

LAPAROSCOPIC TREATMENT OF PEDIATRIC VARICOCELE: A MULTICENTER STUDY OF THE ITALIAN SOCIETY OF VIDEO SURGERY IN INFANCY

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ABSTRACT

Purpose: We report preliminary results of a multicenter study of the Italian Society of Video Surgery in Infancy on the laparoscopic treatment of pediatric varicocele.

Materials and Methods: A total of 161 children 6 to 16 years old (median age 12.5) underwent laparoscopic treatment of varicocele at 6 pediatric surgery divisions. Varicocele was on the left side in 159 cases (98.7%) and bilateral in 2 (1.3%). Two boys had recurrent left varicocele. All children were treated with laparoscopy, including ligation of the spermatic veins only in 28 (17.3%), and ligation of the testicular veins and artery in 133 (82.7%). In 10 boys (6.2%) an additional procedure was done simultaneously, including closure of an apparently patent peritoneal vaginal duct on the right side in 7 and resection of epiploic adhesions between the intestinal loops and abdominal wall from previous appendectomy in the remaining 3.

Results: Average operative time was 30 minutes and hospitalization was about 24 hours. At followup there were 13 minor complications (8%), including left hydrocele in 9 children who underwent the Palomo technique, minor scrotal emphysema in 2 and umbilical granuloma in 2. In our series varicocele recurred in 1 boy (3.5%) who underwent ligation of the spermatic veins only and in 3 (2.2%) treated with the Palomo technique.

Conclusions: Our preliminary experience shows that the results of the laparoscopic approach are comparable to those of the open approach. However, the important advantages of laparoscopy over the open approach are its minimal invasiveness and precision of intervention. Moreover, laparoscopy allows treatment of other intra-abdominal pathological conditions using the same anesthesia, as in 10 patients in our series. We believe that ligating the testicular veins and artery is preferable to ligating the testicular veins only, even if the incidence of hydrocele is not negligible after the Palomo procedure.

KEY WORDS: testis; varicocele; infertility, male; laparoscopy

Varicocele is considered the most identifiable cause of male infertility.¹ The incidence of varicocele in the prepubertal age ranges from 10% to 15% in various series and the importance of early treatment in childhood for preventing testicular damage is widely accepted.² Treatment options include spermatic vein sclerotherapy or embolization, classical surgical treatment via the scrotal, high retroperitoneal or inguinal approach, microsurgical bypass and more recently laparoscopy.^{3–7} We report preliminary results of the multicenter study of the Italian Society of Video Surgery in Infancy of the laparoscopic treatment of varicocele in children.

PATIENTS AND METHODS

In a 3-year period from January 1995 to December 1997, 195 children 6 to 16 years old (median age 12.5) underwent laparoscopic treatment of varicocele at 6 pediatric surgery divisions. In this study we present only 161 of the 195 cases because 34 reports were not correct or complete. Varicocele was on the left side in 159 cases (98.7%) and bilateral in 2

(1.3%). Two boys had recurrent left varicocele after previous open surgery.

Table 1 shows the results of preoperative examinations. In the 2 cases of recurrent varicocele venography showed reflux through the deferential veins and recurrence via the spermatic internal veins in 1 each. Varicoceles were graded according to the Horner classification as first degree—palpable but not well visible in 21 cases (13%), second degree—palpable and clearly visible in 83 (51.5%), and third degree—large in 57 (35.5%). Third degree varicocele was always an indication for surgery. In cases of first and second degree varicocele pain or scrotal discomfort, or testicular asymmetry with hypotrophy of the side affected was also an indication (table 2). All 57 boys with third degree varicocele were symptomatic and 42 of the 57 (73.6%) had testicular hypotrophy.

All children were treated via laparoscopy. After the induction of general anesthesia the patient was placed in the Trendelenburg position. In 141 cases (87.6%) we used 3 trocars in triangu-

TABLE 1. Preoperative diagnostic evaluations

| | No. Pts. (%) |
|---------------------------------------|--------------|
| Supine + standing scrotal examination | 161 (100) |
| Testicular vol. determination | 161 (100) |
| Scrotal + color Doppler ultrasound | 75 (46.5) |
| Preop. venography | 16 (9.9) |

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TABLE 2. *Indications for surgery*

| Indication | No. Pts. |
|--|----------|
| Third degree varicocele | 57 |
| Pain or scrotal discomfort (varicocele degree): | |
| First | 18 |
| Second | 49 |
| Testicular hypotrophy (varicocele degree): | |
| First | 3 |
| Second | 32 |
| Varicocele recurrence after traditional open surgery | 2 |
| Total No. | 161 |

lation, while in 20 (12.4%) only 2 trocars were needed. Ligation of the veins only was done in 28 boys (17.3%) using the Ivanissevich procedure, while ligation of the veins and artery was performed in 133 (82.7%) by the Palomo technique.

In 22 patients (13.7%) the spermatic vessels were sectioned and the posterior peritoneum was closed using separate stitches and resorbable suture. In the other 139 cases the posterior peritoneum remained open. In 10 children (6.2%) an additional procedure was performed simultaneously, including closure of a patent peritoneal vaginal duct on the right side in 7 patients and sectioning of epiploic adhesions between the intestinal loops and anterior abdominal wall due to previous appendectomy in 3. The latter 3 boys had a history of chronic abdominal pain after appendectomy, which would have required laparoscopic exploration. Pneumoperitoneum pressure ranged from 8 to 14 mm. Hg (median 11).

RESULTS

All operations were completed via laparoscopy and no conversion to open surgery was needed. Median operative time was 30 minutes (range 20 to 60) and median hospital stay was 24 hours (range 1 to 4 days). There were only 5 perioperative complications (3.1%), including slight bleeding from the inner spermatic vessels in 3 cases that resolved using clips and a technical problem associated with blockage of a clips applier in 1. In addition, the light source broke during surgery in the latter case.

Followup was 1 to 4 years (median 30 months), and in most cases involved clinical examination, while only 14 (8.7%) underwent ultrasonography or echo color Doppler ultrasound. We noted 13 (8%) major complications in our series, including left hydrocele in 9 children (5.6%) who underwent the Palomo technique, minor scrotal emphysema in 2 and umbilical granuloma in 2. Granuloma was treated with nitrogen dioxide and scrotal emphysema resolved at the end of the operation.

Of the 9 patients with hydrocele 3 underwent surgery via the scrotal approach. In 2 boys the condition regressed naturally and 1 with persistent recurrence after open surgery was treated with scrotal punctures. In this case the hydrocele resolved after 5 punctures during a 1-year period. The other 6 patients were treated with scrotal puncture. In 4 boys who underwent therapy every 2 to 3 months hydrocele disappeared within a median of 12 months. In the remaining 2 cases hydrocele persisted after 2 punctures but was decreased in size.

We observed 4 recurrent varicoceles (2.4%) in our series, including 1 after the Ivanissevich procedure (1 of 28 cases or 3.5%) and 3 after the Palomo technique (3 of 133 or 2.2%). These 4 children underwent venography postoperatively to identify the possible cause of recurrence. After the Ivanissevich procedure venography showed varicocele through a residual internal spermatic vein that was probably not sectioned at surgery. After the Palomo technique the study revealed recurrence through the deferential veins. Repeat laparoscopic surgery resolved the problem in these 4 children. To verify improvement in the affected testis followup should continue even during puberty and include spermography as well.

DISCUSSION

Several operative procedures may be used to treat pediatric varicoceles. Some prefer to perform percutaneous embolization or sclerosis, while others prefer open surgery with or without a loupe or microscope magnification. A few perform a microsurgical venous bypass. However, a review of the medical literature of the last 5 years reveals that varicocele is often treated via the laparoscopic approach in adulthood and childhood.^{8,9} For this reason and to analyze objectively the results and pitfalls of laparoscopic treatment of varicocele in children we evaluated data from a large (161) case series of the Italian Society of Video Surgery in Infancy multicenter study treated during a 3-year period.

The most striking evidence is the common trend of several to adopt the laparoscopic technique for treating varicocele. In fact, more than 82% of the patients in our current series underwent the Palomo technique. This general tendency seems to be associated with its lower recurrence rate, which was 2.2% in our series, versus that of other procedures.^{8,10,11}

Postoperatively venography indicated that recurrence in our series may have been due to reflux through the deferential veins associated with obstruction of the left common iliac vein. We think that this extremely rare event, which develops in about 5% to 10% of children with varicocele, may be prevented by systematic venography in the preoperative period or by also sectioning the deferential veins when laparoscopic examination shows that they are varicose compared with the contralateral side. In our opinion the latter solution is much better. To confirm this hypothesis we examined the videos of 2 of the 4 recurrences in our series that were filmed and noted dilated deferential veins associated with inner spermatic vessel dilatation.¹²⁻¹⁵ Another interesting finding is that during the operation 6.2% of the patients in our study required another surgical procedure simultaneously with varicocelectomy. A great advantage in children is that laparoscopic view magnification enables the identification and treatment of any other associated pathological condition, such as a permeable peritoneal vaginal duct, or adhesions due to previous appendectomy or another abdominal intervention.

When criticizing the laparoscopic treatment of varicocele, some mention high cost. We think that this problem is almost eliminated when reusable trocars and instruments are applied. The only nondisposable instrument in our series was the clips applier, which was sometimes replaced with traditional ligatures.¹⁶ On the other hand, in our series we observed a high 5.6% rate of hydrocele associated with ligation of the lymphatic vessels. This etiology was confirmed by the analysis of hydrocele fluid in our patients, which revealed a high protein content.

The Ivanissevich procedure seems to decrease the rate of hydrocele by sparing the lymphatic vessels adherent to the spermatic artery, although unfortunately it has a higher rate of recurrence than the Palomo technique.¹⁷ In our experience, which confirms most reports in the literature, there were no cases of testicular hypotrophy or atrophy using the Palomo technique because the collateral blood supply to the testis originated from the gubernaculum, anterior and posterior scrotal vessels, intrascrotal anastomosis and deferential vessels.^{10,18,19} On the other hand, we noted no improvement in spermatogenesis in our series because less than 5% of our patients underwent semen analysis, mostly due to young age at the time of intervention.

CONCLUSIONS

Our preliminary experience shows that the recurrence and complication rates of the laparoscopic approach are comparable to if not better than those of the open or radiological approach.^{5,8,20} However, laparoscopy seems to have a great

advantage compared with other procedures because of its minimally invasive nature and the precision of the intervention. Moreover, this method makes it possible to treat other intra-abdominal pathological conditions using the same anesthesia, as in 10 patients in our series. Concerning the type of procedure to perform in boys with varicocele, there are several valid techniques. The choice depends on surgeon experience and clinical history. Based on our experience we think that laparoscopy may be considered a feasible alternative to other techniques.

In regard to the specific laparoscopic technique, we believe that ligation of the testicular veins and artery is preferable to ligation of the testicular veins only due to the recurrence rate. However, the incidence of postoperative hydrocele after the Palomo procedure should not be ignored. Long-term followup is essential in all cases to evaluate the results of this technique and improvement of the affected testis as well as detect possible hydrocele formation within the initial 6 to 12 months after intervention.

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