

Selami Sözübir · Gülşen Ekingen · Ufuk Şenel
Hayrünisa Kahraman · B. Haluk Güvenc

A continuous debate on contralateral processus vaginalis: evaluation technique and approach to patency

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Abstract We present our experience with the transinguinal diagnostic laparoscopy and discuss its efficacy in evaluating the contralateral side in unilateral inguinal hernias. The possible influence of the initial side of hernia, age and gender on recognized bilateralism were also evaluated in two study groups (diagnostic laparoscopy vs clinical diagnosis). In this retrospective study, we evaluated 36 bilateral, 158 left-sided and 303 right-sided consecutive inguinal hernia cases. A total of 211 out of 461 unilateral cases underwent hernia repair and transinguinal laparoscopic evaluation of the contralateral side. Complications and difficulties of the technique, the mean duration of laparoscopy and operative times were additionally analyzed from operation charts. In this study, bilateralism was determined by transinguinal laparoscopy in Group 1 (children with a contralateral patent processus vaginalis) and clinically in Group 2 those who had a metachronous hernia. The patients were also analyzed according to the side of the inguinal hernia, age and gender in both groups. We found an overall positive contralateral patency in 41 cases (19.4%). We failed to perform a successful diagnostic laparoscopy in six cases (2.7%). No anesthetic or surgical complications were noted. Transinguinal laparoscopy did not add any considerable time to the mean operation time. The incidence of bilateralism in Group 1 was higher in girls than boys. Clinically detected bilateralism was significantly higher in 0–6 month age group and contralateral patency detected via laparoscopy was high in all other age groups. We may conclude that

transinguinal diagnostic laparoscopy is a feasible technique in children. We advocate its use as a tool with minimal complication risk even in the hands of novice.

Keywords Inguinal hernia · Laparoscopy · Patent processus vaginalis

Introduction

Inguinal hernia repair is the most common surgical procedure performed in the pediatric surgical practice, and 90% of the patients present with a unilateral hernia at first admission [1]. Studies for investigating the most suitable method in evaluation of the contralateral side has been an important topic for many years, since the reported incidence of a developing contralateral hernia after unilateral repair is as high as 31% [2, 3].

With more common use of pediatric laparoscopy over the last decade, diagnostic laparoscopy has become a prevalent method in the evaluation of the contralateral processus vaginalis than the earlier described methods such as herniography, Bakes dilators, Goldstein test and open exploration. In 1998, a meta-analysis has reported diagnostic laparoscopic evaluation of the contralateral inguinal region as the most reliable method with a sensitivity of 99.4% and specificity of 99.5% [4]. The method has still not reached an overall consensus, despite the fact that 24% of the pediatric surgeons utilize laparoscopy as a method of evaluation of the contralateral side by 2002 [5].

Even though the use of diagnostic laparoscopy has disclosed high rates of patency on the contralateral side, it is a well-known fact that a certain number of these patencies would never present as a clinical hernia [6–11]. Thus, studies concerning the determination of the criteria that would disclose a genuine candidate with a future clinical hernia have also become very important.

In this study, we initially presented the efficacy of our technique and discussed our results according to the literature. We additionally aimed to evaluate and com-

S. Sözübir (✉) · G. Ekingen · U. Şenel · H. Kahraman
B. H. Güvenc
Department of Pediatric Surgery, Kocaeli University
School of Medicine, Kocaeli, Turkey
E-mail: selamisz@superonline.com
Tel.: +90-21-65784097
Fax: +90-21-64693796

S. Sözübir
Pediatric Surgery Department, Yeditepe University
Medical Faculty, Devlet Yolu Ankara Caddesi No: 102–104,
Kozyatağı, Istanbul, Turkey

pare the basis of detected bilateralism according to the initial side of hernia, age and gender differences in two study groups (diagnostic laparoscopy vs clinical diagnosis).

Material and methods

In this retrospective study, we evaluated 497 consecutive inguinal hernia cases that were treated in our department from March 1998 through December 2003, with a mean age of 2.6 years (14 days to 14 years) including 389 boys and 108 girls. At admission, we found a total of 36 (7.2%) bilateral, 158 (31.8%) left-sided and 303 (61%) right-sided unilateral hernias. A total of 211 cases out of 461 with a unilateral presentation underwent an open conventional surgical hernia repair and a transinguinal laparoscopic evaluation of a contralateral patent processus vaginalis (CPPV). The remaining 250 underwent open conventional surgical hernia repair only.

Conventional high ligation of the hernia sac was the choice of surgical procedure for all patients. Two surgeons performed a similar standard technique of transinguinal laparoscopic exploration of the contralateral groin. All operations were performed as same-day surgery. The stomach was emptied with a suction catheter and the bladder was emptied using a Crede maneuver under general anesthesia. The ipsilateral hernia sac was reached through a skin-crease incision and simply dissected from the adjacent tissue. A reusable trocar was inserted through a longitudinal cut on the sac and secured in place with a 0 silk suture (Fig. 1). The patient was then placed in the Trendelenburg position and the abdomen insufflated with CO₂, preferably at a low flow rate (1 l/min) to a maximum pressure of 8–10 mm Hg. A 30° 5 mm laparoscope was used to assess the patency of the contralateral inguinal ring. The presence of a significant peritoneal opening (Fig. 2), absence of an identifiable termination of the peritoneal sac and expression of bubbles by palpating the inguinal canal (Fig. 3) were accepted as positive findings of patency. All of the detected contralateral patencies were repaired. The mean duration of diagnostic laparoscopy time and

mean surgery times for children with a CPPV, bilateral cases and unilateral cases were estimated from the data. Complications and difficulties of the laparoscopic technique were additionally analyzed from operation charts.

All of the cases with a negative CPPV and those that had solely open surgical repair were recalled for determination of a metachronous hernia or recurrence. However, as we could not reach the families of 36 children, they were excluded from the study. In this study, children with a CPPV have been accepted as Group 1 (laparoscopic) and those who had a metachronous hernia along with 36 bilateral cases have been accepted as Group 2 (clinical). In other words, bilateralism was determined by transinguinal laparoscopy in Group 1 and clinically in Group 2. All children in these groups were analyzed according to the side of hernia, age and gender.

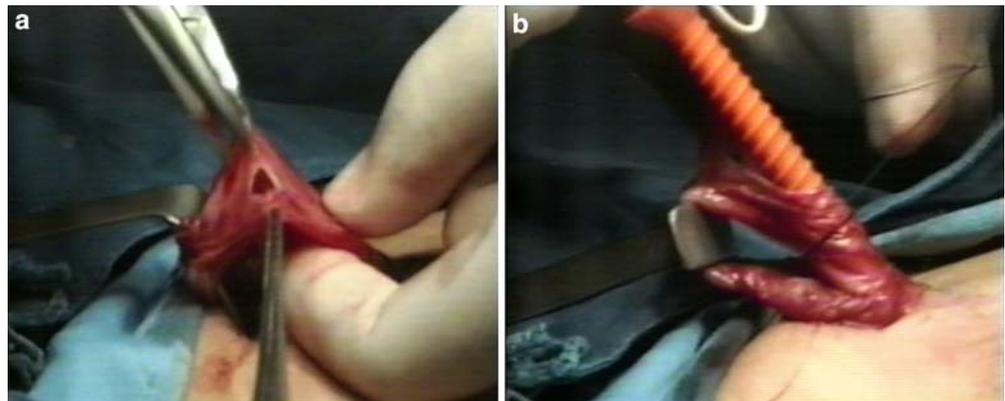
Statistical package for social sciences (SPSS) for windows 10.0 software package was used for the statistical analysis when the results were evaluated. During the evaluation of the study data, along with the descriptive statistical methods, parameters without normal distribution were evaluated using Mann–Whitney *U* analysis. The qualitative data were evaluated using chi-squared test. Significance was accepted as $P < 0.05$ levels.

Results

The overall patency rate was calculated as 19.4% (41 cases) in the transinguinal diagnostic laparoscopy group. A contralateral hernia sac was found in all cases with a detected CPPV, and repaired with open surgical technique. This reveals the positive predictive value of the technique as 100%. Thus, there were no false positive results. No anesthetic or surgical complications were noted. We were not able to perform diagnostic laparoscopy in 6 cases (2.7%) because of the aspect of hernia sac.

This technique added 7.58 ± 2.44 min to the real operation time. The mean duration of laparoscopy was particularly shorter in the latest cases. Mean duration of

Fig. 1 Transinguinal approach to the contralateral side in unilateral hernia repair. Following insertion of a reusable trocar through the ipsilateral hernial sac, the port is secured in place with a 0-silk suture. A 30° 5-mm laparoscope is used to assess the contralateral inguinal ring



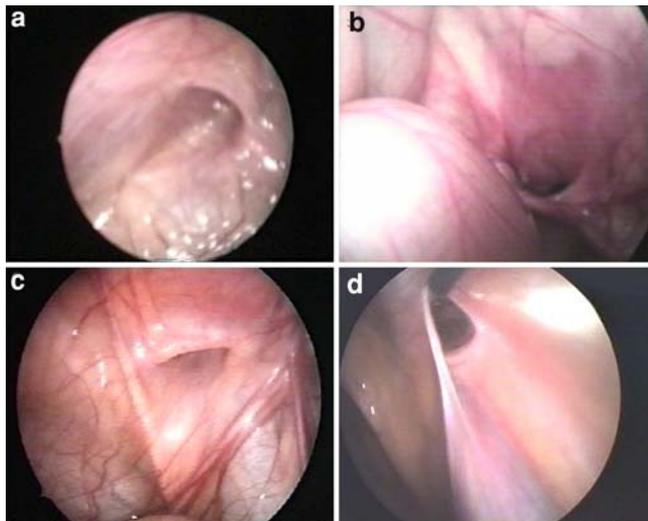


Fig. 2 Different views of a positive contralateral patent processus vaginalis. The presence of a significant peritoneal opening and absence of an identifiable termination were accepted as positive findings

bilateral operative time was longer in the CPPV-detected group, compared with the initial bilateral presentation group (61.94 ± 14.93 vs 53.33 ± 16.09 min). But, this was not statistically significant. Mean duration of unilateral operative time without diagnostic laparoscopy was calculated as 32 ± 10.24 min in our series. An imaginative doubling of this duration regarding a bilateral repair would be 64 min, which is still longer than the mean repair time for our CPPV-detected group.

The mean follow-up period was 36.7 months (2–74 months) in our series. No recurrence was noted in the initial bilateral presentation group and in the unilateral group who had undergone diagnostic laparoscopic evaluation. Three recurrences were observed out of 214 cases, which did not undergo diagnostic laparoscopic evaluation. These were observed on the left side presenting 5 days, 3 months and 2 years following the initial operation. Nine cases (4.2%) from this group presented later with a metachronous hernia (six boys and three girls). The mean detection time of a metachronous

hernia was 11 months (22 days to 18 months) following initial hernia repair. Thus, clinically detected bilateralism rate in our series was determined as 9.7% (36+9/497–36).

The presenting side of a clinically detected hernia had no influence on the rate of contralateral patency in the laparoscopy group. Right-sided hernias presented 20.5% (29 of 141) patency rate vs 17.1% (12 of 70) compared to the left. This concept was relevant for clinical evaluation group as well. A metachronous hernia was detected in 5.7% (4/70) of the right-sided hernias and in 3.4% (5/144) of the left.

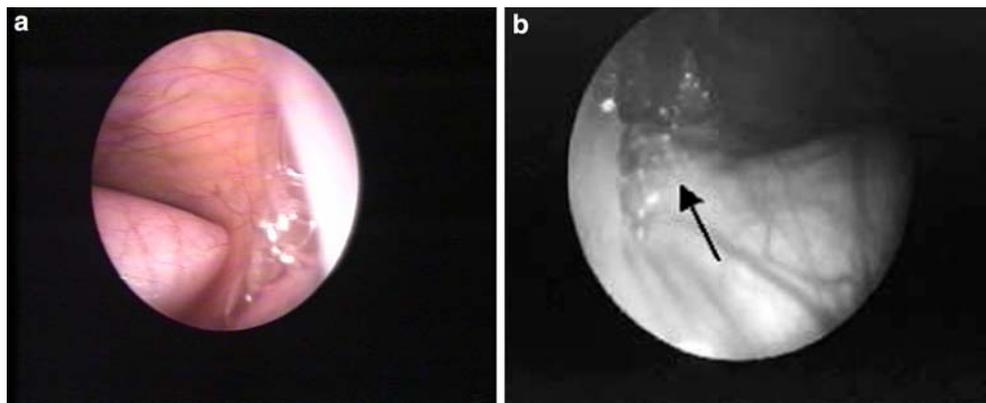
The rate of clinical or laparoscopic recognition of true bilateralism was at its peak in the 0–6 month age group. In this age group, the rate of detected bilateralism was significantly in favor of the clinically diagnosed group when compared to laparoscopy ($P=0.046$). In contrast, the percentage of bilateralism detected by diagnostic laparoscopy was higher for the remaining age groups when compared to clinical detection. The details are listed in Fig. 4.

There were 211 children (150 boys and 61 girls) in the diagnostic laparoscopy group. A total of 21 boys out of 150 (14%) and 20 girls out of 61 (32.7%) had CPPV. The rate of detected bilateralism with laparoscopy was higher in girls than boys and the difference was statistically significant ($P=0.002$). The rate of detected bilateralism under clinical examination was 8.4% for boys (33 out of 389) and 11.1% for girls (12 out of 108). This difference was statistically insignificant for the clinical group.

Discussion

The suggested techniques of diagnostic laparoscopy for evaluating a contralateral patency mainly include transinguinal approach or “in line” methods via an umbilical port or a lateral abdominal approach [4–6, 9, 12–14]. Schier et al. [14] advocates the umbilical approach as the most reliable technique. However, the need of an additional incision or a new hole in the abdominal wall and occasional inability to visualize the internal ring

Fig. 3 Bubbles (arrow) expressed from the internal ring under scrotal or inguinal compression is considered as a positive sign of a metachronous hernia



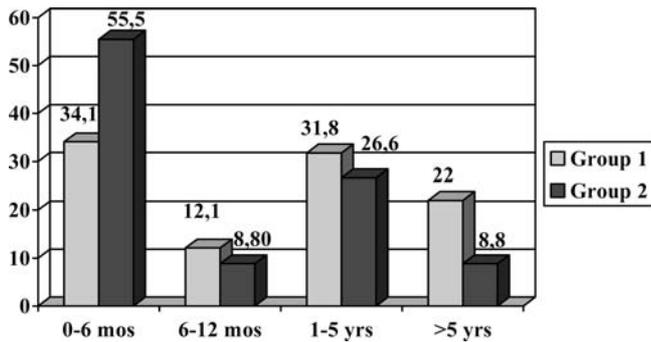


Fig. 4 The age distribution for group 1 (*patent processus vaginalis detected by laparoscopy*) and group 2 (*clinically detected bilateralism*) patients are indicated as percentages

because of distended bowel are noted as disadvantages for the various “in line” techniques in the literature [12, 15, 16]. In this series, we have successfully used the transinguinal approach for the evaluation of the contralateral side without any complications.

A variety of optics ranging from 1.2 to 10 mm is recommended in the literature [7, 12, 13]. We believe that a 5-mm 30° oblique optic is the most suitable tool for almost all age groups, regarding a published report on male newborn cadavers, which dictates the mean diameter of the internal ring as 5.9 mm [17]. The mean additional time for diagnostic laparoscopy in our series was less than 7.5 min and this was in accordance with the reported series [15]. This period includes all types of additional attempts in the preparation of the patient.

We could not perform diagnostic laparoscopy in 2.7% of the children because of a thin and fragile hernia sac. These were all premature or low-birth weight babies. Prematurity, presence of a low-inserting umbilicus and congenital heart disease are considered as contraindications in performing the “in line” technique [14]. A wide median umbilical ligament forming a peritoneal veil may occasionally preclude direct visualization of the contralateral ring. An initial insertion of the scope toward ipsilateral diaphragm and maneuvering around the “veil” with a 30° optic may usually overcome this technical difficulty.

There is a distinct difference among the incidence of a metachronous hernia (4.2%) and bilateralism (9.7%) when compared to the rate of CPPV (19.4%) in our series. It is obvious that CPPV and clinical hernia are not equivalent entities. The decision of repairing a CPPV that is most likely to develop a clinical hernia remains as an important point in clinical practice. Morphologic features of the internal ring such as measurement of sac depth was initially regarded as the criteria in determining a true patency. Fuenfer et al. [18] considered a processus vaginalis as a patent, if the depth exceeded 1.5 cm beyond the internal ring. However, reports from the adult laparoscopic experience demonstrate patients presenting with patencies larger than 3 cm without any clinical evidence [19]. Nixon et al. [20] documented marked variability of

morphology of the internal ring ranging from closed to a widely open hernia sac in a series of 1,500 children. They considered a processus vaginalis as a patent when no termination is visualized or when bubbles are expressed from the internal ring under scrotal or inguinal compression. In our study, we used the same criteria while demonstrating a patency.

Clinical features like the initial presenting side, age and gender are also taken into consideration as the diagnostic criteria in determining a possible metachronous hernia. The reported figures in the literature concerning the mentioned parameters are conflicting as well. Some report a higher incidence for left-sided hernias [7, 15, 21] while others report for right-sided [22–24]. The controversy is existent with regard to the presenting gender [6, 11, 24–26]. In our series, the incidence of a contralateral patency in the laparoscopy group was significantly higher for girls. We may conclude that boys are more likely to present with a clinical bilateral hernia when compared to girls. According to our results, initial presenting side of a hernia, however, is not a reliable parameter in determining a possible metachronous hernia.

Our study revealed that the overall rate of bilateralism among laparoscopy and clinical groups was very similar according to age groups. A bilateral presentation less than 6 months of age, however, was mostly diagnosed in the clinical group. Diagnostic laparoscopy proved as a more useful tool for patients over this age group. This in turn, might be a true clue that we are repairing more patencies than required. Since apart from the nine metachronous cases from the clinical group, there had to be more patients with a metachronous hernia, which did not come to light. Patients over 6 months of age with a CPPV may be less-potential candidates of a metachronous hernia.

Unlike a decade ago, diagnostic laparoscopy in children presenting with a unilateral hernia is now associated with decreased cost, morbidity and potentially less-serious complications. We may conclude that transinguinal diagnostic laparoscopy is a reliable and feasible technique and it does not add any considerable time to the mean operating time. Search for the potential candidate with a future metachronous hernia, already presenting with a CPPV has yet to be answered.

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