



ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

The laparoscopic repair of inguinal hernia in female children in the Republic of North Macedonia

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SUMMARY

Introduction/Objective Laparoscopic inguinal hernia repair in children is a minimally invasive method, and with its safety, feasibility, and excellent cosmesis is an acceptable alternative to open repair.

Methods This is a prospective clinical study, with national data of 49 female children aged 1–14 years, treated via laparoscopic approach. Operative time, time to verticalization (normal position in bed, standing/walking), hospital stay, nausea, pain, and cosmetic effects (size and visibility of the mark) were elaborated.

Results The results revealed that five (10.2%) children had a family history of inguinal hernia. A total of 29 (59.2%) children had hernia located on the right side, 19 (38.8%) on the left side, and one (2%) on both sides. The average diameter of the inguinal opening was 3 ± 2.17 cm. Sixteen children (32.7%) had hidden hernia. The average operation time of the unilateral intervention was 29.5 ± 6.8 minutes, and for bilateral hernias it was 43.6 ± 7.2 minutes. The average length of hospitalization was 14.1 ± 3.1 hours, and the time needed for a full return to a normal position in bed was 2.6 ± 0.6 hours. The average length of the scar in both the right and the left groin region was 2.2 ± 0.4 mm. A total of 46 (93.9%) parents/guardians were satisfied by the esthetic result, while three (6.1%) had no particular opinion regarding this question.

Conclusion The introduction of laparoscopic surgery in the treatment of inguinal hernia is a promising method, which plays an important role as an alternative surgical technique because of the minimal invasiveness of the technique and improved recovery of the children.

Keywords: children's inguinal hernia; PIRS – percutaneous internal ring suturing; minimally invasive surgery

INTRODUCTION

Inguinal hernia is far more common in males [1, 2, 3]. Available data suggest that the overall incidence of inguinal hernias in childhood ranges 0.8–4.4% (to more than 30% in infants born preterm), with the incidence in boys being 10 times higher compared to girls. Similarly, a study of almost 80,000 children in the USA showed that the cumulative incidence of inguinal hernia from birth to the age of 15 was 6.62% in males and 0.74% in females [4, 5].

Surgery is required for almost all pediatric patients with inguinal hernia. Unlike hernias in adults, hernias in children are treated when they are diagnosed, even if they are asymptomatic. It is the most common surgical procedure in children that makes up more than 95% of treatments of all hernias [6, 7]. Operation prevents the occurrence of complications, such as incarceration and obstruction, which may potentially result in ischemia and necrosis of the hernia content. In comparison with boys, girls with inguinal hernia, whose content are ovaries and Fallopian tubes, are at risk of compression or torsion of the gonadal structures, which leads to ovarian ischemic stroke [8].

The golden standard for treatment of inguinal hernia is open herniotomy and herniorrhaphy, a procedure with a high rate of success

and a relatively low rate of complications [6]. Still, inguinal hernia treatment has achieved great advancements over the centuries [6]. The introduction of laparoscopic surgical treatment for inguinal hernia, first performed in 1993 and 1994, seems to play a significant role in terms of safety, visibility, as well as simultaneous treatment of the contralateral side, and a better esthetic result [9].

The trend has been turned towards the application of laparoscopic techniques with a rapid movement forward and a number of different laparoscopic techniques, an upward trend of the use of extracorporeal knotting and a decrease of the use of working ports and endoscopic instruments, as alternatives to open surgery [10–16].

The laparoscopically assisted technique of percutaneous internal ring suturing with one port, was initially introduced by Patkowski in 2004, as a minimally invasive method with a high success rate and rare complications [17].

It seems that among numerous techniques for treatment of inguinal hernias during childhood in the last decade, the one-port laparoscopic technique of internal ring suturing represents a very competitive achievement regarding this issue [18, 19].

The aim of this study was to present the national experience of the Republic of North

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Macedonia in laparoscopic (percutaneous internal ring suturing – PIRS) repair of inguinal hernia in female children.

METHODS

The analysis represents a prospective clinical study, which has elaborated national data of 49 female children 1–14 years old, with clinically diagnosed indirect inguinal hernia treated by laparoscopic PIRS. The study was carried out at the University Clinic for Pediatric Surgery, Ss. Cyril and Methodius University, Skopje, Republic of North Macedonia – as the single national center for laparoscopic (PIRS) repair. We started to implement this technique during 2015, as the only institution where the PIRS treatment of clinically diagnosed indirect inguinal hernia of female children was performed.

The PIRS method we used had been introduced by Patkowski and involves the percutaneous closure of the internal inguinal ring under the control of a telescope placed in the umbilicus. The telescope was used to control all procedures, with optics of 5 mm, and an angle of view of 30°.

The insufflation pressure in the peritoneal cavity was maintained at 8–10 mmHg. The internal ring of the inguinal canal was closed using non-absorbable 2-0 monofilament sutures. The wound in the umbilicus was closed using absorbable 3-0 sutures, and the skin was closed with non-absorbable 4-0 or 5-0 monofilament sutures. The patient condition allowed discharge on the first postoperative day.

The study covered all national cases of interest during the period between 2015 and 2017. We elaborated the operative time, time to verticalization (normal position in bed, standing/walking), hospital stay, nausea, pain and cosmetic effects (size and visibility of mark). All the children were asked for outpatient follow-up examination on the seventh day and three months after the laparoscopic surgery. At the time of the second follow-up visit, the parents were asked of symptoms, such as recurrent hernia, swelling or lump in the groin, local pain, palpable stitches in the groin area, and their personal opinion on the appearance of the scar and whether, if necessary, they would choose this treatment again or recommend it to others.

The study was approved by the Ethics Committees of the University Clinic of Pediatric Surgery and Faculty of Medicine of the Ss. Cyril and Methodius University of Skopje. Written consents from parents/guardians were obtained according to the Declaration of Helsinki and local ethics committees.

RESULTS

The study presents national data of 49 female children with clinically diagnosed indirect inguinal hernia. All of them aged 1–14 year [mean age 5.3 ± 2.7 with Median IQR = 5 (3–7)] and were treated via PIRS during the three-year period (2015–2017).

Characteristics of inguinal hernia

Five (10.2%) children had a family history of inguinal hernia. A total of 29 (59.2%) children had hernia located on the right side, 19 (38.8%) had it on the left side, and one (2%) had it on both sides. About 22 (44.9%) children had hernia for a duration of one to two years, followed by 11 (22.4%), where the duration was 6–12 months, eight (16.3%) with a duration of two to five years, and three (6.1%) with a duration of more than five years. None of the females had hernia with a duration of less than 1 month.

Pre-operative symptoms

About 32 (65.3%) children felt discomfort, nine (18.4%) experienced pain, and 43 (87.8%) had swelling. The average number of existent pre-operative symptoms in children was 2.1 ± 0.7 , with one to four symptoms.

Intervention

The length of the inguinal opening was 3 ± 2.17 cm, with a minimum of 2 cm and a maximum of 5 cm. During the intervention, two (4.1%) cases had conversion in the open technique. In 16 (32.7%) children, the presence of hidden hernia was found, 50% of them on the left side and 50% on the right side, all surgically treated during the same intervention. The average length of the unilateral intervention was 29.5 ± 6.8 minutes, with min/max. time of 15/45 minutes. In bilateral hernias, the average length of the intervention was 43.6 ± 7.2 minutes, with min/max. time of the intervention of 25/55 minutes, and the length of the intervention was less than 45 minutes in 50% of the female patients.

Hospitalization

The average length of hospitalization was 14.1 ± 3.1 hours, with min/max. time of hospitalization of 10/24 hours, and the length of the postoperative stay in hospital was less than 12 hours in 50% of female patients.

Return to normal activities

The time needed for a full return to a normal position in bed was 2.6 ± 0.6 hours, with a min/max. time of 2/4 hours, and the time was shorter than three hours in 50% of the patients. The time to verticalization was 3.6 ± 0.8 hours, with a minimum of two and a maximum of six hours. In 50% of the females this time was shorter than four hours.

Postoperative discomfort

None of the females had postoperative nausea. The average grade of pain according to the VAS scale of 0–10 was 0.3 ± 0.5 , with a min/max. of 0/2. No pain was registered in 50% of the patients. Analgesic therapy with one dose was given to four (8.2%) children.

Esthetics

The average length of the scar was 2.2 ± 0.4 mm, with min/max. length of 2/3 mm and the scar was smaller than 2 mm in 50% of the patients for median IQR = 2 (2-2). Esthetics was an important issue for 37 (75.5%) parents/guardians. In our case, 38 (77.5%) parents/guardians thought that the mark did not disrupt the esthetics, while 11 (22.5%) were undetermined. About 46 (93.9%) parents/guardians felt that they would recommend this intervention to others who have children with inguinal hernia.

DISCUSSION

Throughout history, many concepts of surgical treatments of hernia have changed and been applied by pediatric surgeons in their everyday practice [6]. The last decade marks an evolution in techniques, from three-port to two-port and one-port laparoscopic technique [9–13].

Intracorporeal suturing and knotting are becoming unpopular among pediatric surgeons according to the results of various studies. Intraabdominal skills are necessary, such as intracorporeal suturing, knotting and needle handling, which in essence take up a lot of time in context of the time needed to carry out the procedure [16].

At the beginning, the laparoscopic treatment often lasted longer than the open technique treatment. However, once the learning curve was passed, the duration gradually decreased [16]. Researchers have shown that the operating time was in an interval of 20–74 minutes [17]. Patkowski on the sample of 140 hernias discovered that the average PIRS operative time for unilateral hernias was 19 minutes, while it was 24 minutes for bilateral ones [17].

Wolak and Patkowski reported the average PIRS time of 31.6 minutes for bilateral, and 28.2 (15–45) minutes for unilateral hernias [19]. For Lipskar, the average operative time was 37 ± 10 minutes [20]. The average length of the unilateral intervention in our study was 29.5 ± 6.8 minutes, with min/max. time of 15/45 minutes. In bilateral hernias, the average length of the intervention was 43.6 ± 7.2 minutes, with min/max. time of the intervention being 25/55 minutes.

With the conventional open surgical techniques, patients have a relatively larger skin incision, while in other laparoscopic treatments three or four skin incisions are necessary for inserting the trocars. The PIRS technique can be carried out with only one incision, concealed in the bellybutton region and extracorporeal suture. In comparison to open surgery, laparoscopic hernioplasty offers excellent visual exposition, minimal dissection and reduced trauma of the surrounding tissue. It offers the opportunity to identify unexpected conditions, such as direct or femoral hernia, as well as other intraabdominal processes and pathologies (intersexual anomalies) and other conditions [13–16].

Chan discovered that children after the laparoscopic treatment of inguinal hernia had less pain and had made faster recovery, which is similar to our results [21]. We found that none of the children had postoperative nausea,

and for full return to a normal position in bed as well as standing/walking, the time was 2.6 vs. 3.6 hours.

One of the advantages of laparoscopic hernioplasty is the possibility of exploration of the contralateral side, which in fact means higher costs and distress to the child and their parents. Around 38–100% of children with unilateral inguinal hernia have contralateral open patent processus vaginalis (PPV) [22]. In 60% of children with unilateral hernia, contralateral PPV is present at two years of age, in 40% it is present for those over two years of age, while half of these children are at risk and can develop inguinal hernia. There is a risk of about 10% of developing hernia, if the hernia from the left is primarily treated.

However, Li et al. [23] reported a rate of development of metachronous hernia of 5.2%. It is believed that the sex of the child, girls opposed to boys, has a slight influence on the incidence of metachronous hernia (6.05% in boys in contrast to 6.59% in girls; $r = 0.202$) [24, 25]. In our research, we found contralateral PPV in 32.7% – 4 on the left and 4 on the right side, all treated during the same intervention. With contralateral exploration and suturing of the asymptomatic inner inguinal ring, the manifested contralateral inguinal hernia can be prevented, and the need for additional surgery later in the child's life is eliminated.

As the PIRS technique has been offering excellent esthetic results, the majority of parents are satisfied with the use of this method for their children and recommend it to other parents whose children need to undergo surgery of this type.

Bharathi et al. [26] reported scars of 5 mm in PIRS treatment, Patkowski et al. reported nearly no visible scars, and Chan et al. stressed the superiority of the laparoscopic technique as one with an excellent esthetic effect [17, 27]. In a retrospective study by Amano et al. [28], from 1033 children with laparoscopic hernioplasty, on a 1–5 scale of satisfaction (5 being the highest), regarding the visibility of the scar, the results were 4.9 ± 0.5 points. In our study, 77.5% of the parents/guardians thought that the mark did not disrupt the esthetics and 93.9% of them were satisfied by the esthetic look.

According to the existent literature to date, there is no tool that would enable a view to the inside with a representation of the inner inguinal ring after its suturing. It is unknown whether the suturing of the inner inguinal ring keeps the inner ring closed for the remainder of the patient's life, or whether some kind of fibrosis or reorganization of the peritoneum would contribute to that. Although there are data in the literature concerning recurrent laparoscopy in patients with previous laparoscopic hernioplasty, the sample of patients is simply too small to come to a conclusion [21, 22, 24]. Still, the lack of noted complications makes this technique efficient and especially promising in girls [24].

CONCLUSION

The introduction of laparoscopic surgery in the treatment of inguinal hernia is a promising method, which plays an

important role as an alternative surgical technique, while at the same time it represents a diagnostic tool for exploration and simultaneous treatment of the contralateral inguinal ring. We found that this technique allows better recovery, quick return to full activity, and no visible scars. Most parents were satisfied with the treatment of their children by this method and would recommend it to others.

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Лапароскопска операција ингвиналне херније код женске деце у Републици Северној Македонији

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САЖЕТАК

Увод/Циљ Лапароскопска техника решавања ингвиналне киле код деце је минимално инвазивна метода, са великом сигурношћу, изводљивошћу и одличним козметским резултатом и прихватљива је алтернатива стандардној отвореној процедури.

Методe Ово је проспективна клиничка студија, са националним подацима о 49 девојчица узраста од једне до 14 година оперисаних лапароскопским приступом. Анализирани су оперативно време, време до вертикализације (нормалан положај у кревету, стајање/ходање), боравак у болници, мучнина, бол и козметски ефекти (величина и видљивост ожиљка).

Резултати Породичну анамнезу о постојању ингвиналне киле имало је петоро (10,2%) деце. Килу локализовану на десној страни имало је 29 (59,2%) болесника, на левој страни 19 (38,8%) болесника, а обострано ју је имао један

болесник (2%). Просечан дијаметар ингвиналног отвора износио је $3 \pm 2,17$ cm. Шеснаесторо деце (32,7%) имало је скривену килу. Просечна дужина једностране интервенције била је $29,5 \pm 6,8$ минута, а билатералне киле $43,6 \pm 7,2$ минута. Просечна дужина хоспитализације била је $14,1 \pm 3,1$ сат, а време потребно за пуни повратак у нормалан положај у кревету било је $2,6 \pm 0,6$ сати. Просечна дужина ожиљка после операције била је $2,2 \pm 0,4$ mm. Четрдесет шест (93,9%) родитеља/старатеља били су задовољни естетским изгледом, а без посебног мишљења о овом питању била су три (6,1%) родитеља.

Закључак Увођење лапароскопске хирургије у лечење ингвиналне киле је обећавајућа метода, која игра важну улогу као алтернативна хируршка техника, због минималне инвазивности технике и бољег опоравка деце.

Кључне речи: дечја ингвинална кила; перкутано ушивање унутрашњег прстена; минимално инвазивна хирургија