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Original Article

Evaluation of Initial Results of Laparoscopic Inguinal Hernia Repair in Children at Vietduc University Hospital

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Abstract

Objective: **To evaluate the early outcomes of totally intra-peritoneal laparoscopic inguinal hernia repair in children by stitching herniated sac in the deep inguinal orifice at VietDuc university hospital.**

Materials and Methods: **Prospective and retrospective study, 153 patients over 2 years old that were diagnosed with inguinal hernia based on clinical symptoms and ultrasound and treated with laparoscopic technique that use 3 trocars (1 trocar 5mm, 2 trocars 3mm) to stitch hernia sac in the deep inguinal orifice at VietDuc university hospital from January 2017 to June 2018.**

Results: **In 153 patients: 10 bilateral hernias (6.5%), 31 unilateral hernias were diagnosed with contralateral hernia by laparoscopic (20.3%), 112 unilateral hernias (73.2%). The mean surgical time was 25.2 minutes (30.1 minutes with bilateral hernia, 22.9 minutes with unilateral hernia). Hospital stay duration 1.6 day. No case of surgical catastrophe. Post-operation: 2 patients were bleeding in position of the umbilical trocar and 3 patients were mild swelling of the groin, scrotum. Post-operation follow-up 3 months: no recurrence, no testicular atrophy.**

Conclusion: **Laparoscopy that use trocar 3mm to treat inguinal hernia in children is safe, feasible, effective methods. The opportunity to diagnose a bilateral hernia when non-diagnosed before surgery, or in case of recurrence after an inguinal approach, are the main advantages for laparoscopy.**

Keywords: **Pediatric inguinal hernia, laparoscopic inguinal hernia**

Introduction

Pediatric inguinal hernia is one of the most common diseases encountered by pediatric surgeons. Surgical management of pediatric inguinal hernia (PIH) including exposing the herniated materials and tying off the processus vaginalis at deep inguinal ring level. To do this, there are 2 surgical methods: open surgery and laparoscopic surgery. In the recent 20 years, laparoscopic surgery has become common. Many studies have reported several advantages of the laparoscopic procedure over the open one, i.e. the ability to assess the contralateral deep inguinal ring, and the ability to close the unclosed contralateral deep inguinal ring in the same phase[1,2]. This helps reducing

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the rate of recurrence after open repair of inguinal hernia. In Vietnam, laparoscopic repair of PIH has been performed at several pediatric surgical centers, but there has not been any study yet to assess the result of this method. Thus, we report our experience in this topic using the preliminary assessment of the laparoscopic repair of pediatric inguinal hernia.

Materails and Methods

Subjects

This study was performed at Department of Pediatric and Neonatal Surgery, VietDuc University Hospital, from January 2017 to June 2018. In this period, 153 children were diagnosed with PIH and were treated with laparoscopic repair. Most patients were discharged 1 day after the procedure. We then set up appointment for reassessment after 3 months.

Surgery technique

The technique of the repair is as follows: the laparoscopic repair is done under general anesthesia. 3 trocars are inserted: a 5mm one is inserted through the umbilicus, two 3mm ones are inserted at the left and right subcostal regions. The abdominal cavity is then insufflated with CO_2 at a pressure of 6 - 10mmHg.

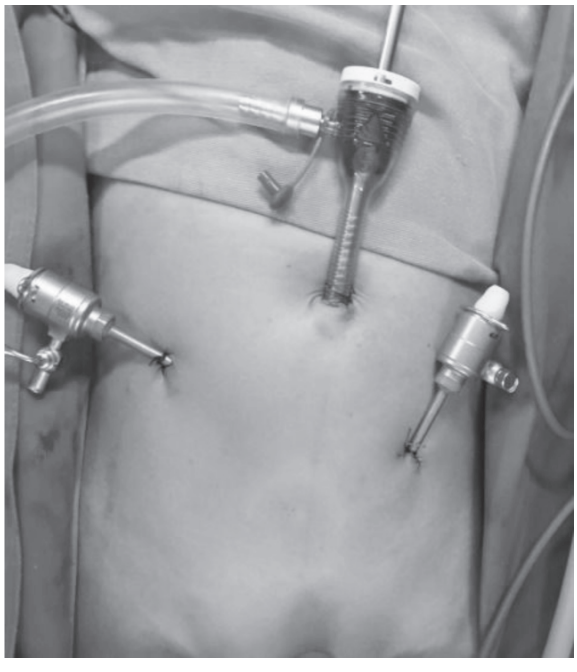


Figure 1 Placement of trocars

Assess the contralateral deep inguinal ring. Use dissecting clamp to pull the hernia sac into the abdominal cavity, and open the peritoneum at the deep inguinal ring.

In male patients, dissect and free the peritoneum at the deep inguinal ring from the testicular vessels, then cut the hernia sac. In female patients, after pulling the hernia sac (Canal of Nuck) into the abdominal cavity, use monopolar electrocautery for hemostasis, and also cut the hernia sac.

A needle is inserted into the abdominal cavity directly through the skin. A Z-stitch suture is used to tie the peritoneum at the deep inguinal ring intraabdominally. If the contralateral deep inguinal ring is not closed yet, the similar technique is applied to that side.

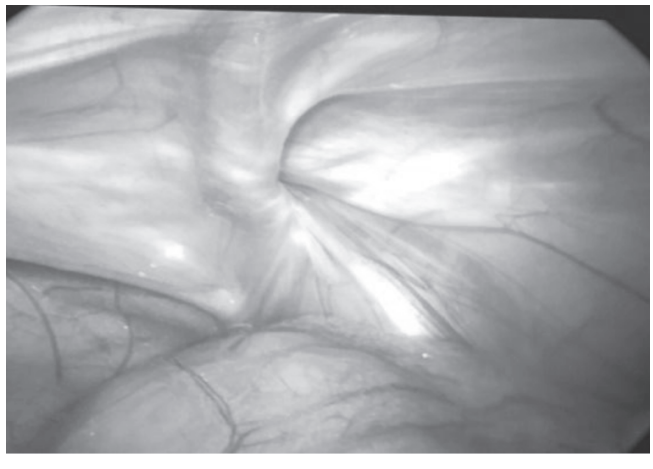


Figure 2 Right hernia ring

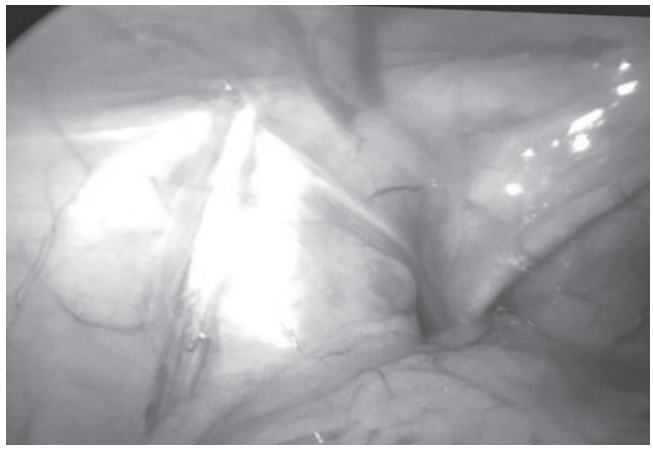


Figure 3 Closed contralateral deep inguinal ring

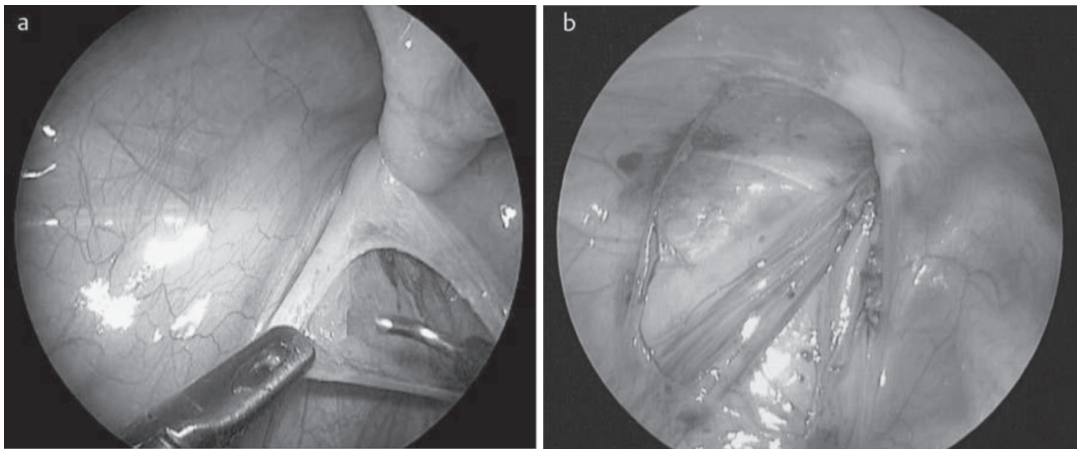


Figure 4 Dissecting and freeing the peritoneum through laparoscopy

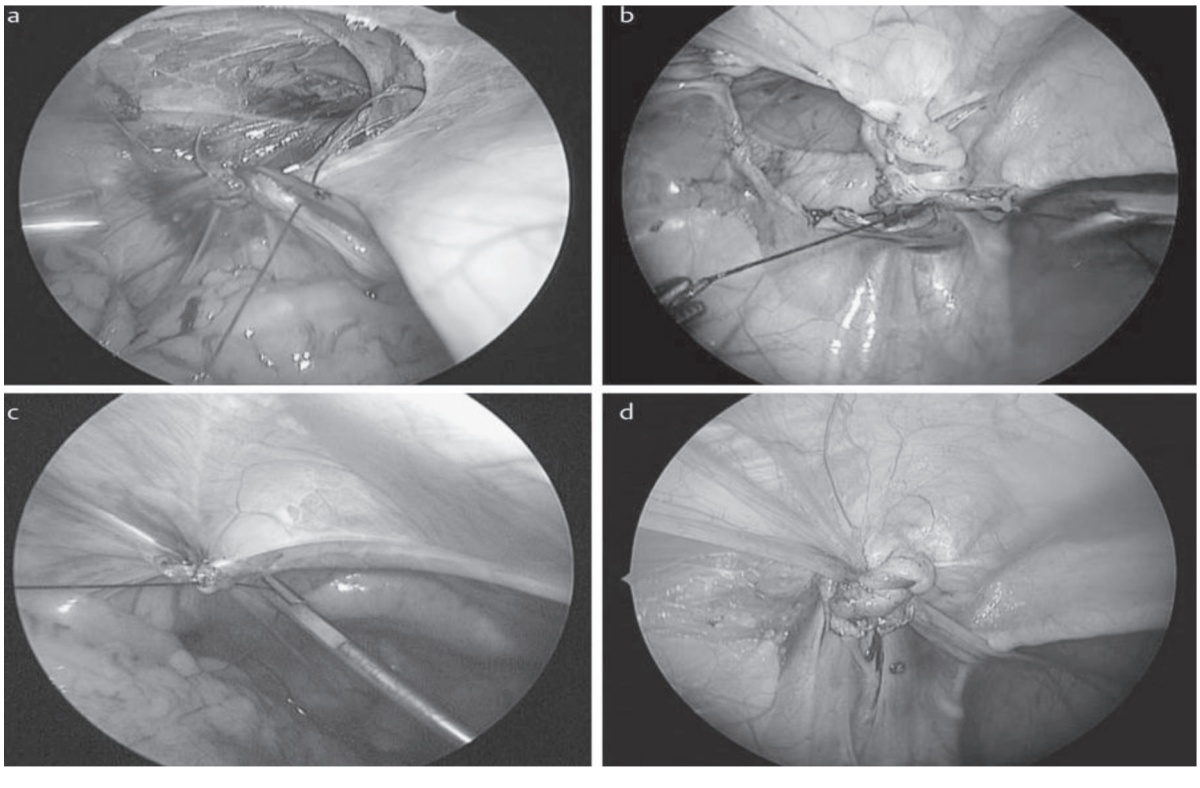


Figure 5 Stitching the peritoneum through laparoscopy

Results

153 patients received the repair, including 102 boys (66.7%) and 51 girls (33.3%). 10 patients with bilateral PIH (accounting for 6.5%) were diagnosed pre-operatively, while 31 patients were diagnosed with bilateral PIH during the surgery (accounting for 20.3%) and received the repair in the same phase. 34 patients (73.2%) had unilateral PIH. Their age ranged from 2 to 10 years old, with an average age of 4.8. 100% of the patients were diagnosed with indirect inguinal hernia, and none was diagnosed with direct inguinal hernia or femoral hernia. The average duration of surgery for the unilateral group is 22.9 minutes (24.4 minutes for boys, and 20.3 minutes for girls), and the average duration for the bilateral group and the unilateral group with open contralateral deep inguinal ring is

30.2 minutes (33.1 minutes for boys, and 27.6 minutes for girls). There was no complication during surgery. The normal time for recovery is 1 day, and the average length of hospital stay is 1.6 days. After the operation, 2 patients had bleeding from the umbilical port, and 3 male patients had mild swelling in the scrotum region. Follow-up in 3 month after surgery, no patient had recurrent inguinal hernia, testicular atrophy or persistent infection of surgical site.

Discussion

a. Diagnostic laparoscopy

Inguinal hernia is one of the most common pediatric diseases, accounting for 1 to 4% of all children who received surgery. In the newborns and young children, the risk of incarcerated inguinal hernia is 31% (usually occurs when the children reach a few month of age), posing danger for their intestines and testicles[3]. Thus, inguinal hernia repair is recommended as soon as possible after the diagnosis. Moreover, the rate of contralateral inguinal hernia after open surgery can be assessed earlier with laparoscopic surgery, and perioperative assessment of the contralateral inguinal ring and the existence of the contralateral processus vaginalis. The rate of open deep inguinal ring in patients with unilateral inguinal hernia was reported from 31% to 48%[4,5]. In our study, this rate is 20.3%.

Apart from the ability to detect the existence of the contralateral processus vaginalis, the laparoscopic approach has more benefit over the traditional open method in correctly assessing the anatomy of the groin region, detecting direct inguinal hernia, femoral hernia or the combination of multiple types of hernia[6,7]. Another advantage of this method is leaving the vas deferens and the testicular vessels intact, especially when the patients had recurrent inguinal hernia after a previous open surgery. In the case of recurrent inguinal hernia, this method helps both in its diagnosis and treatment.

b. Laparoscopic treatment

When assessing the feasibility of laparoscopic surgery in comparison with open surgery, regarding to the operate time, 2 studies have pointed out that the length of surgery for both laparoscopic and open repair is the same[8]. Chan and Tam[9] with single-blind comparison has reported that the duration of the laparoscopic repair is shorter than the open one .

The advantage of laparoscopic surgery is to help the surgeon detect the existence of the contralateral processus vaginalis through assessing the width and depth of the processus vaginalis. Many studies has shown the existence of the contralateral processus vaginalis through laparoscopy[10]. The question is, when to treat the contralateral processus vaginalis. Koivusalo[2] stated that the repair should only be done in the presence of symptoms. However, in the study of Koivusalo, the average age is from 7 months to 15 years old. Sachs[11] argued that the processus vaginalis remained opened in 57% of children from 4 months to 1 year old. According to F. Becmeur[1], in the newborns and the breastfeeding children, the deep and superficial inguinal ring is almost overlapped. Thus, dissecting the deep inguinal ring in this age can easily damage the superficial inguinal ring and other components in the inguinal canal. After 2 years old, when the child can walk easily, the two inguinal rings move apart, it would be clearer to dissect the peritoneum at the neck of the hernia sac. For these reasons, in our study, the existence of the contralateral processus vaginalis account for 20.3%, and we decided to repair immediately.

Nowadays, the laparoscopic repair including intraperitoneal, extraperitoneal and a combination of both approaches. We chose the intraperitoneal approach. Dissecting the peritoneum at the neck of the sac, freeing the peritoneum from the vas deferens and the testicular vessels and closing the peritoneum with non-absorbable stitches. Using non-absorbable stitches is one of the reasons causing post-operative recurrence. Parelka[12] who reported 437 children underwent laparoscopic inguinal hernia repair, argued that one of the reasons causing post-operative recurrence in his 14 patients is because of non-absorbable stitches. Thus, we used only non-absorbable stitches. When dissecting the peritoneum, we prefer dissecting scissor over monopolar electrocautery hook, to avoid thermal damage to the testicular vessels. When cutting the peritoneum, to avoid cutting the vas deferens and the testicular vessels, we lifted the peritoneum at the neck of the sac. By dissecting the peritoneum and closing the peritoneum at deep inguinal ring, the hernia can be fixed successfully without causing damage to components of the inguinal

canal, unlike open surgery.

Moreover, laparoscopic repair allows diagnosing and treating congenital malformations of the reproductive system in those with sex chromosomal abnormalities[10], treating undescended testicles in combination with inguinal hernia[13]. Furthermore, laparoscopy is also very useful to those with recurrent hernia. After an open surgery, scar tissue forms in the inguinal canal, and if another open surgery is performed, the risk of damaging the testicular vessels and the vas deferens is higher. When performing laparoscopic procedure, especially the intraperitoneal one, it is easier to dissect the neck of the sac from the testicular vessels, reducing the risk of damaging these structures.

After 3-month post-operative follow-up, we have not found any case with recurrent inguinal hernia, testicle atrophy or persistent infection of the surgical site. Furthermore, all patients and their families are very satisfied with the result of the repair.

Conclusion

Laparoscopic repair of pediatric inguinal hernia is a safe, effective and feasible, and it can be easily done in pediatric surgical centers. Intraperitoneal laparoscopic technique can be performed by dissecting the peritoneum and closing the peritoneum at the neck of the hernia sac. The operating duration, the post-operative period and the result of the surgery is the same as the open procedure. However, compared with open surgery, laparoscopic surgery has more advantages in assessing the existence of the contralateral processus vaginalis, deciding whether the contralateral repair can be done in the same phase, making proper anatomical assessment and detecting other congenital malformations of the reproductive system. Furthermore, laparoscopic surgery is more advantageous in diagnosing and repairing recurrent hernia. Long-term follow-up will be needed to accurately determine the rate of recurrent inguinal hernia.

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