

Ergonomic varicocele ligation: laparoscopic intracorporeal knot-tying

Esra Ozcakir and Mete Kaya

Introduction/aim Many surgical and radiological techniques have been introduced for treating varicoceles. The goal of surgical treatment of varicocele is to occlude the refluxing venous drainage to the testis while maintaining the normal testicular function. The aim of this study was to present our initial experience in laparoscopic varicocele treatment using intracorporeal knot-tying with available laparoscopic instruments.

Materials and methods A retrospective file review of the patients who were treated with laparoscopic intracorporeal knot-tying between May 2010 and July 2014 was carried out. The patients were evaluated as regards age, symptoms, and clinical grade of varicocele. All patients were diagnosed through physical examination and color Doppler ultrasound, which measured the diameter of spermatic veins and retrograde flow in spermatic veins after the Valsalva maneuver.

Results The mean operative time was 35 ± 8 min. There was no intraoperative complication, and all patients had uneventful postoperative courses. Patients were

discharged from hospital on the same day after surgery. No recurrent varicocele, testicular atrophy, postoperative hydrocele, or hematoma were observed.

Conclusion Our preliminary results indicate that laparoscopic varicocele ligation carried out with intracorporeal knot-tying is safe and effective and produces cosmetically better results. Therefore, it is a suitable procedure in both pediatric and adolescent patients. *Ann Pediatr Surg* 12:59–62 © 2016 Annals of Pediatric Surgery.

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Introduction

Varicocele is the abnormal dilatation and tortuosity of the testicular veins of the testis. Overall, 95% of affected patients have left-sided varicocele, whereas 22% have bilateral varicocele [1–3]. The prevalence of this disease among adolescents is 10–15% among the general population [4,5]. The evidence obtained from recent studies have suggested that varicocele may cause time-dependent negative influence on testicular function; subsequently, treating this condition leads to an increase in measurable outcomes of fertility [6]. The goal of surgical treatment of varicocele is to occlude the refluxing venous drainage to the testis while maintaining the normal testicular function. The most frequent complications occurring after varicocele repair include hydroceles, testicular atrophy, and recurrence [4,5].

Many surgical and radiological techniques have been introduced for treating varicoceles. Since 1988, when it was first introduced, high ligation of the spermatic veins by using laparoscopy has become the preferred technique for surgical correction of varicocele in pediatric patients and adolescents [7,8]. The primary concern of the laparoscopic approach to varicocelectomy has been the high associated cost and required expertise.

The aim of the study was to present our initial experience in the laparoscopic varicocele treatment using intracorporeal knot-tying with available laparoscopic instruments.

Materials and methods

We reviewed our clinical records on the patients who were treated with laparoscopic intracorporeal knot-tying

between May 2010 and July 2014. The patients ($n = 24$) were evaluated by age (mean age 13.79 years), symptoms, and clinical grade of varicocele (Table 1). All patients were diagnosed through physical examination and color Doppler ultrasound, which measured the diameter of spermatic veins and retrograde flow in spermatic veins after the Valsalva maneuver. Surgical indications included the presence of clinically palpable varicocele (cosmetics), pain, and testicular hypotrophy. Patients were treated on an outpatient basis and then operated by the same surgeon (the second author). Ampicillin (50 mg/kg) and single-dose gentamisin (2, 5 mg/kg) were used for antibiotic prophylaxis.

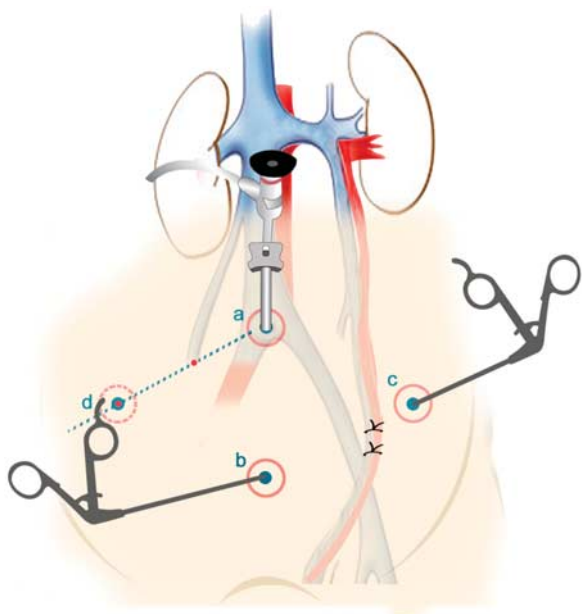
Laparoscopic procedure

After induction of general anesthesia, gastric and bladder decompression were carried out routinely if necessary, and a Verres needle was inserted into the peritoneum via infraumbilical mini incision in the supine position. Next, pneumoperitoneum was generated with CO₂ insufflations (10–12 mmHg). A 5 mm trocar was inserted for the 30° telescope. Under direct vision, working trocars were placed in the midline suprapubic area (3 mm) and at the left McBurney's point (3 mm) in the patients who had varicocele on the left side. In the cases diagnosed with bilateral varicoceles, a 3 mm trocar was placed at the right McBurney's point (Fig. 1). Afterwards, the patient was placed in the Trendelenburg position. Following the general inspection of the abdomen, a peritoneal window was created to expose the spermatic vascular bundle at the point 2 cm above the internal inguinal ring and on the median of the spermatic vascular bundle (Fig. 2). Blunt

Table 1 Demographic data

Patient number (n)	Age	Complaint	Side	Diameter of testicular veins (mm)	Grade of varicocele
1	12	Pain	Left	4.3	3
2	13	Hypotrophy	Left	2.8	2
3	14	Hypotrophy	Left	5.1	3
4	13	Pain	Left	3.9	1
5	16	Palpable varicocele	Left	5.4	3
6	15	Palpable varicocele	Left	5.9	2
7	15	Pain	Left-right	4.3-5.3	2
8	15	Pain	Left	4.3	2
9	15	Palpable varicocele	Left	4.4	2
10	11	Pain	Left	4.3	3
11	12	Pain	Left	5	3
12	13	Hypotrophy	Left	2.7	2
13	15	Pain	Left	4.2	3
14	12	Hypotrophy	Left	3.6	2
15	13	Pain	Left	2.8	1
16	11	Pain	Left	2.7	2
17	15	Pain	Left	5	3
18	14	Pain	Left	3.4	2
19	13	Palpable varicocele	Left	4.4	3
20	14	Pain	Left	4.3	3
21	14	Pain	Left	3.8	2
22	15	Palpable varicocele	Left	5.3	3
23	16	Hypotrophy	Left	5	3
24	14	Pain	Left	4.2	3

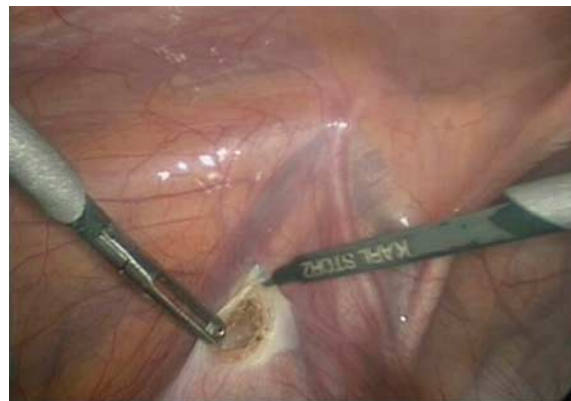
Fig. 1



An illustration of the figure shows trocars. (a) The 5 mm port inserted just below the umbilicus for direct vision with a 30° camera. (b) The first working trocar (3 mm) placed at the midline suprapubic area. (c) The second one (3 mm) placed at left McBurney's (who have left varicocele). (d) A 3 mm third trocar placed at the right McBurney's instead of b point in bilateral varicocele.

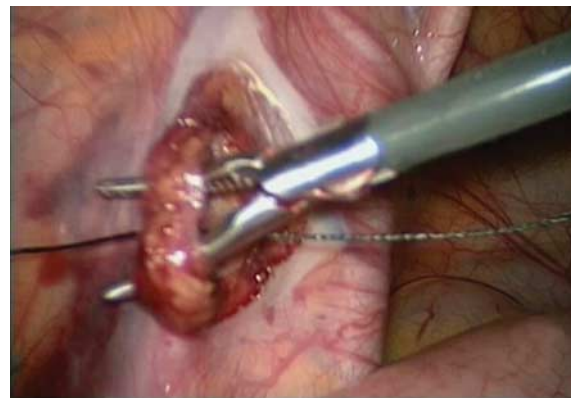
dissection was used to isolate the whole spermatic bundle. No attempt was made to separate the testicular artery or adjacent lymphatics. The spermatic bundle was elevated by dissectors and a nearly 8 cm free silk suture material was inserted into the abdomen (Fig. 3). Afterwards, the spermatic bundle was suture-ligated at two points as a mass with silk sutures (Fig. 4). At the end of the procedure, we did not divide the veins by cutting, and we hid the nodes by pushing them into the lateral

Fig. 2



The peritoneal window.

Fig. 3



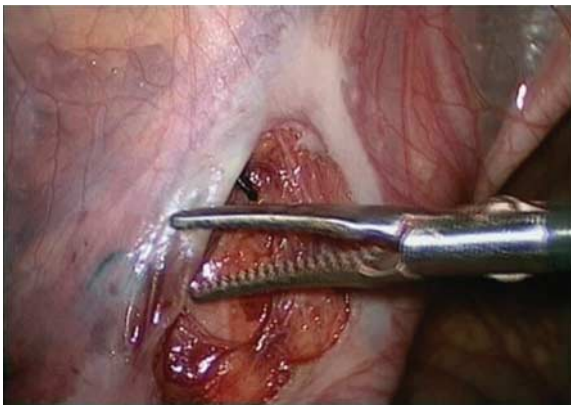
Dissection of spermatic bundle and free silk suture material inserted into the abdomen.

Fig. 4



Spermatic bundle are noded at two point as mass without division.

Fig. 5



Knots are hidden by being pushed to lateral retroperitoneal area.

retroperitoneal area (Fig. 5). Metamizole sodium in a dose of 8–16 mg/kg was used for providing postoperative analgesia. Oral intake was initiated at third postoperative hour.

This study was approved by our institute review board.

Results

Mean operative time was 35 ± 8 min. There was no intraoperative complication and all patients had uneventful postoperative courses. Patients were discharged from hospital on the same day after surgery. All patients were followed-up in the 1st, 3rd, 6th, and 12th months after the surgery through a physical examination and scrotal Doppler ultrasonography. No recurrent varicocele, testicular atrophy, postoperative hydrocele, or hematoma were observed.

Discussion

Many surgical and radiological techniques have been introduced for the correction of varicoceles, such as open-high or subinguinal ligation (microsurgical), laparoscopic methods, and sclerotherapy [5,8,9]. All these methods have some advantages over one another.

Laparoscopic varicocele surgery was first performed by Sanchez de Badajoz *et al.* [7]. The major advantage of the laparoscopic approach is that it provides a direct and magnified view of the structures allowing for the precise identification and dissection [2]. However, it is considered to be more expensive and has no proven benefit in comparison with open procedures [9]. Currently, laparoscopic varicocele ligation is considered as a good alternative surgical procedure for the repair of varicocele with reported benefits of better convalescence, minimally invasive characteristic, and lesser analgesic requirement [10–12]. In our series, we reported our method and encouraging moderate-term clinical outcomes of laparoscopic suture ligation in varicocele treatment.

The advent of laparoscopic surgery has introduced various methods to ligate the varicose veins, such as electrocautery, endoclips, suture ligation, and vessel sealing [5]. The factors including surgeon preference, recurrence and complication rates, and cost are important when deciding on the most appropriate approach for a patient [11]. In this study, the intracorporeal knot-tying with silk suture was used to ligate varicose veins in the male patients with varicocele.

The main issue in laparoscopic varicocele surgery concerns the ligation of the artery and lymphatics. Using our method, the vascular mass was lifted and ligated without separating the arterial and lymphatic components from the veins. Several studies have found that mass ligation of the spermatic vessels (Palomo procedure) potentially carries the risk for testicular atrophy as a result of artery ligation, and higher incidence of postoperative hydrocele due to lymphatic ligation [4]. It has been reported recently that mass ligation of the spermatic vessels offers a safe method to achieve varicocelectomy without compromising the blood supply of the testis [3,5,9,10]. In addition, the preservation of artery and lymphatic vessels of testis may help to avoid complications; however, attempts to preserve these vessels, which are intimately attached to spermatic veins, during laparoscopy may extend the duration of the operation and may also carry a high risk for relapse because of the presence of small spermatic vessels that have been overlooked and thus left unknotted [8]. We doubly ligated the veins with silk suture as a mass. Moreover, none of our cases showed atrophy, recurrence, or hydrocele in the follow-up period.

Intracorporeal knot-tying with silk method is superior over other methods because of its feasibility, as it can be used for mass ligation of the varicose veins using inexpensive suture material and available laparoscopic instruments without the need for expensive devices [5]. In contrast, the apparatus used for ligation – vessel sealing, endostapler, and clips – are expensive and also require 10 mm working ports and a wide incision area. In our series, we performed varicocelectomy with a 3 mm working trocar. It yielded cosmetically better results. It is true that intracorporeal knot-tying is a difficult task in laparoscopic surgery. We thought that the tying could be performed when working ports were placed appropriately.

Tissue reaction to silk suture is another critical issue in this method. Silk – a nonabsorbable suture material – is cheaper and easier to handle as compared with other nonabsorbable suture materials; however, the most marked tissue reaction is associated with this natural suture material. This problem was resolved by adjusting the position of the nodes to the retroperitoneal area. Intra-abdominal adhesions or related complications were not detected in our series.

Our technique is not unique, and several similar methods have been reported previously [13,14]. However, unlike others, we did not attempt to divide the vessels after ligation because of the risk for node slippage. Furthermore, in several studies, no transection was reported after clipping or ligation [3,9].

Conclusion

Although the most effective and least invasive method of varicocele treatment remains uncertain, our preliminary results indicate that laparoscopic varicocele ligation carried out with intracorporeal knot-tying is safe and effective and produces cosmetically better results. Therefore, it is a suitable procedure in both pediatric and adolescent patients.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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