

## Laparoscopic Varicolectomy with Single Incision in Children

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**Purpose:** Single-port laparoscopic varicolectomy has recently been introduced. As an instrument with three ports was too large for use in children, a modified technique using a single incision with two trocars was attempted in our department. This study was designed to compare the new method with the traditional laparoscopic method involving three ports.

**Materials and Methods:** Twelve boys with a total of 14 varicoceles were admitted for laparoscopic varicolectomy through a single incision with two trocars. Thirty-two patients with 33 varicoceles were treated using traditional three-port laparoscopy, and were reviewed as controls. Data were collected to compare the two groups.

**Results:** All procedures were completed successfully in both groups. There were no significant differences in terms of patients' age, operative time, blood loss, analgesic requirement, hospital stay, and complications.

**Conclusion:** The technique of laparoscopic varicolectomy through a single incision with two trocars is safe, effective, and cosmetically acceptable.

**Keywords:** laparoscopy; adolescent; vascular surgical procedures; methods; postoperative complications; treatment outcome; urologic surgical procedures.

### INTRODUCTION

Adolescent varicocele is a common condition that is often encountered by pediatric urologists. The prevalence of the disease in the pediatric population is about 10% to 15%.<sup>(1)</sup> Although many factors are involved in the genesis of a varicocele, primary retroperitoneal reflux is the most common cause of the disease. As this can create both testicular and sperm damage leading to testicular atrophy and oligozoospermia, many pediatric urologists are recommending varicolectomy in children.<sup>(2)</sup>

Several surgical techniques for treatment have been described, and controversy still surrounds the advantages and disadvantages of the different options.<sup>(3)</sup> With decreased postoperative pain, improved cosmetic appearance, and reduced hospital stay and convalescence, laparoscopic varicocele surgery is an accepted procedure in China. Recently, single-port laparoscopic surgery via the umbilicus to repair varicoceles has been reported.<sup>(4)</sup> The concealed scar of this "scarless" technique has led to wider use. However, a special port with three inserts was too large for use in children. A modified single incision with two trocars is used by our department. Compared to other means of surgical access, the wound is

more suited to the shape of the umbilicus.

### MATERIALS AND METHODS

#### *Patients*

From March 2011 to February 2012, 12 boys aged 9 to 18 years (mean age 13.6 years) were admitted to our hospital for the treatment of varicocele. Twelve patients had varicoceles on the left side only, while two patients had bilateral varicoceles. Four had grade II varicoceles and the other 10 had grade III varicoceles. This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Shanghai Jiao Tong University. Written informed consent was obtained from all participants' guardians. All the clinical diagnoses were verified by a Doppler study and a retroperitoneal location was excluded.

#### *Laparoscopic Procedure*

The patient was placed in the supine position. An infraumbilical incision of about 10 mm was made. After dissection with mosquito clamps and varicocele hooks, the peritoneum was opened under direct vision. Two 5 mm trocars were inserted into the abdominal cavity through the single incision (**Figure**). After carbon di-

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**Table.** Clinical data analysis of varicocele with different laparoscopic treatments.\*

Variables	Single Incision with Two Trocars (12 patients, n = 14)	Traditional Three Ports (32 patients, n = 33)	P Value
Age (years)	13.6 ± 2.6	15.3 ± 3.7	.126
Operative time (minutes)	25.0 ± 5.7	28.9 ± 10.2	.187
Blood loss (mL)	0	0	> .05
Analgesic requirement	0	1	.82
Hospital stay (days)	2.1 ± 0.6	3.1 ± 1.2	.26
Complications	0	1 hydrocele	.82

\* Data are presented as mean ± SD.

oxide insufflation, a 5 mm laparoscope was used for visualization, and a straight working instrument was inserted. The patient was maintained in the Trendelenburg position and rotated slightly to the contralateral side of the operated vessels. The spermatic vessels were identified in the retroperitoneum. The peritoneum was then opened alongside the spermatic vessels as high as possible above the internal inguinal ring. The vessels were dissected free and divided with a harmonic scalpel. No attempt was made to spare the testicular artery or adjacent lymphatics. All patients were discharged on the 2nd postoperative day and returned to the hospital for scheduled follow-up. A group of 32 patients with 33 varicoceles was treated using traditional three-port laparoscopy between 2009 and 2010, and was served as control group.

#### Statistical Analysis

Data on age, operative time, blood loss, analgesic requirement, hospital stay, and complications were collected. The unpaired *t*-test with mean and standard deviations (SD) was used for comparisons. A value of *P* < .05 was considered to be significant.

## RESULTS

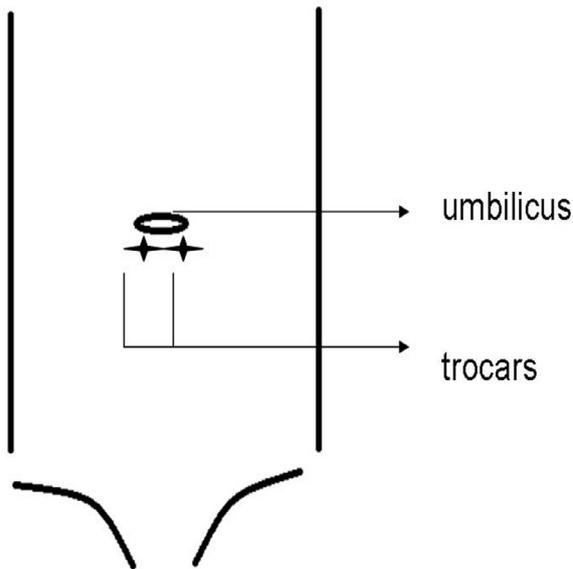
The average operating time was 25.0 minutes, and there was no significant blood loss during any operations. No postoperative complications were observed after 1 year of follow-up; complications were defined as wound infection, dehiscence, hydrocele, testicular atrophy, or recurrence. Each incision was hidden well within the umbilicus. After the wound healed, the cosmetic result was excellent. All procedures were completed successfully using either the modified single incision with two trocars or the three-port technique. There were no significant differences between the two groups in terms of patients' age, operative time, blood loss, analgesic requirement, hospital stay, or complications (**Table**).

## DISCUSSION

About 30% of patients with a varicocele are subfer-

tile.<sup>(5)</sup> However, repair of adult varicocele in infertile men does not always result in fertility. Many urologists therefore advocate performing varicocelectomy in children.<sup>(6)</sup> In our hospital, significant varicocele is routinely treated to preserve future fertility. Several types of procedures are currently used to treat varicocele, including interventional radiologic vein embolization, inguinal microscopic testicular artery-sparing varicocelectomy, spermaticoepigastric venous anastomosis, and Palomo varicocele ligation.<sup>(3,7-12)</sup> Evolving laparoscopic techniques are mostly based on the Palomo procedure. Several reports have described laparoscopic extraperitoneal treatment for varicocele.<sup>(1,13,14)</sup> The principal disadvantages with this method are insufficiency of retroperitoneal space and difficulty in orientation, which are more significant in children. The transperitoneal approach was chosen, as we previously noted the ease of access and minimal invasiveness with this technique. A single incision with two trocars was used 2 years previously by the authors of this study. Many surgeons have reported the use of a single port while performing laparoscopic varicocelectomy. In this process, a specially manufactured port with three inserts was necessary.<sup>(15-17)</sup> Although the device was innovative, it is not suitable for use in children. The high cost of instruments for laparoendoscopic single-site surgery has also hindered update of traditional endoscopic ports in pediatric specialty hospitals in China.

Two 5 mm trocars could be inserted into the peritoneum through a single small infraumbilical incision with minimal or no gas leakage. Pneumoperitoneum was induced with carbon dioxide to a pressure of 13 mmHg. Both the laparoscope and working instruments used in the operation were straight. The spermatic vessels could be identified at the internal ring of the inguinal canal where the vas deferens joins the spermatic cord. The spermatic vessels were divided as high as possible. When feasible, vessels were coagulated with a harmonic scalpel without using hemoclips. Although some spermatic veins have been reported to merge, this an-



**Figure.** A schematic figure from the sites of Trocar insertion.

atomical variant was not observed in our study.<sup>(18)</sup> All vessels were therefore carefully isolated. We have no experience with the artery-sparing technique, but most surgeons believe that there is a higher risk of varicocele recurrence with techniques that preserve lymphatic or arterial supply.<sup>(19,20)</sup> Therefore, surgeons who perform lymphatic or arterial preservation need to employ strategies to ensure venous collaterals are ligated.<sup>(21)</sup> The high division of both the testicular artery and vein resulted in a satisfactory outcome with no incidence of testicular atrophy in any of the patients we treated. With conventional laparoscopic equipment, the bilateral spermatic vessels can be inspected simultaneously. In our study, two patients underwent bilateral varicocelectomy. Based on our experience, the two trocar insertion sites were placed in a line perpendicular to the midline of the body (**Figure**), and the position of the laparoscope was closer to the dilated vessels, making it more convenient to observe and operate.

Follow-up was performed for an entire year. As shown in the **Table**, there were no significant differences when compared to the three-port technique, including operative time, blood loss, and hospital stay. The cosmetic appearance was not scientifically evaluated. The surgeon's subjective assessment was that single-port incisions were cosmetically superior.

## CONCLUSIONS

Laparoscopic varicocelectomy through a single incision with two trocars involves only a small modification in technology. The learning curve was very short for a senior laparoscopic urologist, after the main challenge

of performing without triangulation was overcome.

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## CONFLICT OF INTEREST

None declared.

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