17.9 ± 1.75 and 15.7 ± 1.7 (ml) for right and left side respectively. For laparoscopic group, the volume was 16.6 ± 1.1 and 13.9 ± 1.27 (ml) preoperatively and became 17.4 ± 1.3 and 14.9 ± 1.3 (ml) for right and left side respectively.

Our study demonstrated a postoperative improvement in sperm concentration, motility, and morphology respectively in semen analyses performed 3, and 6 months following both subinguinal and laparoscopic varicocelectomy. There was a little different between the two groups, as regards the improvement of semen parameters.

In this study, there is a significant decrease in serum FSH and a significant increase in the level of serum testosterone before and after treatment at both groups.

CONCLUSION

Varicocelectomy is advised for all symptomatic patients who suffer from pain or infertility resulting from varicocele with abnormalities in the semen analysis. In both methods, results were almost the same, but the sub inguinal approach is qualitatively better in terms of the lack of complications, but with delayed return to work compared with laparoscopic technique.

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