

Laparoscopic ligation of varicoceles: an anatomically superior operation

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Since December 1991, 25 consecutive symptomatic male patients with 26 varicoceles were treated by laparoscopic ligation of internal spermatic veins under general anaesthesia. Twenty-one patients had either scrotal discomfort or painful swelling and four patients presented with infertility. The mean follow-up period is 5 months (range 3 weeks to 9 months). The procedure has provided a satisfactory outcome in 19 out of 21 patients (90.5%) with scrotal symptoms. Of the four patients presenting with infertility due to oligospermia, three had significantly elevated sperm counts at 3 months which resulted in one pregnancy. So far there has been no recurrence of the varicocele. The main potential advantage of the laparoscopic approach is better visualisation of the anatomy, especially the testicular artery and the collateral venous circulation at the level of the internal inguinal ring. In addition to being less invasive with implied benefits, the endoscopic procedure has enabled identification of multiple veins in 22 out of 26 (84.6%) varicoceles in our series.

A varicocele is a collection of abnormally tortuous and dilated veins in the spermatic cord. The clinical presentation of varicocele varies from an associated scrotal discomfort or pain to infertility due to low sperm count. There are two main approaches for treating a varicocele, ie radiological (1,2) and open surgery (3,4). However, it is well recognised that the collaterals connecting the

internal spermatic veins with renal, lumbar and capsular veins account for recurrence after these procedures (5–7). The advent of therapeutic laparoscopy has provided the opportunity for a new approach. We describe our initial experience with laparoscopic ligation of varicoceles.

Patients and methods

Having already performed 120 laparoscopic cholecystectomies in our surgical unit the study was started in December 1991. Patients attending the clinics of the two senior authors (SRK and ZAS) with varicocele have all been dealt with by the laparoscopic method. Being a military hospital, a rather selective group of people have been served. Otherwise no special selection of the patients was made. So far, we have had 24 cases of left varicoceles and one case of bilateral varicoceles.

Twenty-one patients presented with either scrotal discomfort or painful swelling and four patients presented with infertility. The diagnosis was made on clinical evidence. Four of the cases were recurrent, three after retroperitoneal ligation of the internal spermatic vein (Palomo method) and the other after ligation of veins in the inguinal canal (Ivanissevich method). The latter presented with bilateral varicoceles and oligospermia. The age of the patients ranged between 18 and 29 years. None of the patients had undergone previous abdominal surgery.

Serum follicular stimulating hormone, luteinising hormone and testosterone levels were normal pre- and

postoperatively in all patients presenting with infertility. Sperm count of the patients with infertility ranged between 9.5 and 18.2 million. In others, semen samples were difficult to obtain due to cultural reasons.

Laparoscopic ligation was effected on all 25 patients that we attempted, bilateral ligation on the four recurrent varicoceles and unilateral ligation on the rest.

Another group of 25 patients of comparable age range who underwent open surgery (Palomo method) just before the commencement of laparoscopic surgery in our hospital, were studied retrospectively concerning analgesic requirement, mobilisation, hospital stay and return to military duties.

Surgical procedure

A standard laparoscopic method was used for the purpose of varicocele ligation. The equipment used was manufactured by Solos (Atlanta, USA) and Autosuture® (Norwalk, USA). The patient was given general anaesthesia and positioned supine. The urinary bladder was emptied by catheterisation. The surgeon stood on the patient's right and his assistant on the opposite side. The camera operator stood on the left of the surgeon and scrub nurse to the left of the assistant. In the case of right varicocele the positions of various members in the team changed appropriately. A television monitor was placed near the foot of the operating table.

Initial carbon dioxide (CO₂) peritoneum was achieved by introducing a Veress needle at the umbilicus and insufflating CO₂. A 10 mm trocar with sheath (Surgiport®) was passed through the same point. This port was restricted for the use of a laparoscope with an attached camera and was connected to a colour television monitor. Two further working ports were made, one in each iliac fossa under vision and avoiding any obvious blood vessel. The port used on the right was 10 mm in diameter and the one on the left was 5 mm. The insufflation pressure was maintained at 15 mmHg.

The spermatic vessels and the vasa were identified on either side helped by gentle traction on the testes and spermatic cords. The posterior peritoneum (serosa) covering the left spermatic vessels was incised with a diathermy scissors. All veins were dissected individually avoiding injury to the pulsating artery. The veins were divided separately after double clipping each proposed cut end. The number of veins varied between one and four. In one case of bilateral and the other cases of recurrent varicoceles the procedure was repeated on the right side. The raw area was minimised by clipping together the edges of the posterior peritoneal wound.

The CO₂ peritoneum was evacuated completely and the laparoscopic ports were sutured in two layers.

Each wound was infiltrated with 2 ml of 0.25% bupivacaine with 1:200 000 adrenaline.

The urinary catheter was removed before recovery from anaesthesia. Patients were given oral, non-opiate analgesics as required. They were mobilised within a few hours and discharged from hospital the next day.

Table I. Results of laparoscopic ligation

	Number of cases (%)
<i>Presentation</i>	
Scrotal discomfort/pain	21 (84)
Infertility	4 (16)
<i>Successful laparoscopy</i>	
Unilateral ligation	21 (84)
Bilateral ligation	4 (16)
<i>Number of veins</i>	
Four veins	2 (7.7)
Three veins	11 (42.3)
Two veins	9 (34.6)
One vein	4 (15.4)
<i>Follow-up (3 weeks to 9 months)</i>	
A Scrotal symptoms (n = 21)	
Complete relief	19 (90.5)
Residual pain	2 (9.5)
Varicocele recurrence	0
B Infertility (n = 4)	
Pregnancy	1 (25)
Improved sperm count	2 (50)
Varicocele recurrence	0

Results

Laparoscopic ligation was effected successfully on all 25 patients that we attempted giving a 100% success rate. The mean operating time was 40 min (range 25–95 min). In two patients CO₂ had to be evacuated from the scrotum by compression at the end of the procedure. There were no other complications either intraoperatively or postoperatively.

The follow-up period varied between 3 weeks and 9 months. So far no recurrence has been encountered. Of the 21 patients who presented with scrotal discomfort or pain, 19 (90.5%) had complete resolution of their symptoms; two patients have residual discomfort owing to the large size of the veins at the initial presentation.

In three of the patients with infertility, the mean sperm count has increased from 12.5 × 10⁶/ml preoperatively to 48.2 × 10⁶/ml at 3 months. The wife of one of these patients is now pregnant. A fourth patient with oligospermia has been followed up for only 3 weeks. The results of laparoscopic ligation are summarised in Table I.

The requirement of analgesics, postoperative mobilisation, hospital stay and return to military duties in two groups of the patients are as given in Table II.

Discussion

Conventionally, symptomatic varicoceles are dealt with by either the radiological method or open surgery (1–4). The radiological method is not followed in the majority of centres due to lack of radiologists skilled enough to

Table II. Palomo versus laparoscopic ligation

Procedure	Analgesics (No. of tablets of paracetamol + codeine)	Pethidine injections (50–75 mg)	Mobilisation (hours postoperatively)	Hospital stay (days)	Resumption of military duties (days)
Palomo (n = 25)	40	3	24	5	25.2
Laparoscopic ligation (n = 25)	10	0	6	2	9.6

deal with such cases. In addition, the procedure is time consuming, has a significant recurrence rate (5) and carries a theoretical risk of complications due to inadvertent embolisation. Open surgical methods include a scrotal approach, a retroperitoneal approach and an inguinal approach. The scrotal approach is obsolete due to a very high recurrence rate and the risk of devascularising the testis (8). The retroperitoneal/high ligation is effective (4) as is the inguinal approach (3). Nevertheless, both these methods have some recurrence (5).

The safety of diagnostic laparoscopy in gynaecological practice is established beyond doubt (9). Improvements in light transmission and manufacturing of instruments enabled various therapeutic gynaecological procedures to be carried out (10). The recent increase in the application of laparoscopy for cholecystectomy has also confirmed the safety of the procedure (11,12). There were very few reports of laparoscopic surgery for varicocele in the world literature at the start of our study in December 1991.

Our experience confirms that laparoscopic ligation, which corresponds to high ligation of the internal spermatic veins by the Palomo method, is technically feasible in all cases. The laparoscopic procedure has an anatomical advantage of superior preservation of the testicular artery and better identification of the collateral veins near the internal inguinal ring. It is well recognised that these collateral veins communicating with renal, lumbar and capsular veins account for recurrence after open surgery (5–7). The multiplicity of veins has been a feature of 22 (84.6%) varicoceles in our series. In three out of four cases of recurrent varicoceles, there were two residual veins in each, and the fourth patient had one large residual vein. The magnification achieved at laparoscopy (20×) enables identification of more venous tributaries than is possible at open surgery. The magnification offered by the operating spectacles (loupes) does not match that of laparoscopy. Thus, laparoscopy provides better visualisation and should, therefore, give a better anatomical result.

The laparoscopic method also enables bilateral ligation without the need for another incision and the added morbidity of an open operation. However, we have restricted such practice to the recurrent and bilateral varicoceles. In comparison with an open operation, the

other advantages of this procedure are: (a) it is minimally invasive, (b) equally effective as the open procedure, (c) minimal requirement of analgesics, (d) early ambulation, (e) early discharge from hospital, improving the bed utilization, (f) early return to work and (g) good cosmetic result (Table II).

The laparoscopic procedure suffers the disadvantage of requiring a general anaesthetic, whereas an open procedure can be performed under local anaesthesia. However, laparoscopic ligation of varicoceles has been carried out under local anaesthesia (13), although we did not do this ourselves.

All the patients in our series either had symptoms or infertility. The patients were totally unselected except that all were military. It is an interesting coincidence that 25 out of 38 Palomo's patients (66%) were military, when he reported his operation (4).

Providing sufficient attention is paid to the initial training, laparoscopic skill is not all that difficult to acquire. With the increasing use of minimally invasive surgery, we suggest that laparoscopic ligation of internal spermatic veins in the management of varicoceles is the operation of choice.

References

- 1 Porst HB, Ahren W, Lenz M, Altwein JE. Percutaneous sclerotherapy of varicoceles—an alternative to conventional surgical methods. *Br J Urol* 1984; **56**: 73–8.
- 2 White RI, Kaufman SL, Barth KH, Kadir S, Smyth JW, Walsh PC. Occlusion of varicoceles with detachable balloons. *Radiology* 1981; **139**: 327–34.
- 3 Ivanissevich O. Left varicocele due to reflux. Experience with 4470 operative cases in forty-two years. *J Int Coll Surg* 1960; **34**: 742–55.
- 4 Palomo A. Radical cure of varicocele by a new technique: preliminary report. *J Urol* 1949; **61**: 604.
- 5 Kaufman SL, Kadir S, Barth KN. Mechanisms of recurrent varicocele after balloon occlusion or surgical ligation of internal spermatic vein. *Radiology* 1983; **147**: 435–40.
- 6 Narayan P, Amplatz K, Gonzalez R. Varicocele and male subfertility. *Fertil Steril* 1981; **36**: 92–7.
- 7 Coolsaet BLRA. The varicocele syndrome: venography determining the optimal level for surgical management. *J Urol* 1980; **124**: 833–9.

- 8 Combhaire FH. Varicocele. In: Whitfield HN, Hendry WF eds. *Textbook of Genitourinary Surgery*. Edinburgh: Churchill Livingstone, 1985: 1157–67.
- 9 Mintz M. Risks and prophylaxis in laparoscopy: a survey of 100 000 cases. *J Reprod Med* 1987; **18**: 269–72.
- 10 Semm K, Mettler L. Technical progress in pelvic surgery via laparoscopy. *Am J Obstet Gynecol* 1980; **138**: 121–7.
- 11 Cushieri A, Berci G, McSherry CK. Laparoscopic cholecystectomy. *Am J Surg* 1990; **159**: 273.
- 12 Larsen GM, Vilale GC, Casey J *et al.* Multipractice analysis of laparoscopic cholecystectomy in 1983 patients. *Am J Surg* 1992; **163**: 221–5.
- 13 Matsuda T, Horii Y, Higashi S, Oishi K, Takeuchi H, Yoshida O. Laparoscopic varicocelectomy: a simple technique for clip ligation of the spermatic vessel. *J Urol* 1992; **147**: 636–8.

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