

ORIGINAL ARTICLE

EFFECTIVENESS OF LAPAROSCOPIC VARICOCELECTOMY: A COMPARATIVE STUDY WITH SUBINGUINAL APPROACH

By

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Aim: *The aim of this study was to compare the effectiveness and outcome of laparoscopic and subinguinal approaches in the management of varicocele.*

Methods: *The study included 64 males equally divided into 2 groups, in which 32 patients underwent subinguinal varicocele ligation (SVL), and the rest (32 patients) underwent laparoscopic varicocele ligation (LVL). The 2 groups were compared as regards operative time, hospital stay, and postoperative complications including recurrence, hydrocele formation, and testicular atrophy.*

Results: *The operative time was significantly shorter in the LVL group in both unilateral and bilateral cases. The incidence of postoperative hydrocele formation was significantly higher in the LVL group (6 cases) while no patient developed this complication in the SVL group. All other data was statistically non significant.*

Conclusion: *Both techniques are equally effective in controlling varicocele, with non significant difference in recurrence rate, the LVL technique was associated with significantly shorter operative time and significantly higher postoperative hydrocele formation.*

Keywords: *Varicocele, laparoscopy, testicle.*

INTRODUCTION

Varicocele is the abnormal tortuosity and dilatation of the testicular veins and the pampiniform plexus of the testis. The incidence of varicocele is approximately 16% in the adult population.⁽¹⁾

Varicoceles are common not only in adults, but also in peripubertal children and adolescents. In the adult population varicoceles are the most common potentially correctable etiology found in men with abnormal semen analysis and infertility. Thus, in adults there is a definable indication for varicocele correction.⁽²⁾

Recent data have suggested that varicocele may cause a time-dependent negative influence on testicular function and therefore, their presence in adolescent population may represent more than an inconsequential physical finding.⁽³⁾

Although the exact relationship between varicocele and

impaired spermatogenesis is not clear, about 40% of males with infertility have a varicocele. Correction of the varicocele improves the semen parameter in over half of these men.⁽⁴⁾

Various surgical and radiological treatment techniques have been advocated for managing varicoceles.

The microscopic subinguinal approach has been the standard technique for treating varicoceles in many centers for long time with good results and low complication rates.⁽⁵⁾

Kass and Marcol advocated the Palomo technique in which high open retroperitoneal ligation of the spermatic artery and vein is performed as a highly successful technique for the correction of varicoceles. This technique yielded superior control of varicoceles compared to artery preserving methods.⁽⁵⁾

With the advent of modern laparoscopic surgery, the technique of laparoscopic varicolectomy has progressively improved. The first laparoscopic varicolectomy was performed by Sanchez de Badajos et al in 1985.⁽⁶⁾ The initial reports considered laparoscopic varicocele ligation (LVL) to be a safe and effective technique even in patients who had previously undergone ipsilateral inguinal/scrotal surgeries.

The aim of the present study was to evaluate the techniques of subinguinal varicocele ligation (SVL) and LVL as regards effectiveness, postoperative sequelae and complication rates.

PATIENTS AND METHODS

The study was conducted over a period of 6 years, from September 1999 to December 2005, in which 64 patients with varicocele were studied, patients were randomly divided into 2 equal groups, group I (32 patients) had their varicoceles treated by the standard subinguinal technique, and group II (32 patients) underwent laparoscopic varicolectomy using the standard Palomo technique. Patients were randomly allocated into 2 groups using a closed envelope randomization.

The diagnosis of varicocele was made on the basis of self-diagnosis of scrotal swelling, incidental finding with infertility, scrotal heaviness, and testicular pain.

All patients underwent preoperative colored flow duplex, estimation of the testicular size using a 7.5 MHz ultrasound probe and semen analysis (Fig. 1).

Varicoceles were classified according to physical examination into 3 grades using the Dubin and Amelar grading system in which subclinical varicocele means no palpable varicocele with positive Doppler flow, grade I: palpable only with Valsalva's maneuver, grade II: easily palpable without Valsalva, and grade III: visible through the skin of the scrotum.⁽⁷⁾

Postoperative duplex and ultrasonography were performed on a routine basis.

The indication for surgery included symptomatic palpable varicocele grade II and III, and infertility. Surgery was not done for subclinical or grade I varicoceles.

Patients were excluded if any additional procedure had been done at the time of the varicocele repair.

Technique: The open technique (group I) was performed according to the standard subinguinal technique, with an

approximately 2-cm transverse incision at the level of the external inguinal ring, using the surgical loupes 3x for optical magnification, the incision was deepened through the subcutaneous tissue and the Scarpa's fascia. The spermatic cord was identified; ilioinguinal nerve was carefully retracted without damaging the nerve. The cord was delivered slowly, cord structures were carefully dissected and the vas deferens was identified. The pampiniform plexus was then carefully dissected apart to separate the veins into small groups. The testicular artery was identified and preserved. Each group of veins was double ligated with 3-0 vicryl sutures. The vas deferens was again identified and preserved with its artery and vein. Any lymphatics that were noted were dissected out of the veins before ligation. Closure of the Scarpa's fascia and skin was carried out.

Patients included in group II (LVL) were asked to empty the bladder just before the procedure, placed in Trendelenburg position, no catheter or nasogastric tube were needed. A pneumoperitoneum was established -at a pressure not exceeding 14 mm Hg- through an umbilical incision using the open laparotomy technique. Another 2 ports were inserted; 5 and 10 mm each. The 10mm port was placed in the anterior-axillary line 3cm cephalad to the iliac crest. The site of the other 5mm port was changed throughout the period of the study, in the first 5 cases; this port was placed in the suprapubic area 2cm proximal to the symphysis pubis. The site of this port was then changed in the rest of patients (27 patients) to be inserted at the level of umbilicus about 4 cm medial to the first port (Fig. 2). This site was found to be more convenient to the surgeon for ligating both sides of varicocele, with the surgeon standing to the right side of the patient, the camera man and scrub nurse on the left side.

A small peritoneal window was made over the spermatic vessels about 3cm cranial to the internal ring (Fig. 3). Blunt dissection was used to isolate the whole spermatic bundle, which should be clearly isolated; this could be confirmed by applying traction on the ipsilateral testis (Fig. 4). The whole packet of spermatic vessels including the vein, artery and the surrounding tissue was clipped using large sized laparoscopic clips (Fig. 5). In the first 8 cases, the vessels were clipped and divided; this was changed later (24 patients) into just double clipping without division of the vessels (Fig. 6). No attempt was made to isolate the testicular artery or lymphatics from the remainder of the vessels.

The ports were extracted under vision to detect any bleeding from port sites, closure of the umbilical 10mm port with non-absorbable 0 sutures was performed, and other ports were closed in the routine fashion.

The parameters compared between both groups included operative time (from incision to closure), hospital stay, postoperative complications (including persistent or recurrent varicoceles using postoperative colored duplex study, hydrocele formation, testicular atrophy using postoperative ultrasonography).

Follow up ranged from 6 months to 3 years, average 26 months.

The mean operative times and hospital stay were evaluated for statistical significance using the independent samples t test. Postoperative complications were evaluated for statistical significance using the chi-square test. The mean operative times were further divided into subgroups comparing unilateral and bilateral varicoceles. These subgroups were evaluated for statistical significance using the two-tailed Student t test. A P value of less than 0.05 was accepted as indicating a statistically significant difference.

RESULTS

A total of 64 patients who underwent correction of 105 varicoceles were included in this study. The average follow up was 8 months. Group I (SVL) included 32 patients with a mean age of 25.4 ± 3.1 years, and group II (LVL) included 32 patients with a mean age of 27 ± 2.7 years.

The mean operative time was 62 ± 8 minutes and 28 ± 3 minutes for groups I and II respectively.

When comparing the operative times for unilateral and bilateral cases, LVL resulted in decreased operative times

in both cases. The mean operative time for unilateral repairs was 59 ± 7 minutes for SVL ($n = 12$) and 26 ± 3 minutes for LVL ($n = 13$). The operative time for bilateral repairs was 79 ± 9 minutes ($n = 20$) and 33 ± 2 minutes ($n = 19$) for SVL and LVL respectively. This difference was statistically significant for unilateral and bilateral cases ($P < 0.05$, 95% confidence interval) Table 1.

Although statistically non significant, the hospital stay was shorter in the LVL group, 1.1 ± 0.5 days versus 1.8 ± 0.7 days in the SVL group.

In group I, two cases developed recurrent varicoceles during the follow up period (6.2%). While no recurrent cases were recorded in the LVL group ($P > 0.05$). The recurrent cases were detected 8 and 12 months postoperatively.

No testicular atrophy developed in either group. Six patients in the LVL group developed postoperative hydrocele (18.7%), while no patients developed postoperative hydrocele in the SVL group. The difference was statistically significant ($P < 0.05$, 95% confidence interval).

Out of the 6 patients who developed postoperative hydrocele in group II, 4 resolved spontaneously and 2 required intervention.

One patient in the SVL group developed scrotal hematoma that resolved under medical treatment (3.1%). This complication was not recorded in the LVL group Table 2.

Table 1. Operative time of both groups.

	Group I (SVL) n=32	Group II (LVL) n=32	P value
Mean operative time (minutes)	62 ± 8	28 ± 3	< 0.05
Unilateral cases	59 ± 7 (n=12)	26 ± 3 (n=13)	< 0.05
Bilateral cases	79 ± 9 (n=20)	33 ± 2 (n=19)	< 0.05

SVL: Subinguinal varicocele ligation, LVL: Laparoscopic varicocele ligation.

Table 2. Incidence of postoperative complications in both groups.

	Recurrent cases (%)	Testicular atrophy (%)	Postoperative hydrocele (%)	Scrotal hematoma (%)
Group I (SMV)	2 (6.2%)	0	0	1(3.1%)
Group II (LVL)	0	0	6 (18.7%)	0
P value	>0.05	>0.05	<0.05	>0.05

SMV: subinguinal varicocele ligation, LVL: laparoscopic varicocele ligation.

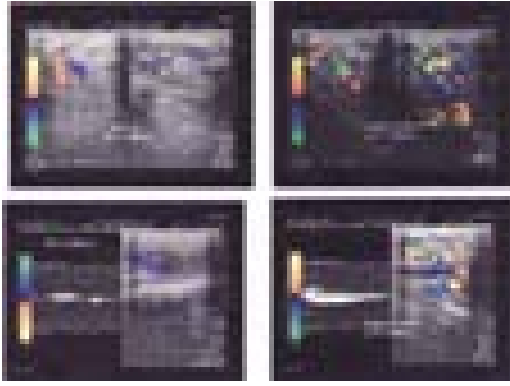


Fig 1. Duplex study of testicular veins.



Fig 2. Site of ports.

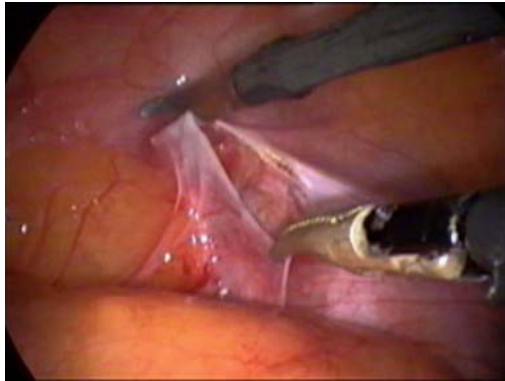


Fig 3. Peritoneal window.

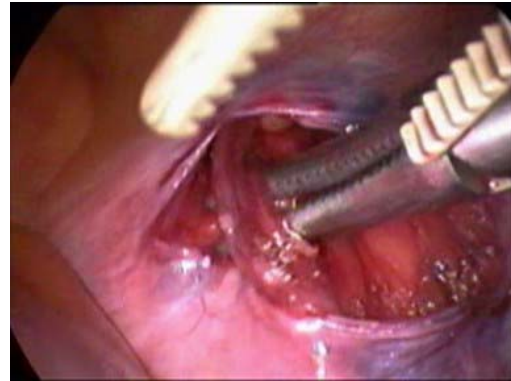


Fig 4. Dissection of spermatic pedicle.



Fig 5. Clipping of spermatic vessels.



Fig 6. Double clipping without division.

DISCUSSION

Multiple surgical and non-surgical techniques are available for the treatment of varicocele, and all of them constitute a matter of controversy. Homonnai et al in 1980 and other later reports advocated inguinal ligation of varicoceles. Indicating that inguinal varicocelectomy has the advantage of allowing delivery of the spermatic cord structures where the testicular artery may be easily identified, separated from the spermatic veins, and preserved.^(8,9,10)

On the other hand, other researchers advocated retroperitoneal approach for the treatment of varicocele, in which less number of veins is ligated yielding the procedure relatively faster.⁽¹¹⁾

The advent of laparoscopic surgery and the great expansion of its scope, yielded laparoscopic varicocelectomy a feasible and effective technique in the management of varicoceles.^(12,13)

The aim of the study was to objectively compare between the laparoscopic high ligation technique, and the subinguinal approach in treating varicocele.

This randomized prospective study included 64 patients that were equally divided into the 2 groups.

The LVL group was associated with significantly shorter operative time compared to the SVL group. This was valid for both unilateral and bilateral cases. The longer operative time in the SVL group is comparable to other studies,^(5,9) and could be attributed to the meticulous dissection of the spermatic cord structures, paying attention to preserve the testicular artery.

This result was also concluded by Kass et al (1992), and Matsuda et al (1992) in their studies comparing different techniques of varicocele ligation in which LVL was associated with shorter operative time.^(5,14)

On the other hand, Watanabe et al (2005) found that SVL resulted in the shortest operative time.⁽¹⁵⁾

The subinguinal approach was associated with recurrence in 2 cases (6.2%), while no cases developed recurrent varicocele after LVL. Although the result was non significant, the low recurrence rate associated with the LVL group could be attributed to the technique of ligating the whole spermatic bundle including the veins together with the testicular artery, as originally described by Palomo.⁽¹⁶⁾ This method resulted in a significant decrease in the operative failure rate compared with the artery-sparing procedures, with no increase in the incidence of testicular atrophy.⁽¹⁴⁾

Recurrence is the most common complication after varicocelectomy. Persistent or missed small collateral veins at the time of ligation are considered to be the main cause of recurrence after varicocele repair. Katten reported that preservation of the testicular artery was associated with a higher recurrence rate of varicocele, and this could be related to incomplete ligation of venous concomitants adjacent to the preserved testicular artery.⁽¹⁷⁾ According to Kass and Marcol, there are collateral branches of the internal spermatic vein intimately associated with the internal spermatic artery that are not functionally significant unless the main internal spermatic venous channels are ligated, and when the artery is preserved these small venous channels become difficult to identify and interrupt. After varicocelectomy, however, the increased venous pressure facilitates blood flow through these collaterals and subsequently produces operative failure and recurrence.⁽⁵⁾

Therefore, in this study, no recurrence was recorded in the LVL group. Thus, mass ligation of the spermatic vessels offers a safe and effective method to achieve a low recurrence rate without compromising the blood supply of the testis.

There was no significant difference between both groups as regards postoperative testicular atrophy –no cases was recorded in either group- or scrotal hematoma, only one case developed this complication in the SVL group.

On the other hand, the difference between the 2 groups was significant as regards development of postoperative hydrocele. Six patients (18.7%) developed this complication in the LVL group while no patients had hydrocele in the SVL group. Watanabe et al⁽¹⁶⁾ recorded an incidence of 9.1% of postoperative hydrocele after LVL, while Kass and Marcol⁽⁵⁾ reported an incidence of 25.3% of the same complication.

Hydrocele formation is the second most common complication after varicocelectomy and has been reported to have a rate of up to 39%.⁽¹⁸⁾ The testicular lymphatic consists of 2 plexuses, the deep plexus that drains the substance of the testis and epididymis and the superficial plexus that commence beneath and drain the tunica vaginalis. These lymphatic trunks ascend to collect in the spermatic cord accompanying the testicular vessels to end in the lateral aortic lymph nodes. Since postoperative hydrocele occurs in the minority of cases in which the testicular lymphatics are ligated by means of Palomo procedure, lymphatic drainage may continue to occur through the activation of the normally non functioning lymphatic collaterals between the testicular lymphatics and the vas deferens lymphatic, which drain in the external iliac lymph nodes. The imbalance between the production and absorption of serous fluid between the tunica vaginalis

and tunica albuginea is considered another cause of hydrocele formation. Overproduction and less absorption have to occur for hydrocele to manifest. The postoperative inflammatory reaction secondary to extensive dissection, spermatic cord hematoma formation, and reaction to suture material could lead to excess production of serous fluid and to obstruction of testicular lymphatics.⁽¹⁵⁾

The relatively high incidence of postoperative hydrocele in this study could be attributed to the surgical technique adopted in which the whole spermatic bundle is ligated including the lymphatic vessels. In spite of the effectiveness of this original Palomo technique in terms of lowest recurrence rate, this is achieved on the expense of higher incidence of postoperative hydrocele. Many reports advocated ligation without division of the spermatic vessels in an attempt to decrease the incidence of postoperative hydrocele in LVL; this technique was adopted in this study after the first 8 cases.

The results of different studies and reports concerning surgical management of varicocele are contradicting. Some reports advocated subinguinal approach as the technique of choice for its low morbidity and effectiveness.⁽⁸⁻¹⁰⁾ Others recommended the laparoscopic high original Palomo technique for its short operative time, easiness and very low recurrence rate.^(5,11-13)

It could be concluded from the present study that both techniques are equally effective in controlling varicocele, with non significant difference in the recurrence rate. The main difference between the 2 techniques is the shorter operative time of the LVL technique with its higher incidence of postoperative hydrocele formation. The higher incidence of this complication renders the laparoscopic approach questionable as to whether it could be considered as the technique of choice for treating varicocele, taking in consideration its higher operative cost.

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