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Original Article

Scarless laparoscopic varicocelectomy using percutaneous intruments

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Abstract: Background: Varicocele is one of the most frequent andrological diseases in adolescents; laparoscopic varicocelectomy is a good option. The aim of this study is to investigate, report and evaluate surgical outcomes of laparoscopic technique in pediatric age using percutaneous instruments. Materials and methods: We report our experience with a new technique for varicocelectomy. I.R.B. approved the study. Patients with varicocele and testicular hypotrophy age between 9 and 16 years underwent laparoscopic varicocelectomy using a single transumbilical port for camera and 2 laparosocpic 2.5 mm percutaneous instruments. After dissection of lymphatic vessels and artery, veins were coagulated using monopolar hook. After the procedure a standard umbilical closure was performed using resorbable stiches, without suture into the percutaneous accesses. All patients underwent 2 controls visit at 3 and 6 months after surgery. Results: During the study period (April 2018-October 2019) 25 patients were treated; all patients were treated by the same surgeon. There were no cases of recurrence nor hydrocele. All patients reported a good post-op activity without pain and a good cosmetic result. Conclusion: This first small series report a new technique for varicocelectomy; our study demonstrate that this technique is safe without complications and it is associated with good cosmetic results.

Keywords: Varicocele, pediatric age, percutaneous, scarless

Introduction

Varicocele is the most frequently diagnosed andrological condition requiring surgery in pediatric and adolescent patients [1].

Medical literature has reported that 15-20% of young people aged between 10 and 14 years have varicocele of any grade [2, 3]. The gold standard to treat varicocele in pediatric age and adolescence is yet to be found [4-9].

In pediatric age, the criteria for varicocelectomy are varicocoele associated with a significantly small ipsilateral testis, additional testicular conditions affecting fertility (i.e. history of cryptorchidism), bilateral palpable varicocoeles, abnormal semen parameters (in older adolescents), varicocele associated with a supranormal hormone response to the GnRH (gonadotropin-realising hormone) stimulation test (less used) and symptomatic varicocoele (i.e. causing physical discomfort) [5-10].

Although there are different options (eg, percutaneous sclerosis, laparoscopy, retroperitoneoscopy, open surgery) for the treatment of varicoceles, there is not currently a gold standard for its treatment. In many studies it has been reported that, when possible, preserving the spermatic artery during ligation of the spermatic vessels, is the best option [4].

The aim of this study is to report our experience with percutaneous instruments during laparoscopic varicocelectomy, reporting clinical outcomes, complication rates and cosmetic results.

Materials and methods

We considered data about patients with varicocele aged between 9 and 16 years treated at our institution with this new procedure, between April 2018 and October 2019.

I.R.B. approved the study (n.04/18). The procedure was explained and proposed to patient

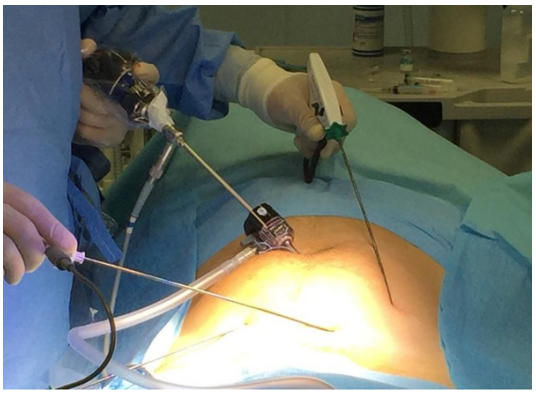

Figure 1. Instruments position.

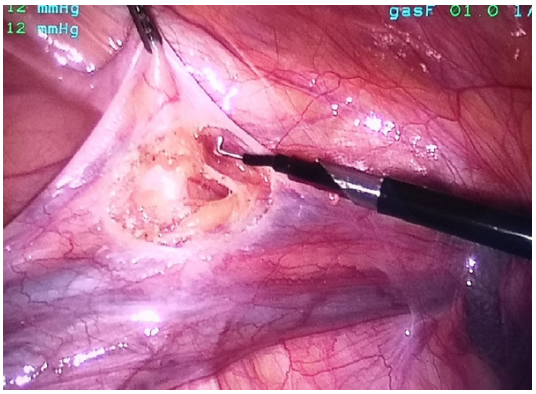

Figure 2. Vessels dissection.

parents. All patients underwent surgery for ipsilateral testicular hypotrophy. Varicocele was classified as follows: grade I - palpable varicocele only with Valsalva; grade II - palpable varicocele without Valsalva; grade III - visible varicocele. Testicular hypotrophy was defined as a testicular volume loss >20% with respect to the contralateral testis, assessed using Siemens Sonoline Elegra Ultrasound Imaging System (Siemens AG, Munich, Germany) with a 7.5 MHz probe. Measurements of testicular length, width, and height were obtained by using electronic calipers. Testicular volume was estimated with the formula for a prolate ellipsoid: [Vol (ml) = 523 × *L* × *W* × *H*] [4].

The inclusion criteria for this study were the following: subjects with normal body mass index (B.M.I. less than 20), left varicocele; testicular hypotrophy at US; no previous testicular traumas nor previous inguinal and scrotal surgeries; no other metabolic disease; no contraindication to laparoscopy; completed follow-up (3, 6 months after surgery).

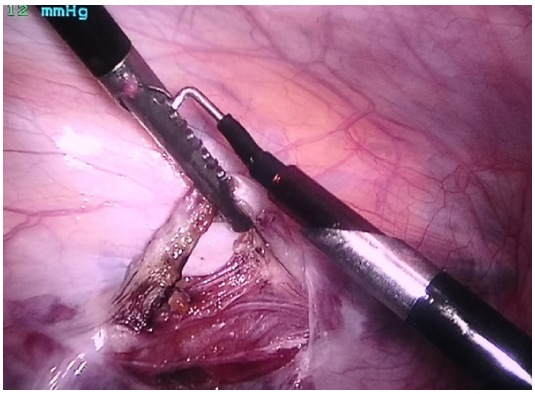

Figure 3. Treatment.

Other parameters were considered: surgical complications (hydrocele and recurrence), intraoperative complications (bleeding, problems introducing instruments, technical difficulties); for cosmetic results, there were both evaluations by patients and parents showing laparoscopic post-op pictures. Also eventual discomfort after surgery was recorded. All patients were treated under general anesthesia, in Day care modality.

Procedure

All patients underwent standard laparoscopic approach for camera (umbilical 5 mm port) and 2 percutaneous instruments (2.5 mm). Working space was created using 12 mmHg pneumoperitoneum with 1.5 L/min insufflation in all patients.

All percutaneous instruments were introduced into the abdomen using their cutting edge after a 2 mm skin incision; one instrument was placed soprapubic (retractable monopolar hook) while the second one into the left iliac fossa (grasper) (**Figures 1**, **2**).

The trocars insertion site was the same used during standard laparoscopy. After dissection of lymphatic vessels and artery, using the hook that is retractable, veins were coagulated using the same monopolar hook (**Figures 3**, **4**).

After the procedure a standard umbilical closure using resorbable stiches was performed without suture into the percutaneous accesses. After surgery all patients had local anesthetic injection near the instruments insertion. All patients underwent 2 follow-up visit (with Doppler velocimetry and ultrasound) at 3 and 6 months post-op (**Figure 5**).

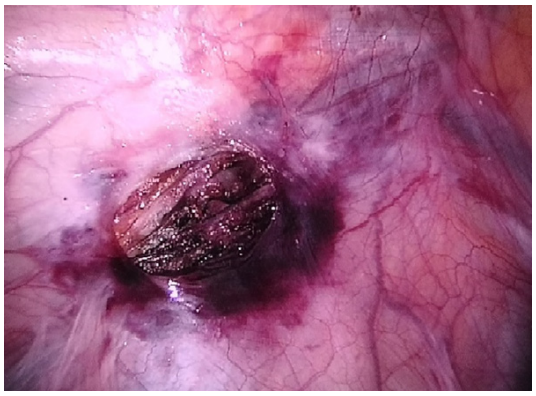

Figure 4. End of procedures.

Figure 5. Final view.

Statistical analysis was performed using the chi-square and Fischer exact tests. *P* value less than .05 was considered significant for the correlation between the variables and compared to our laparoscopic data (with the same inclusion and exclusion criteria).

Results

During the study period 25 patients were treated; All patients were treated by the same senior surgeon with two residents.

16 patients had grade III varicocele while 9 patients had grade II varicocele. All our patients had continuous spermatic vein reflux and left testicular hypotrophy (as reported in medical report before surgery). During follow-up there were no cases of recurrence nor hydrocele ($P<0.05$) respect to personal data (about 3% for hydrocele and 2.8% for recurrence: more than 500 cases treated). All patients (and patients parent) reported a good post-op sport activity (after 15 days) without pain and a good cosmetic result.

Among patients, 17 cases at 6 months had left testicular catch-up growth (detected also by ultrasound and manually). There was no statistical differences between percentage of catch-up growth after surgery (between this new technique and standard laparoscopy), nor correlation between grade of varicocele before surgery and the relative catch-up growth ($P>0.05$).

Data analysis does not show statistically significant differences between surgical procedure time respect to standard laparoscopy (our experience), even if it was not necessary to close the instruments accesses as for standard laparoscopy: 17±3.1 min vs 22±2.8 min ($P>0.05$).

No patients required hospitalization; About post operative pain, there was not a differences between the pain killer use (paracetamol) between the two techniques 2±0.8 vs 1.8±0.8 ($P>0.05$).

Discussion

The main outcomes of varicocelectomy is to achieve normal ipsilateral testicular size, and to preserve the fertility potential. Based of different studies, those techniques that preserve the testicular artery, offer a better semen quality [4].

Despite the high number of studies carried out on the treatment of varicocele, in pediatric age, at present, a surgical or anesthesiological gold standard is yet to be determined.

The guidelines state that surgical intervention is based on ligation or occlusion of the internal spermatic veins. Ligation is performed at different levels: inguinal (or subinguinal), transscrotal or suprainguinal using open or laparoscopic techniques. The former procedure has the advantage of being less invasive, while the advantage of the latter procedures is the considerably lower number of veins that need to be ligated and the increased safety of the incidental division of the internal spermatic artery at suprainguinal level.

Techniques for varicocele treatment are different such as retroperitoneal repair, laparoscopic repair, open supra or inguinal or subinguinal approach and percutaneous technique; the decision of which procedure is better is sometime based on percentage of recurrence or per-

sistence, percentage of post-operative hydrocele formation, risk of testicular atrophy, and the need of general anesthesia.

Many authors agree on the fact that the veins should be ligated and then excised. Also, testicular delivery should be avoided in order to reduce post-operative pain [10].

This international discussion include important fields such as which is the gold standard technique to reduce the onset of complications, the optimal age range to treat this pathology and which are the indicators to a real need for varicocele treatment.

The use of minimally invasive approach (i.e. single port surgery and others), the use of bipolar, cutting or not cutting the vessels has been proposed by many authors but, in pediatric age, series are less reported; these new approach is safe and associated with better cosmetic results [12-15].

In the era of technology, minimally invasive surgery needs to follow these important criteria: less pain, less hospital stay, reduced morbidity and costs, reduce complications and improve cosmetic results.

Based on our preliminary results this new technique is safe and respects all the above criteria. Possible criticisms of the study are the following: 1) all patients are treated by the same surgeon, and the feasibility could be different with different surgeons; 2) the instruments are blocked in their position, so it is important to decide the correct point of insertion before surgery; 3) instruments are single use and for this reason a real costs analysis at present is not possible; 4) a longer follow-up period could be necessary to exclude possible long-term complications such as recurrence.

Conclusions

This series in pediatric age, in a Day care modality with percutaneous instruments, is the first in medical Literature; our study demonstrate that this technique is safe without complications and it is associated with good cosmetic results.

Disclosure of conflict of interest

None.

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