

# **SURGICAL EVALUATION OF LAPAROSCOPIC VARICOCELECTOMY**

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## **ABSTRACT**

A total number of 100 patients presented with varicocele-induced male infertility were included in this study. All patients were treated surgically by laparoscopic varicocelectomy L.V with spermatic artery preservation. At the 4<sup>th</sup> and 6<sup>th</sup> month postoperatively, all patients were subjected to clinical examination, Doppler, Duplex ultrasound and conventional semen analysis. The rate of conception of the wife was recorded up to two years after surgery. Postoperative spermiogram showed significant increase in the number and motility with marked reduction of the abnormal forms. The pregnancy rate had much increased up to 45% of patients. The overall postoperative complications such as recurrence, hydrocele formation and testicular atrophy occurred in a very small number of patients if any.

*Conclusion* : L.V is a good method for treatment of varicocele-induced male infertility as it is performed by using a minimum laparoscopic instruments, allows easy access to spermatic veins with preservation of spermatic artery, short hospital stay, early return to work and minimal complications.

## **INTRODUCTION**

Primary infertility affects about 15% of the married couples. Of this group about 30% is solely secondary to male factors, while another 20% both partners has detectable abnormalities. Therefore in 50% of infertile couples, male factors are at least partially etiologic (1). Varicocele is the most common surgically correctable cause of male infertility, being found in approximately 30% of infertile males (2). Varicocele is distension of

the pampiniform venous plexus, usually on the left side, resulting from inversion of blood flow in the internal spermatic vein (3). The association between varicocele and impaired spermatogenesis has been well documented and widely accepted (4). However, up till now, the pathologic mechanism leading to varicocele-induced impaired spermatogenesis are unclear; likewise, the controversial data do not allow us to explain why testicular function improves after varicocelectomy (5). The ideal method of varicocele treatment is still a matter of controversy and several methods have been used, such as open surgical ligation of the spermatic veins and retrograde sclerotherapy (6). In recent years, antegrade scrotal sclerotherapy, microsurgical and laparoscopic surgical methods have also been used. Each technique has its own advantages and disadvantages, and conflicting results have been obtained from different studies. We present our experience with the results of treatment of 177 idiopathic varicoceles in 100 patients presented with infertility using L.V technique with artery preservation.

### AIM OF THE WORK

Evaluation of L.V as a method of

treatment of varicocele induced male infertility.

### PATIENTS AND METHODS

A total number of 100 patients presented with varicocele-induced primary infertility were included in this prospective study. They were treated in Endocrine Surgery Unit, Mansoura University Hospital during the period from June 2000 to May 2002 inclusive and followed up for 2 years (till May 2004). All patients were subjected to careful history taking, thorough general and local examinations. Preoperative investigations included (a) conventional semen analysis, (b) hormonal assay (serum: follicle stimulating hormone, leutenizing hormone, prolactin, testosterone), (c) laboratory tests: complete blood picture, liver functions, serum creatinine, fasting & 2 hours postprandial, blood sugar (d) Doppler & Duplex ultrasound examination. Varicocele was graded according to the following clinical grading (7):

*Grade I* : Palpable only during valsalva's maneuver,

*Grade II* : Palpable at rest but not visible.

*Grade III* : Palpable and visible at rest.

Semen analysis provides the following limits of adequacy below which the initiation of pregnancy becomes statistically increasingly difficult: ejaculatory volume 1.5 – 5 ml, sperm density > 20 million/ml, motility > 60% at emission, forward progression > 2 (scale 0 – 4), no significant sperm agglutination, no pyospermia or hyperviscosity. At the 4th to 6th month postoperatively, all patients were subjected to the following postoperative follow up schedule:

- 1) Clinical examination to record any postoperative complications such as (persistent varicocele, hydrocele, testicular atrophy).
- 2) Doppler and Duplex ultrasound examination to assess the success of varicocelectomy. Reflux was indicative of recurrent or persistent varicocele.
- 3) Conventional semen analysis.

Postoperative follow up was continued for two years for all patients' wife conception.

## OPERATIVE PROCEDURE

General anesthesia is advised and bladder catheterization is a must. After induction of suitable endotracheal anesthesia, a mini laparotomy incision is made in midline infraumbili-

cally. Skin, subcutaneous tissue and fascia are incised exposing the peritoneum which is then grasped and opened under direct vision. This avoids the potential dangers of a "blind stick". A 10-11 mm hasson type of trocar is passed, its position verified and pneumoperitoneum initiated with CO<sub>2</sub> to a pressure of 14 mm Hg. After achieving a suitable pneumoperitoneum, the peritoneal cavity is carefully examined and two additional trocars are then passed under direct vision. A 10 and 5 mm trocar are placed in the left and right anterior axillary lines respectively. The camera is positioned in the midline. Adhesions, if present, can be taken down by sharp dissection with the endoshear. The anatomy is quite well visualized. Prominent spermatic vessels are noted coursing to the internal ring inferiorly. Identification of the vas is mandatory. It is usually quite prominent exiting from the ring, running medially toward the bladder. Medial and superior to the vas is the median umbilical ligament with the bladder medial. Transmitted pulsations from the iliac vessels (inferior and medial to the spermatic vessels) may sometimes be seen. All dissection should be carried out inferior to the vas and internal ring and lateral to

the spermatic veins. Using the endoshears, an incision in the parietal peritoneum is made parallel and lateral to the vessels, inferior to the vas. This is a "safe zone" allowing for excellent exposure of the operative site.

After incising the parietal peritoneum, grasping its medial border facilitates dissection of the vascular bundle. This dissection is readily accomplished since the vessels lie loosely in the retroperitoneal fat. After mobilizing and freeing the vascular bundle from adjacent retroperitoneal fat a probe or curved forceps is placed beneath the bundle lifting the vessels from their bed. Once the vessels are exposed and held in position, the artery can usually be seen pulsating and is separated from the larger vein(s) with the dissector. The assistant then places the probe under each vein and it can be occluded with the clip applier safely avoiding the artery. Two clips are placed proximally and two distally on each vein. Once the clips are applied and we are assured

the artery has been preserved, the veins are transected. Care must always be taken to identify the artery. A Doppler probe was utilized to identify the artery in some cases. Following ligation of all the visible veins, the field should be dry and the artery pulsating. A final inspection is made of the abdominal contents. The two lateral trocars are withdrawn under direct vision to assure there are no bleeding sites at the point of their insertion. The peritoneal cavity is then deflated as completely as possible and lastly the trocars removed. Incisions are then closed adequately. Postoperative analgesic use is quite minimal. Patients were discharged on the first or second postoperative day.

## STATISTICAL ANALYSIS

Was done using (Statistical Package of Social Science, SPSS) version 10, 1999. The data were parametric using Kolmogorov-Smirnov test. The quantitative data were presented in the form of mean, standard deviation and range.

## Results:

Table (1): Grading of varicocele.

		Patients		Test of significant
		Number	Percent	
Left side	No	0	0	$\chi^2 = 0.33$ P = 0.56
	Grade I	0	0	
	Grade II	22	50	
	Grade III	78	89	
Right side	No	23	40	$\chi^2 = 5.54$ P = 0.13
	Grade I	13	35	
	Grade II	56	90	
	Grade III	8	20	
Total	Grade I	13	19	
	Grade II	79	91	
	Grade III	82	90	

Table (2): Comparison between preoperative and postoperative sperm count.

		Patients	Test of significance
Preoperative	Mean	53.23	t = 0.44 P = 0.59
	SD	21.43	
	Range (million/ml)	(0.6 – 92)	
Postoperative	Mean	62.9	t = 1.25 P = 0.216
	SD	24.67	
	Range (million/ml)	(11 – 120)	
Test of significance		t = 2.98 P = 0.023*	

\* = significant

**Table (3) : Comparison between preoperative and postoperative sperm motility.**

		Patients	Test of significance
Preoperative	Mean	64.70	t = 1.22 P = 0.288
	SD	23.30	
	Range (percent)	(5 – 60)	
Postoperative	Mean	97	t = 0.65 P = 0.51
	SD	33	
	Range (percent)	(30 – 70)	
Test of significance		t = 22.39 P < 0.001**	

\*\* = highly significant

**Table (4): Comparison between preoperative and postoperative sperm abnormal forms.**

		Patients	Test of significance
Preoperative	Mean	53	t = 0.25 P = 0.80
	SD	20.87	
	Range (percent)	(10 – 50)	
Postoperative	Mean	41.5	t = 1.6 P = 0.099
	SD	12.13	
	Range (percent)	(5 – 30)	
Test of significance		t = 5.15 P = 0.016*	

**Table (5): Pregnancy after L.V.**

	Patients		Test of significance
	Number	Percent	
No pregnancy	55	55	$\chi^2 = 2.71$ $P = 0.32$
Pregnancy within 1 year	38	38	
Pregnancy within 2 years	45	45	
Total pregnancy rate	45	45	

**Table (6): Operative time of L.V.**

	Patients	Test of significance
Mean	69.45	$t = 3.8$ $P = 0.003^{**}$
SD	18.75	
Range (minutes)	(15 – 55)	

**Table (7): Postoperative hospital stay after L.V.**

	Patients	Test of significance
Mean	2.475	$t = 8.53$ $P < 0.001^{**}$
SD	0.162	
Range (days)	(0.5 – 2)	

**Table (8): Postoperative return to work after L.V.**

	Patients	Test of significance
Mean	11.65	t = 16.76 P < 0.001**
SD	2.321	
Range (days)	(2 - 7)	

**Table (9): Postoperative testicular atrophy and hydrocele formation.**

	Patients		Test of significance
	Number	Percent	
Testicular	0	0	$\chi^2 = 1.68$
Hydrocele	5	5	P = 0.19

**Table (10): Recurrent varicocele rate.**

Recurrent varicocele according to	Patients		Test of significance
	Number	Percent	
Number of patients	22	22	P = 0.14
Number of varicocele	23	23	P = 0.31

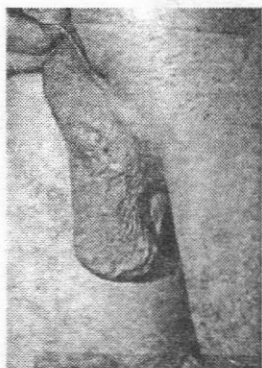


Fig (1) : Left varicocele grade III.

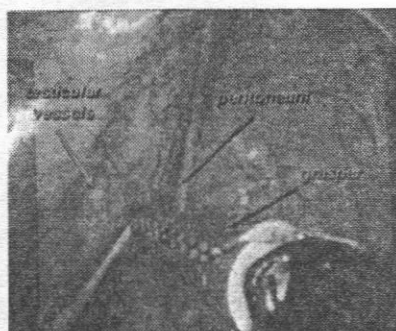


Fig (2) : L.V : grasping of the peritoneum over the testicular vessels.

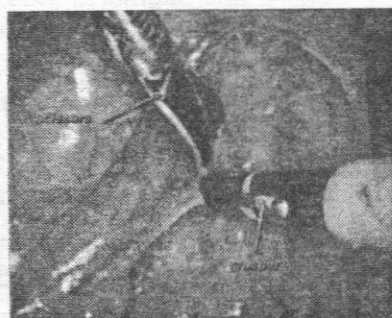


Fig (3) : L.V : incision of peritoneum over the testicular vessels .

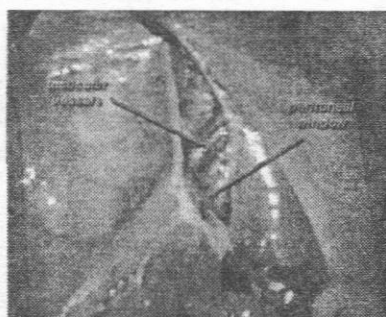


Fig (4) : L.V : the testicular vessels appear through the peritoneal window.



**Fig (5) : L.V :** double clip ligation of testicular veins.

## DISCUSSION

Clinically varicoceles were thought to occur far more common as isolated left-sided lesions (70% to 95%) while bilateral varicocele have historically, been observed in 10% of patients and the isolated right-sided varicoceles were rare (2%) and caused concern about the possibility of an underlying retroperitoneal abnormality (8, 9). Recent data have indicated bilaterality in 70% of patients (10, 11). In our study, 23% of patients had left-sided varicocele while 77% had bilateral varicocele. Improvement of different semen parameters was noticed after L.V. It

was found that there was significant increase in the mean sperm count, highly significant increase in the mean sperm motility and significant decrease in the mean sperm abnormal forms. This goes hand in hand with the majority of investigators (12, 13, 14, 15). L.V will at least halt the progressive testicular injury associated with varicocele and in a large percentage of patients, will result in improved spermatogenesis (17). In our study, improvement in sperm motility was the most common occurring in 97% of patients, with improved sperm count in 62% and improved sperm morphol-

ogy in 70% of patients. The impact of varicocele grade on different semen parameters before and after L.V was studied by Buch (18) who reported that men with large varicoceles (grade III) had poorer semen quality than men with small varicoceles which affect the semen parameter after surgery.

But in our study, there was no significant effect of the varicocele size on the response to varicocele treatment. This is in agreement with Amelar and Dubin (6). In the present study, the pregnancy rate following L.V was 38% during the first year and 45% by the end of 2nd year while Goldstein (17) reported a pregnancy rate of 43% and 60% at one year and two years respectively, however, Madger (16) reported a higher pregnancy rate of 60% after one year and 72% after two years. L.V was associated with significant shorter hospital stay and significant early return to work. This is in agreement with Goldstein (17) who reported that patients tolerate L.V well and may be discharged the same day with minimal symptomatology. Hydrocele formation is the most common complication of varicocele with an average incidence of 7% and usually forms sec-

ondary to ligation of the testicular lymphatic (18). In our study hydrocele formation was about 5% only. The reduction in hydrocele number after L.V as reported by Goldstein (17) was due to the magnification offered by the laparoscope, which allows good identification and preservation of both lymphatics and the artery.

In the present study, the incidence of varicocele recurrence was 23%. This is in agreement with Madger (16) who reported that the incidence of varicocele recurrence following surgical repair ranges from 1% to 45% and with Ross and Ruppman (15) who reported a recurrence rate of 0% to 20%. Venographic studies have shown that recurrent varicoceles are caused by periaarterial, parallel inguinal, midretroperitoneal, gubernaculum and scrotal collateral veins. The only method to treat these vessels is the inguinal or subinguinal technique with delivery of the testis (19). As regards the testicular atrophy, we have not encountered any case. This goes hand in hand with Kass and Marcol (20) who reported no cases of testicular volume loss occurred after ligation of testicular vascular pedicle above the entrance of the vas deference. Also Goldstein (17), showed that in

the adolescents, even total ligation of the testicular vascular pedicle allowed for the catch-up growth of the smaller ipsilateral testes. Furthermore, testicular atrophy will not always results when testicular artery is ligated at the level of the internal inguinal ring, because of the adequate collateral circulation of the testis via the vascular communication between testicular, cremastic and vasal arteries (21)

### CONCLUSION

- Varicocele is considered to be the most common treatable cause of male infertility.
- L.V is the treatment of choice in patients with varicocele as it corrects the semen picture of nearly all patients.
- L.V is contraindicated in cases of bleeding problems, multiple prior, abdominal surgeries and significant peritoneal inflammatory disease.
- L.V perhaps the easiest of all laparoscopic techniques to learn, confidence and facility soon mastered.
- L.V allows good visualization and preservation of the spermatic artery.
- L.V may be of high cost than open varicocelectomy but it has benefits of minimal hospital stay and early

return to work.

### REFERENCES

1. **Hellstrom, W.J. (1999)** : Preface. In: Hellstrom W.J. (ed): Male infertility and sexual dysfunction. New York: Springer-Verlag. P: IX.
2. **Sigman, M. and Lipshultz, L.I. (2003)** : Male infertility. In Stein, B.S.; Caldmone, A.A. and Smith, J.V. (eds.): Clinical urologic practice. New York: Norton Medical Books; 42: 1219.
3. **Comhaire, F. and Gerris, J. (2002)** : Varicocele. In: Comhaire, F.H. (ed.): Male infertility. London: Chapman & Hall Medical; 14: 231.
4. **Paduch, D.A. and Niedzielski J. (1999)** : Semen analysis in young men with varicocele. J Urol; 156: 788.
5. **Lenzi, A.; Gandini, L., Bagolan, P. and Nahum, A. (2000)** : Sperm parameters after early left varicocele treatment. Fertil Steril; 69(2): 347.

6. Amelar, R. Dubin, L. (2002) : 486 cases of varicocelectomy: A 12 year study. *Urology*; 10: 446.
7. Hargreave, T.B. (2000) : Varicocele. In Hargreave, T.B (ed.): *Male infertility*. 2nd edition. New York: Springer-Verlag. P: 249.
8. Sigman, M.; Lipshultz, L.I. and Howards, S.S. (1999) : Evaluation of the subfertile male. In Lipshultz, L.I. and Howards, S.S. (eds.): *Infertility in the male*. 3rd edition. St. Louis: Mosby Year Book; 9: 137.
9. Nagler, H.M.; Luntz, R.K. and Martinis, F.G. (1999) : Varicocele. In: Lipshultz, L.I. and Howards, S.S. (eds.): *Infertility in the male*. 3rd edition New York: Mosby Year Book; 18: 336.
10. Amelar, R.D. and Dubin, L. (2003) : Therapeutic implications of left, right, and bilateral varicoectomy: *Urology*; 30: 53.
11. McClure, R.D. and Hericak, H. (2003) : Scrotal ultrasound in the infertile man: Detection of subclinical unilateral and bilateral varicocele. *J Urol*; 135: 711.
12. Magdy, A.A., Shokeir, A.A. Farage, V. et al. (2001) : Treatment of varicocele: A comparative study of conventional open surgery, percutaneous retrograde sclerotherapy, and laparoscopy. *J Urol*; 52(2): 294.
13. Marks, J.L. McMahon, R. Lipshultz, L.I. (2000) : Predictive parameters of successful varicocele repair. *J Urol*; 136: 609.
14. Goldstein, M. Einer-Jensen, N. and Morrow, J. (2003) : Microsurgical inguinal varicoectomy with delivery of the testis: an artery and lymphatic sparing technique. *J Urol*; 148: 1808.
15. Ross, L.S. and Ruppman, N. (2000) : Varicocele vein ligation in 565 patients under local anesthesia: a long term

- review of technique, results and complications in light of proposed management by laparoscopy. *J Urol*: 149: 1361.
16. **Madger, I.; Anderson, D. and Schlegal, P. (2000)** : Controlled trial of high spermatic vein ligation for varicocele in infertile man. *Fertil Steril*; 63: 120.
17. **Goldstein, M. (2002)** : Varicocelelectomy: General consideration. In Goldstein, M. (ed): *Surgery of Male infertility*. Philadelphia: W.B. Saunders Co.; 18: 169.
18. **Buch, J.P. (1998)** : Surgical therapy for infertility. In Babo-son, R.R. (Gd.): *Management of urologic disorders* London: Wolfe; 27: 1.
19. **Steckel, J. Dicker, A.P. and Goldstein, M. (2001)** : The influence of varicocele size on response to varicocelelectomy. *J Urol*; 149: 769.
20. **Kass, E.J. and Marcol, B. (2003)** : Results of varicocele surgery in adolescents: a comparison of techniques. *J Urol*; 140: 694.
21. **Matsuda, T.; Horii, Y. and Yoshida, O. (2003)** : Should the testicular artery be preserved at varicocelelectomy. *J Urol*; 149: 1357.

## التقييم الجراحى لعملية استئصال دوالى الخصية المنظار

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أجرى هذا البحث وحدة جراحة الغدد الصماء بمستشفى المنصورة الجامعى على عدد (١٠٠) مريض فى خلال سنتين فى الفترة (من مايو ٢٠٠٠ - يونيو ٢٠٠٢) مع متابعة المرضى لمدة سنتين حتى مايو (٢٠٠٤).

كان هؤلاء المرضى يعانون من عقم نتيجة وجود دوالى بالخصية. تم تشخيص الحالات عن طريق أخذ التاريخ المرضى ثم الفحص الاكلينيكي وعمل تحاليل هورمونية وتحليل للسائل المنوى - وأخيرا عمل أشعة ملونة (دوبلكس) على أوردة وشرابين الخصيتين .

وبعد التأكد من تشخيص الحالات والتركيز على كون الدوالى هى السبب المباشر للعقم فى هؤلاء المرضى تم إجراء جراحة استئصال وربط هذه الدوالى بواسطة المنظار الجراحى .

بعد انتهاء الجراحة تم متابعة هؤلاء المرضى بعمل تحليل سائل منوى عد ٤ شهور، ثم ٦ شهور من تاريخ العملية. كما تم متابعة حدوث حمل لزوجات هؤلاء المرضى لمدة سنتين من تاريخ اجراء الجراحة لهم.

كانت نتائج البحث جيدة حيث تحسنت بشكل كبير نتائج تحليل السائل المنوى فزادت حركة الحيوانات المنوية فى ٩٧٪ من المرضى. وزاد عدد الحيوانات المنوية فى ٦٢٪ من المرضى، وقلت نسبة الحيوانات المنوية الغير طبيعية فى ٧٠٪ من المرضى.

وبلغ نسبة الحمل عند زوجات هؤلاء المرضى : ٣٨٪ فى السنة الأولى بعد العملية، ٤٥٪ فى السنة الثانية بعد العملية.

وبلغت نسبة حدوث القلى المائية (٧٪) بينما بلغت نسبة حدوث ضمور بالخصيتين (صفر ٪)، وبلغت نسبة إرتجاع الدوالى نحو (٢٣٪).

وكانت مدة مكوث هؤلاء المرضى بعد الجراحة بالمستشفى قليلة جدا من (٥ر - ٢) يوم والعودة للعمل تم فى خلال (٢ - ٧) يوم.

والنتائج السابقة تعتبر مشجعة لاستخدام هذه الطريقة فى علاج دوالى الخصيتين .

