Laparoscopic inguinal hernia inversion and ligation in female children: a review of 173 consecutive cases at a single institution

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Abstract

Purpose: Laparoscopic inguinal hernia inversion and ligation (LIHIL) is a method of hernia repair in which the hernia sac is inverted into the peritoneal cavity and subsequently ligated and excised. Since 2003, 5 surgeons at our institution have been performing LIHIL in girls.

Methods: A retrospective review of inguinal hernias in girls from 2003 to 2009 was performed.

Results: Two hundred forty-one LIHILs were performed on 173 girls. The average age of children undergoing LIHIL was 57 months (range, 1-210 months). Fifteen cases were ex-premature babies (8.7%). Of the unilateral inguinal hernias, 34% were found to have bilateral hernias intraoperatively, and these were repaired at the same operation. There have been no intraoperative complications. Postoperatively, there have been no wound complications and 2 recurrences (0.83%). Both recurrences were repaired using an open technique.

Conclusions: Laparoscopic inguinal hernia inversion and ligation is a safe and effective operation in girls with a low recurrence rate. Benefits of this procedure include diagnosis and repair of the contralateral side using the same incisions, diagnosis of androgen insensitivity and other dysgenic situations, and excellent cosmesis. This operation is a straightforward technique that can be performed by most pediatric surgeons with basic laparoscopic skills.

Inguinal hernia repair is the most common operation performed by pediatric surgeons [1]. The traditional operation uses a groin incision and high ligation of the hernia sac [2]. Although several minimally invasive surgery approaches have been described to repair pediatric inguinal hernias [3], there is no single laparoscopic approach that has replaced the traditional repair, in contrast to a variety of other common pediatric conditions [4,5]. Laparoscopic inguinal hernia inversion and ligation (LIHIL) is a method of pediatric female hernia repair that was first described in the literature in 1997 [6] and again reported in a small series in 2007 [7]. We described our initial experience with this procedure in 14
patients in a poster at IPEG in 2004 [8]. Since 2003, 5 surgeons at our institution have been performing LIHIL in girls who presented with inguinal hernias.

1. Methods

The operation is performed with a 5-mm, 30° laparoscope inserted through a trocar that is placed directly through the base of the umbilicus, so that incision is completely hidden. Two 2.7-mm instruments are inserted directly through stab wounds in upper flanks (Fig. 1). All incisions are infiltrated with 0.25% or 0.5% bupivacaine solution. The pelvis is carefully inspected. The uterus is identified, and the inguinal rings are evaluated (Fig. 2A). If a contralateral hernia is identified, it can be repaired at the same time with only a few minutes added to the procedure and no additional incisions. Once the anatomy is defined, a 2.7-mm grasper is introduced through the ipsilateral stab incision. This grasper is placed into the hernia, and the very distal end of the sac is grasped and inverted into the abdominal cavity (Fig. 2B). The distal attachments of the round ligament to the labia are disrupted with blunt traction as the sac is inverted. In cases in which the fallopian tube is near or in the hernia sac, it can be freed up using a combination of blunt and sharp dissection. The ipsilateral ovary is exposed to confirm that it is both not involved in the hernia and to rule out androgen insensitivity and other dysgenic syndromes. In the case of an incarcerated ovary, it can usually be reduced laparoscopically during the inversion by applying external pressure on the groin. The final portion of the operation is the ligation and resection of the hernia sac. A 0-PDS endoscopic loop with a pretied knot (PDSII Endoloop; Ethicon Inc, Somerville, NJ) is inserted through the contralateral stab incision with the aid of a Maryland dissector. The ipsilateral grasper is passed through the loop, and the hernia is regrasped and twisted to create a neck at the base of the sac. The hernia sac is then ligated at its base (Fig. 2C). A second loop is placed to doubly ligate the sac, which is then excised and removed through one of the stab incisions (Fig. 2D).

After institutional review board approval, a retrospective chart review of all inguinal hernia repairs in girls at Schneider Children’s Hospital (New Hyde Park, NY) from 2003 to 2009 was performed. Demographic, preoperative, intraoperative, and postoperative data were collected and analyzed. Statistical analysis was performed using the unpaired Student’s t test.

2. Results

Overall, 264 girls underwent inguinal hernia repair (173 LIHIL, 91 open). Accounting for bilaterality, 241 LIHILs were performed in 173 girls. Five pediatric surgeons performed the operation in an identical manner. Babies who could not tolerate pneumoperitoneum were excluded. The average age of children undergoing LIHIL was 57 months (range, 1-210 months). There was a bimodal distribution, with peaks at 0 to 6 months and 4 to 6 years. Fifteen girls were ex-premature infants (8.7%). The operation on premature infants was performed in an identical manner to the previously described technique.

At diagnosis, 156 girls (90%) appeared to have unilateral hernias, 15 (9%) had bilateral hernias and 2 children (1%) were undergoing other laparoscopic procedures and found to have inguinal hernias that were repaired at the same time. Ten children had preoperative evidence of incarceration; all of the other children had reducible groin masses.

Intraoperatively, 34% of the clinical unilateral inguinal hernias were found to have a contralateral patent processus vaginalis (CPPV) or contralateral inguinal hernia, and all of these were repaired during the same operation using the same incisions. The average operating time overall was 37 minutes (±10 minutes). The difference in time for unilateral and bilateral repairs was approximately 8 minutes, which was statistically significant (33.9 ± 7.8 minutes vs 41.9 ± 11.6 minutes; \( P < .001 \)). The average operating time for ex-premature infants was 49.5 ± 19.5 minutes, which was significantly longer than for full-term children \( (P = .003) \). There have been no intraoperative complications, and the estimated blood loss was less than 5 mL in all cases. Seventeen patients (9.8%) had a sliding component to their hernias and required dissection of the fallopian tube from the hernia sac. Thirteen girls had incarcerated ovaries (7.5%). Three (1.7%) of these cases required conversion to an open repair. All ovaries were viable. The presence of an incarcerated ovary led to a significant increase in the time of the operation (37.1 ± 10.2 minutes vs 57.3 ± 19 minutes; \( P < .001 \)). There were no other conversions to an open procedure.

Postoperatively, 157 (91%) of the girls were discharged on the day of the operation. Sixteen patients were admitted for one night for apnea monitoring, observation for other
comorbidities, or resolution of preoperative symptoms. There have been no wound complications and 2 recurrences (0.83%). Both recurrences were repaired using an open technique.

3. Discussion

Inguinal hernia repair is the most common operation performed by pediatric surgeons, constituting more than 15% of total cases [1]. The standard repair in females involves a small groin incision on the affected side, with or without incision of the external oblique muscle and opening of the external ring, dissection of the hernia sac, and high ligation and excision of the sac [2]. Reconstruction of the inguinal ring is not routinely necessary [9].

Laparoscopic repair of inguinal hernias in adults is well established [10,11]. Advantages include less pain, earlier return to work, repair of bilateral hernias through the same incisions, and easier repair of recurrent hernias [10,11]. Because many adult hernias are direct inguinal hernias or involve weakness of the floor of the inguinal canal, established laparoscopic inguinal hernia repairs described in the adult literature are not appropriate for pediatric inguinal hernias. Many minimally invasive approaches have been proposed for pediatric inguinal hernia repair, including high ligation with or without dissection of the internal ring (using intracorporeal/extracorporeal suturing and/or endolooping) [6,7,12-17], subcutaneous endoscopically assisted ligation [18], and percutaneous internal ring suturing [19]. A minimally invasive surgical approach for the repair of pediatric inguinal hernias has yet to become the procedure of choice in most institutions. In the open operation, the incisions are small, the operation is easy, and there is a low cost, with minimal postoperative pain [2]. In addition, current laparoscopic approaches have a troubling rate of recurrence [20,21] and a prolonged learning curve. There is also justifiable concern that the spermatic cord structures cannot be protected as well as in the open approach [9]. Female pediatric inguinal hernias are inherently simpler to repair because there is no need to dissect and protect the structures in the spermatic cord [2].

Fig. 2 The hernia is identified (A) and inverted in the peritoneal cavity (B). It is then twisted and double ligated with endoscopic loop ties (C) and subsequently excised (D).
In 1997, El-Gohary [6] described a technique of laparoscopic inguinal hernia repair in girls involving inversion of the hernia sac into the abdominal cavity and endoscopic loop tie placement at the base of the inverted sac. His original description of the procedure used three 5-mm ports. El-Gohary [6] reported no complications in 28 patients, 11% contralateral patency, and 1 recurrence. Two of this article’s authors reported our initial experience in a poster and abstract at the 13th Annual Congress for Endosurgery in Children in Maui, Hawaii, in 2004 [8]. Zallen and Glick [7], in 2007, reported 37 cases of laparoscopic inguinal hernia inversion and ligation in girls using one 5-mm port and two 3-mm stab incisions. There were no complications or recurrences in this series [7]. It is unclear how many pediatric surgeons around the world have adopted this approach for female pediatric hernias. At our institution, 5 pediatric surgeons have been using this approach in all female pediatric hernias since 2003, with the exception of children who have substantive contraindications to pneumoperitoneum. We have performed 241 LIHILs in 173 girls for the past 5 years. We have had no intraoperative complications, and our recurrence rate (0.83%) is comparable to the recurrence rate reported in most large series of open inguinal hernia repairs [2,9]. In addition, LIHIL has not added time to the operation, especially in cases of bilateral hernias.

There may be some benefits of this operation as compared to the open approach. First, the ability to easily diagnose and treat a CPPV is obvious. Using the LIHIL approach, these defects were easily repaired at the same operation without additional incisions and with minimal additional time (7 minutes). An alternative method of assessing for CPPV is using transinguinal diagnostic laparoscopy with an angled scope [22,23]. Although this method can be useful to diagnose a CPPV, there is occasionally a peritoneal fold on the medial side of the inguinal ring that obscures the view when using a 70° laparoscope from the contralateral side, thus, causing the transinguinal diagnostic laparoscopy to be nondiagnostic. In addition, if a CPPV is encountered, a contralateral incision is required.

A second benefit of LIHIL is the ability to diagnose androgen insensitivity and other dysgenetic syndromes. There is a slightly higher incidence of these conditions in girls with inguinal hernias [24,25], and LIHIL allows for careful inspection of the uterus, ovaries, and fallopian tubes. In 2 cases in our series, abnormalities of the reproductive organs were encountered (one case with a right hemiuterus with no uterus on the left side and a streak left Fallopian tube; one case with the left Fallopian tube not connected to the uterus) and followed up accordingly.

One of the major setbacks of laparoscopic inguinal hernia repairs in children has been the troubling rate of recurrences [20,21]. This is unacceptable as open inguinal hernia repairs have a very low recurrence rate (<1%) [2,9]. We have had only 2 recurrences, and one of these occurred very early in our series. At that time, we were not routinely excising the hernia sac. Since then, we routinely excise the hernia sac, which may limit recurrences.

4. Conclusions

Laparoscopic inguinal hernia inversion and ligation in female children is safe and effective. Benefits of this operation are the ability to easily diagnose and treat a CPPV and to diagnose androgen insensitivity. We use this approach at our institution for most girls with inguinal hernias and have found it to be a straightforward procedure with minimal complications, a low recurrence rate, and excellent cosmetic.

References


