

Percutaneous internal ring suturing as a first choice laparoscopic inguinal hernia repair method in girls: a single-center study in 148 patients

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Abstract

Introduction We sought to retrospectively assess the operative findings and clinical outcomes of 148 girls who underwent laparoscopic inguinal hernia repair with the percutaneous internal ring suturing (PIRS) technique.

Methods Between 2010 and 2014, girls with inguinal hernia underwent surgery using the laparoscopic PIRS technique described by Patkowski. Demographic and perioperative findings, complications, and recurrences were evaluated.

Results A total of 205 inguinal hernia repairs were performed in 148 children with a mean age of 5.83 years (1 month–16 years). In 57 girls (38.5 %), the hernias were bilaterally repaired, while in 91 girls (61.5 %) hernias were unilaterally repaired. The mean follow-up time was 3.6 years (range 2.5–6.1 years). No serious complications or recurrence were noted. Granuloma occurred in one patient.

Conclusion The PIRS technique is a safe, simple and effective procedure for girls. Excellent cosmetic results and reduced recurrence rates are associated with this method. This procedure is particularly suitable for girls because they lack a spermatic cord and vascular structures that can

cause complications with this technique in boys. Based on our experience and others in the literature, we suggest that the PIRS procedure might be considered a gold standard for inguinal hernia operations in girls.

Keywords Inguinal hernia · Percutaneous internal ring suturing · Girls

Introduction

Congenital inguinal hernia repair remains the most common procedure performed by pediatric surgeons. Traditional open inguinal herniotomy is the universally preferred procedure for girls and boys in the case of an inguinal hernia [1, 2]. Recently, laparoscopic inguinal hernia repair has gained acceptance as a treatment in pediatric patients. Laparoscopic procedures have certain advantages, such as: the absence of inguinal incision; diagnosis of contralateral hidden hernia, which can be repaired during the same procedure; diagnosis of atypical hernia; and better cosmetic results [3]. Laparoscopic procedures are usually performed with two or three ports and require intraperitoneal suturing. The percutaneous internal ring closure suturing (PIRS) technique, described by Patkowski [4], is performed with one umbilical port and a puncture to the skin in the groin, with no need for intraperitoneal suturing and instruments. Even though the method has been reported to be safe and effective, there have been some doubts about the entrapment of spermatic cord within the internal cord's purse suture [5]. In this respect, we believe the method is safer in female patients. We present our experience and clinical outcome of the PIRS technique for inguinal hernia in girls.

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Patients and methods

Patient design

Female patients with inguinal hernias who were treated using the laparoscopic PIRS procedure between 2010 and 2014 are included in the study. We collected data with demographic and perioperative findings, complications and recurrence. All patients were preoperatively evaluated by an anesthesiologist. Patients with a history of prematurity were monitored for apnoea for 1 or 2 days postoperatively. All other patients were discharged the same day.

All surgeons performed PIRS in our clinic.

Operative technique

The PIRS procedure was performed under endotracheal anesthesia with muscle relaxation in the supine position. A pneumoperitoneum was formed with either a Hasson or Veress needle technique, depending on surgeon preference. A 5 mm reusable trocar was passed through the umbilicus on the abdominal wall. 5 mm telescope was used. Insufflation pressure was 8–10 mmHg, based on the patient's age. The entire peritoneal cavity was viewed and any hernia reduced manually or with the aid of the telescope tip. The location of the needle puncture was found by pressing the inguinal region from the outside with a forceps tip. To perform this technique under a laparoscopically guided view, a 21-gauge injection needle or a 16-gauge spinal catheter with non-absorbable 2-0 monofilament thread is introduced into the abdominal cavity throughout the peritoneum (Fig. 1). The needle is pulled out, leaving the loop of the thread inside the abdomen (Fig. 2). Then the needle (with suture passed through its barrel) is introduced again through the same skin puncture point, to surround the other half of the internal ring with part of the round ligament. The needle is passed into the loop and withdrawn after the suture is set forward. The loop is then pulled out of the abdomen, with the thread end caught by the loop. Using this manipulation, the suture is placed around the inguinal ring and both ends exit the skin through the same puncture. Then the knot is tied and the internal ring is obliterated. If another hernia is observed at the contralateral inguinal ring, the same procedure is repeated. The umbilical port entrance is closed with absorbable stitches and covered with pressure dressing. The skin puncture point is left undressed.

Results

A total of 205 inguinal hernia repairs were performed in 148 children with a mean age of 5.83 years (1 month–16 years). Preoperatively, 76 cases (51.3 %) had right side,



Fig. 1 Umbilical insertion of the telescope through 5 mm port and a 16-gauge spinal catheter with non-absorbable 2-0 monofilament thread is introduced into the abdominal cavity from the inguinal region

41 cases (27.7 %) left side, and 31 (20.9 %) cases bilateral hernia. However, in 57 of 148 girls (38.5 %), diagnosis of bilateral hernia was established perioperatively. In 26 of 148 (17.5 %) patients, contralateral hernia was visualized perioperatively and repaired. Among these 26 cases, 12 had a left and 14 had a right preoperative inguinal hernia diagnosis. During surgery, we observed that three patients' ovaries, two patients' *tuba uterina*, and one patient's *omentum* were sliding into hernia sacs. Incarcerated hernias were manually reduced with the tip of a telescope, and there was no need for an additional port with instruments. All procedures were completed with PIRS and organs were protected under direct laparoscopic vision. Four umbilical hernia repairs were performed synchronously. Bilateral cord cysts were operated at the same time using this method, and one of the hernias was repaired during a laparoscopic splenectomy and two during appendectomies.

There was no conversion to a classical open surgery technique in our series. In two patients, haematoma had developed near the internal inguinal ring, but the surgery was still completed laparoscopically. The median follow-up time was 3.6 years (range 2.5–6.1 years). No serious complications or recurrence were noted. Granuloma occurred in one patient on the umbilical site and left untreated. The postoperative appearance of the patients was scarless (Fig. 3).

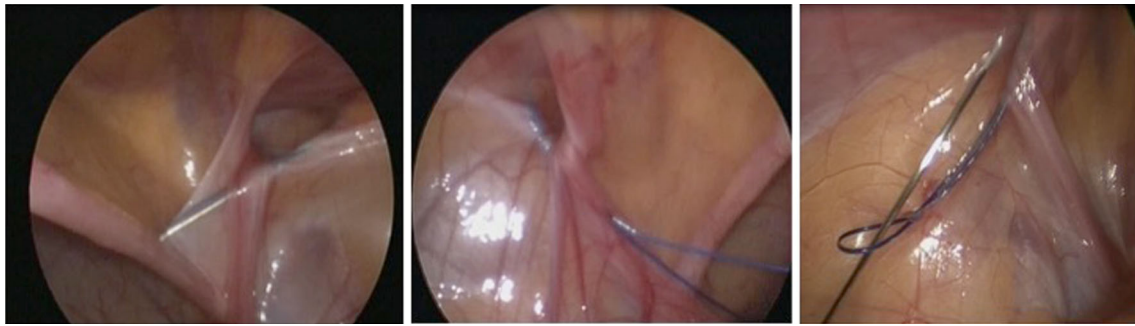


Fig. 2 **a** Laparoscopic view of the right inguinal region (16-gauge spinal catheter is introduced to the peritoneal cavity). **b** Laparoscopic view of the right inguinal region (loop introduced into the peritoneal

cavity from the medial aspect of the internal ring). **c** Laparoscopic view of the right inguinal region (another suture introduced into the peritoneal cavity through the loop)



Fig. 3 Postoperative view

Two patients subsequently underwent surgery with preoperative diagnosis of recurrent hernia 6 and 8 months post operatively, respectively. Their families complained post operatively about a suspicious lump in the incision area. To rule out the risk of recurrence, we planned a laparoscopic exploration. As closed internal inguinal rings were observed in a second laparoscopy in both patients, these cases were not counted as recurrences.

In one of the patients who underwent surgery for a unilateral hernia, a bilateral hernia was diagnosed during the laparoscopy.

Discussion

Inguinal hernia operations are, like other surgical procedures, affected by recent innovations in surgery. Laparoscopic inguinal hernia repair produces much better cosmetic results than open repair and relatively lower recurrence rates in experienced hands [6]. In addition, laparoscopic hernia repair has the advantage of assisting in the diagnosis of bilateral hernias, and it also provides better and less complicated surgeries in recurrent hernias by avoiding entering the inguinal canal which has become fibrotic due to past operation [7].

In particular, single incision laparoscopy with the extracorporeal knot closure technique, such as the PIRS technique described by Patkowski, has gained recent popularity [4, 8]. The repair of an inguinal hernia with a small single umbilical incision is valued for its good cosmetic result and fast recovery. The method’s critics are concerned with the potential entrapment of spermatic cord structures within the knot. However, we propose the use of this extracorporeal method particularly in girls, due to its cosmesis and absence of cord structures.

Many different techniques have been proposed for laparoscopic inguinal hernia repair, either to make the operation easier, or to decrease the complication rate. The PIRS technique was the simplest and quickest method, based on our experience of using the three different techniques [9]. The two other techniques depend on intracorporeal closure of the inguinal ring and require two additional port introductions. Montupet et al. performed laparoscopic repair of the internal ring, but in their technique, they excised the hernia sac laparoscopically before the application of the purse suture [10]. Schier et al. offered a relatively easier method without the excision of the hernia sac. They placed an intracorporeal ‘N’ or ‘S’-shaped suture for the closure of the internal ring [11].

The PIRS technique is also demonstrated and modified by many surgeons [12, 13]. Takehara et al. reported a series of 972 laparoscopic percutaneous extracorporeal ring closures, in which they found the method reliable and safe [14].

The PIRS method may be advantageous for its shorter operative time, lower expense, and minimal scarring, and has a steeper learning curve. Ligation of the suture intracorporeally is a relatively difficult procedure that prolongs the operation time compared to an extracorporeal knot [11]. Since the knot is extracorporeal in the PIRS technique, the method is relatively fast in experienced hands [15]. The most dangerous aspect of percutaneous closure of the internal ring is the risk of entrapment of spermatic cord structures [16]. Therefore, the usage of the method is absolutely safe in girls. A particular advantage of the method is the very low recurrence rate reported in many studies [17]. In our series, there was no recurrence.

Circumferential suturing around the inguinal ring is easy and effective. During laparoscopy, the diagnosis of hernia could be confirmed and any misdiagnosis could be corrected during the operation. In our series, the frequency of bilaterality (57 in 148, 38.5 %) was higher than the frequency in the preoperative stage diagnosis (31 in 148 patients, 20.9 %). Toufique Ehsan et al. have previously reported this advantage of laparoscopic hernia [18]. Rare inguinal hernias and incarcerated hernias can also be diagnosed by the laparoscopic approach and be repaired using this method [19].

It takes a relatively short learning time for the surgeon to be confident with the technique [20]. One of the limitations of our study is not evaluating the operation times. The disadvantage of our study is its relatively short follow-up period. But our series consists of only girl patients; thus, our cohort is homogeneous.

As a laparoscopic hernia repair method, PIRS is fast, safe, effective and reliable, with low recurrence rates in girls. Since the need for the preservation of cord structures is absent, it can be performed very quickly. Its scarless cosmetic results are excellent. We recommend that it should be the first choice of laparoscopic inguinal hernia repair method in girls for all surgeons with a basic laparoscopic experience.

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