UDC 616.381-085-089-053.2

O.S. Maksymenko[1,2], R.B. Lysenko[1,2], O.S. Osipov[1,2], R.B. Savchenko[1], V.H. Hryn[1]

Simultaneous minimally invasive repair of combined defects of the abdominal wall in children

[1]Poltava State Medical University, Ukraine
[2]Limited Liability Company Medical Curatively-Diagnostic Center «MEDION», Poltava, Ukraine

Paediatric Surgery (Ukraine). 2025. 2(87): 33-38. doi: 10.15574/PS.2025.2(87).3338

For citation: Maksymenko OS, Lysenko RB, Osipov OS, Savchenko RB, Hryn VH. (2025). Simultaneous minimally invasive repair of combined defects of the abdominal wall in children. Paediatric Surgery (Ukraine). 2(87): 33-38. doi: 10.15574/PS.2025.2(87).3338.

Nowadays, minimally invasive closure of abdominal wall defects is becoming more popular and is considered an alternative to open methods of their treatment.

Aim: to evaluate the effectiveness of simultaneous repair of combined abdominal wall defects in children using a minimally invasive technique.

Material and methods. A retrospective analysis of laparoscopic closure of combined abdominal wall defects was conducted in 13 children (11 boys and 2 girls), using a single-port technique in 10 cases and with the insertion of an additional working port in 3 others. The duration of surgery, the occurrence of intraoperative, early and late postoperative complications were determined.

Results. The average operation time was 30±3.54 min. In all patients, a multimodal anesthetic approach was used, and the treatment was performed within the day-case surgery. We did not observe any intraoperative or postoperative complications, both in the early and late postoperative period. The scar in the left lateral area is almost imperceptible, and the scar in the umbilical area seems to be a natural embryonic scar. Patients were observed for 1–2 years after surgery – no recurrence of hernias was detected.

Conclusion. Minimally invasive simultaneous repair of combined abdominal wall defects in children has the following advantages: excellent visual control, the ability to assess the contralateral inguinal ring and repair its defect when detected, reduced surgical and anesthetic time, ideal cosmetic and excellent economic results.

The study was performed in accordance with the principles of the Declaration of Helsinki. The study protocol was approved by the Local Ethics Committee for all participants.

The informed consent of the patient was obtained for conducting the studies.

No conflict of interests was declared by the authors.

Keywords: combined abdominal wall defects, epigastric hernia, inguinal hernia, umbilical hernia, Percutaneous internal ring suturing (PIRS) technique, laparoscopy, pediatric surgery.

Одномоментне мініінвазивне усунення поєднаних дефектів черевної стінки в дітей

О.С. Максименко[1,2], Р.Б. Лисенко[1,2], О.С. Осіпов[1,2], Р.Б. Савченко[1], В.Г. Гринь[1]

[1]Полтавський державний медичний університет, Україна
[2]ТОВ «Медичний лікувально-діагностичний центр «МЕДІОН», Полтава, Україна

На сьогодні мініінвазивне усунення дефектів черевної стінки стає більш популярним та вважається альтернативою відкритим методикам їхнього лікування.

Мета: оцінити результативність одночасного лапароскопічного усунення поєднаних дефектів черевної стінки у дітей із застосуванням мініінвазивної техніки.

Матеріали і методи. Проведено ретроспективний аналіз лапароскопічного закриття поєднаних дефектів черевної стінки 13 дітям (11 хлопчиків та 2 дівчинки), із використанням в 10 випадках однопортової техніки та у 3 інших – із постановкою додаткового робочого порту. Визначали тривалість оперативного втручання, виникнення інтраопераційних, ранніх та пізніх післяопераційних ускладнень.

Результати. Тривалість оперативних втручань варіювалась від 20 хв до 55 хв у пацієнтів з епігастральною грижею, середній час операції становив 30±3,54 хв. У всіх пацієнтів застосований мультимодальний анестезіологічний підхід і лікування проводили в межах

хірургії одного дня. Інтраопераційні та післяопераційні ускладнення як у ранньому, так і в пізньому післяопераційному періоді не спостерігались. Рубець у лівій боковій ділянці майже непомітний, а в ділянці пупка відповідає справжньому ембріональному рубцю. Протягом 1–2 років пацієнти перебували під спостереженням після операції – рецидиву гриж не було виявлено.

Висновок. Мініінвазивне одномоментне усунення поєднаних дефектів черевної стінки в дітей має такі переваги: відмінний візуальний контроль, можливість оцінки контрлатерального пахвинного кільця та усунення його дефекту при виявленні, скорочення часу оперативного втручання та анестезії, ідеальний косметичний та чудовий економічний результат.

Дослідження виконано відповідно до принципів Гельсінської декларації. Протокол дослідження ухвалено Локальним етичним комітетом зазначеної в роботі установи. На проведення досліджень отримано інформовану згоду пацієнтів.

Автори заявляють про відсутність конфлікту інтересів.

Ключові слова: поєднані дефекти черевної стінки, епігастральна грижа, пахвинна грижа, пупкова грижа, техніка PIRS, лапароскопія, дитяча хірургія.

Introduction

Abdominal wall hernias are the most common pathology encountered in general pediatric surgery, which pediatric surgeons repair at different periods of age. The frequency of birth of a child with an umbilical hernia reaches about 26.6% of cases, while inguinal hernia occurs in up to 5% [1,20]. Epigastric hernias occur in up to 4% of all hernias in children [7].

Traditional surgical methods are the result of the experience of many generations of surgeons. However, the unstoppable development of laparoscopic surgery opens up new treatment options for surgeons. Minimally invasive interventions have many obvious advantages, namely a better cosmetic result, reduced pain in the early postoperative period, a shorter rehabilitation period, and, most importantly, the possibility of performing revision of the abdominal cavity [2,4,8,14,17–19,28].

Laparoscopic repair of abdominal wall defects is becoming more popular and is considered an alternative to open treatment methods [2,4,8,9,14,15,17,18,21,24]. Some authors indicate the inexpediency of closing abdominal wall defects with minimally invasive techniques and still prefer traditional open techniques [12,24]. One can agree with the open technique of umbilical hernia correction, but the treatment of the linea alba defect is questionable and debated, unlike inguinal hernias, where the only laparoscopic method of treatment is preferred by most pediatric surgery centers [2,4,8–11,14,15,17,18,21,23,24].

Numerous methods of laparoscopic closure of inguinal defects have been developed and implemented, which differ in the method of suturing the internal inguinal ring and the number of working ports used during surgery [3,5,14,25]. In 2006, the prominent pediatric surgeon Dariusz Patkowski proposed the method of PIRS, which has gained considerable popularity and is most often used among the other methods [23,29]. This is a single-port technique that is characterized by simplicity of performing, is minimally traumatic, and has a lower risk of recurrence when it is performed by a skillful surgeon and can reach 0–1.4% [21,23,28,29]

We have not encountered literature data on the simultaneous treatment of multiple combined abdominal wall defects in children using minimally invasive techniques, so this issue requires further specification and research.

Aim: to investigate the effectiveness of simultaneous repair of combined abdominal wall defects in children using a minimally invasive technique.

Materials and methods of the study

An analysis of the treatment of 13 children with combined abdominal wall defects operated on from 2021 to 2023 in the surgical department of the Limited Liability Company «Medical Curatively-Diagnostic Center «MEDION» was conducted. The age of the patients varied from 3 months to 5 years 9 months (mean age – 1.9±0.43 years), of which eleven (84.61%) were boys and two (15.39%) were girls. Ten (76.92%) patients had bilateral inguinal hernias combined with umbilical hernias. Three (23.08%) children were diagnosed with four combined abdominal wall defects: in the epigastric region, umbilical, and both inguinal regions. Three (23.08%) patients were diagnosed with a contralateral inguinal defect (the patent processus vaginalis) during surgery.

The research was carried out in accordance with the principles of the Helsinki Declaration. The informed consent of the patient was obtained for conducting the studies.

Surgical technique. During the operation, all patients received a multimodal anesthetic approach – combined analgesia, which included general endotracheal anesthesia in combination with interfascial blocks – transversus abdominis plane blocks as a component of opioid-free anesthesia, as well as intraoperative selective injection with a 1–4% solution of articaine with epinephrine in trocar wounds and in areas of hernia defects closure, with subsequent use, if it necessary, of nonsteroidal anti-inflammatory drugs.

The epigastric hernia localization was always clearly marked with a marker. The child was in a supine position. The surgeon was positioned on the right side, the assistant on the left side, and then the positions were

changed to eliminate the defect of the linea alba. Next, an incision was made up to 10 mm to the left of the umbilicus or directly through the umbilicus. A 5 mm trocar was inserted through the umbilical defect according to Hasson's technique (Fig. 1), with CO_2 insufflation of 8–10 mmHg with a flow of 6–8 l/min, then a 5 mm 30° laparoscope was inserted.

The revision of the abdominal cavity was performed. Open and dilated internal inguinal rings with the patent processus vaginalis, as well as a defect of the linea alba, were diagnosed. Inguinal defects were closed using the double PIRS technique [10,21] using an 18G injection needle, two loops were formed transcutaneously with Prolene 2/0 thread, first from the lateral edge of the internal inguinal ring and then from the medial one, and using a double Ethibond 2/0 thread and its extracorporeal tying, as a results two inguinal defects were repair intraabdominally (Fig. 2).

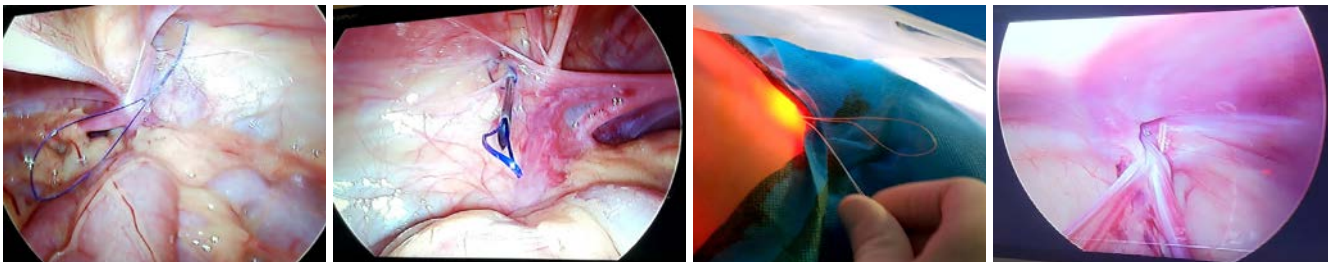
To repair the linea alba defect, an additional 5 mm port was inserted in the left lumbar region. First, the falciform ligament, which sometimes masks the epigastric defect, was dissected, and the hernial contents – preperitoneal fat, were removed. We used a similar PIRS technique to close the epigastric defect with three separate Ethibond 2/0 knotted sutures (Fig. 3).

The umbilical defect was closed with Ethibond 2/0 knotted suture. Inverting intradermal single knotted sutures of Vicryl 4/0 were applied to the umbilicus. Steri–Strip was additionally applied to the skin.

Fig. 1. Insertion of the trocar directly through the umbilical defect by Hasson's technique

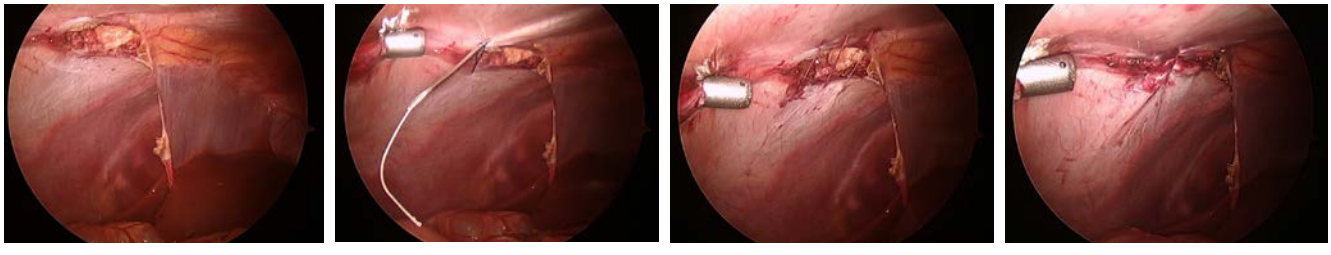
Results of the study and discussion

All patients underwent laparoscopic repair of abdominal wall defects using a single-port technique in 10 cases and in 3 others using an additional working



A *B* *C* *D*

Fig. 2. Repair of inguinal defects using the double PIRS technique: A – transcutaneous insertion of the first loop of Prolene 2/0 through the lateral edge of the internal inguinal ring; B – transcutaneous insertion of the second loop of Prolene 2/0 through the medial edge of the internal inguinal ring, into the first formed loop; C, D – double Ethibond 2/0 suture is inserted, and the defect is closed using the double PIRS technique



A *B* *C* *D*

Fig. 3. Stages of elimination of the epigastric defect: A – the epigastric defect is isolated and the hernial contents are removed; B – transcutaneous insertion of the Prolene 2/0 loop with Ethibond 2/0 thread; C – three separate transcutaneous Ethibond 2/0 sutures are applied; D – the epigastric defect is closed

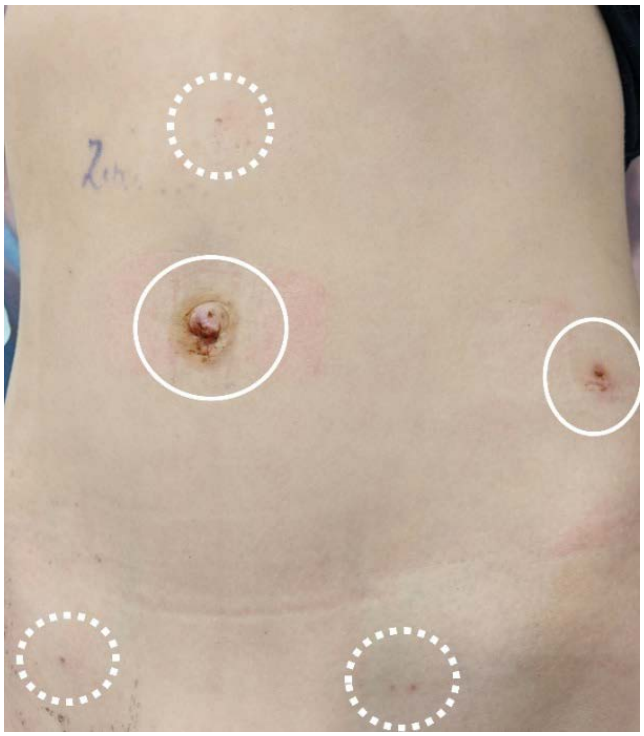


Fig. 4. General view of the abdominal wall on the seventh postoperative day. White solid circles indicate the locations of trocar placement. White dotted circles indicate the locations of the defects closure areas

port. On average, the linea alba defect was located 6–8 cm above the umbilicus, and its size did not exceed 2 cm in diameter. The duration of the operation varied from 20 min to 55 min in patients with epigastric hernia; the average intervention time was 30±3.54 min. We did not observe any intraoperative or postoperative complications, both in the early and late postoperative period. All patients were discharged home on the same day of surgery and did not require additional anesthesia in the ward. All children were active starting from the second postoperative day. The scar in the left lateral area is almost imperceptible, and the rumen in the umbilical area seems to be a natural embryonic scar. Patients were observed for 1–2 years after surgery – no recurrence of hernias was detected.

Laparoscopic treatment of inguinal hernias in children has numerous advantages, the most important and indisputable is the detection of contralateral metachronous hernia – patent processus vaginalis. Thus, in three (23.08%) cases, we found a contralateral inguinal defect, which coincides with the data of various authors, which occurs from 12.89% to 38.5% of children with a primary diagnosed unilateral inguinal hernia [18,26,29]. The sensitivity and specificity of laparoscopic diagnosis of inguinal defects are 99.4–99.5%. The contralateral inguinal defect can be surgically repaired in 8–12 minutes with a minimal risk of complications of up to 1% [13,16,18,26]. However, according to other authors, the risk of complications can reach up to 2.9% [21,22,28]. In one case, we had minimal capillary bleeding, which was clinically insignificant and did not require surgical expansion or additional hemostasis, so we did not record it as a complication.

Even though the classic method of repairing epigastric hernia is a transverse incision over the defect up to 2–3 cm, the removal of compacted preperitoneal fat and closing the linea alba defect, the risk of postoperative complications still remains – this may be infection of the postoperative wound or the formation of a hypertrophic or keloid scar. According to the data of R.D. Coats et al., 13% of patients with hernias have multiple abdominal wall defects, which are sometimes difficult to close with a single incision [7]. Some authors describe the possibility of closing an epigastric defect through an umbilical approach if this one is located no more than 1.5 cm from the umbilical ring [17]. We do not have such experience, single epigastric defects located at a distance from the umbilical ring, from 4 cm to 8 cm, were eliminated through a transverse incision directly above the defect.

Previously, some authors proposed laparoscopic correction of the linea alba defect with the insertion of two 3 mm ports and the performance of a complex intracorporeal suture with one hand using a laparoscopic knot pusher, and sometimes there was a need to place an additional third port [2]. Y. Tatekawa et al. published a case report in which they used a single-port laparoscopic technique for epigastric hernia repair. Only the laparoscope was inserted into the abdominal cavity through a 5 mm trocar. No defect was found intra-abdominally, so the saline solution was injected subcutaneously at the hernia site, and then, without exposing the fascial defect, five percutaneous sutures were applied according to Patkowski et al. [21,27]. In the presented case, the lack of clear visualization of the defect may lead to unsuccessful or incomplete closure of the linea alba defect, as well as leaving the hernia contents unremoved, which, despite the closure of the defect, may remain contoured under the skin of the abdominal wall [17]. Therefore, we, and other surgeons, consider the need for two or even three ports to close one 2 cm epigastric defect impractical and prefer the open technique of closing this defect from a transverse incision of up to 2–3 cm [6].

Some authors have presented a single-port technique with two working instruments in it, but in our opinion, firstly, the technique of single-port surgery should be worked out, which is difficult for young sur-

geons, and secondly, there is a lack of these special ports in some clinics, which is also quite financially costly [4]. In our clinic, as in many other clinics in the country (except for individual centers), according to the data, there are no ports and there is not enough experience in their use.

Having three or more combined abdominal wall defects in one patient, we propose and recommend simultaneously repairing them laparoscopically. Placing a second 5 mm port in the left lumbar region or another region allows for an additional working instrument. Even when closing the inguinal defects, this makes it possible to retract the peritoneum and layer it over the needle, which allows minimizing damage to important structures of the inguinal area in complex and critical cases, especially in newborns and children 1–3 months old. During the dissection an epigastric hernia and removing its contents – preperitoneal fat, you can move the laparoscope to the left lumbar region through an additional port for convenience and continue the dissection from the umbilical access, as we did.

Of course, with the availability of appropriate 3 mm instruments, 3 mm laparoscope, and ports, it is possible to further minimize the postoperative scar and even use the working instrument without inserting a trocar, as indicated by some authors [17]. The duration of surgical interventions for epigastric hernia, according to various authors, ranges from 35 to 75 minutes [2,17]. This also coincides with our duration of surgery with epigastric defect – from 50 to 55 minutes, taking into account that during this time, two more inguinal defects were repaired.

As well, we can`t mention the opponents of laparoscopic techniques, especially among experienced surgeons who consider traditional methods simpler and more reliable [22]. This may be due to the need to «switch» one's own consciousness to the possibility of performing surgical interventions without significant incisions and working in the «2D screen» mode, lack of desire, opportunities for learning and improving knowledge, and hyperbole of the risks of both surgical and anesthetic effects.

Even though we don`t have a lot of cases, the absence of intraoperative and postoperative complications, recurrences, having an ideal cosmetic effect with one visible small postoperative scar, and a relatively quick surgical intervention time – all this allows us to consider this technique reliable, safe, and effective. Having minimal skills in laparoscopic surgery and the presence of more than three combined abdominal wall defects in children are undeniable advantages of the use of minimally invasive treatment methods.

Conclusion

The advantages of minimally invasive simultaneous repair of combined abdominal wall defects in children are excellent visual control, the ability to assess the contralateral inguinal ring and repair its defect when detected, reduced surgical and anesthetic time, and favorable economic results.

The proposed laparoscopic technique can be the method of choice to diagnose and repair combined abdominal wall defects in children as a day-case surgery, producing an ideal cosmetic result without complications.

No conflict of interests was declared by the authors.

References/Література

1. Abdulhai SA, Glenn IC, Ponsky TA. (2017). Incarcerated Pediatric Hernias. Surg Clin North Am. 97(1): 129-145. doi:10.1016/j.suc.2016.08.010.
2. Albanese CT, Rengal S, Bermudez D. (2006). A novel laparoscopic technique for the repair of pediatric umbilical and epigastric hernias. J Pediatr Surg. 41(4): 859-862. doi: 10.1016/j.jpedsurg.2005.12.033.
3. Al-Taher RN, Khrais IA, Alma'aitah S, Al Saiad AA, Al-abboodi AA, Saleh OM et al. (2021). Is the open approach superior to the laparoscopic hernia repair in children? A retrospective comparative study. Annals of Medicine and Surgery. 71: 102889. https://doi.org/10.1016/j.amsu.2021.102889.
4. Babsail AA, Abelson JS, Liska D, Muensterer OJ. (2014). Single-incision pediatric endosurgical epigastric hernia repair. Hernia. 18(3): 357-360. doi: 10.1007/s10029-014-1235-7.
5. Bhattacharjee SS, Daniel S, Das P, Hussain K, Kumar N, Singh M. (2020). Laparoscopic Paediatric Hernia Repair Using Tuohy Needle – Our Preliminary Experience of 100 Cases. Journal of Evolution of Medical and Dental Sciences. 9: 2903-2907. doi: 10.14260/jemds/2020/635.
6. Blonk L, Civil YA, Kaufmann R, Ket JCF, van der Velde S. (2019). A systematic review on surgical treatment of primary epigastric hernias. Hernia. 23(5): 847-857. doi: 10.1007/s10029-019-02017-4.
7. Coats RD, Helikson MA, Burd RS. (2000). Presentation and management of epigastric hernias in children. J Pediatr Surg. 35(12): 1754-1756. doi: 10.1053/jpsu.2000.19242.
8. Dvorakevych A, Pereiaslov A. (2014). Mini-invasive methods of surgical treatment of inguinal hernias. Paedriatric Surgery (Ukraine). (3-4): 54-57.
9. Dvorakevich A, Pereyaslov A. (2016). Minimally invasive treatment of recurrent inguinal hernias in children. Pediatric surgery. 20: 140-143.
10. Dvorakevych A, Pereyaslov A, Tkachyshyn Y. (2017). Modification of the traditional percutaneous internal inguinal ring suturing (PIRS method). Paedriatric Surgery (Ukraine). 2(55): 57-61.
11. Gause CD, Casamassima MGS, Yang J, Hsiung G, Rhee D, Salazar JH et al. (2017). Laparoscopic versus open inguinal hernia repair in children ≤3: a randomized controlled trial. Pediatr Surg Int. 33(3): 367-376. doi: 10.1007/s00383-016-4029-4.
12. Gorbatyuk O. (2021). Incarcerated inguinal hernia in newborns and infants. Neonatology, Surgery and Perinatal Medicine. 11; 3(41): 41-45. https://doi.org/10.24061/2413-4260.XI.3.41.2021.6.
13. Hall NJ, Choi W, Pierro A,Eaton S. (2012). Age-related probability of contralateral processus vaginalis patency in children with unilateral inguinal hernia. Pediatr Surg Int. 28(11): 1085-1088. doi: 10.1007/s00383-012-3174-7.
14. Kantor N, Travis N, Wayne C, Nasr A. (2019). Laparoscopic versus open inguinal hernia repair in children: which is the true

gold-standard? A systematic review and meta-analysis. Pediatr Surg Int. 35(9): 1013-1026. doi: 10.1007/s00383-019-04521-1.
15. Liu J, Wu X, Xiu W, Hao X, Zhao J, Wei B et al. (2020). A comparative study examining laparoscopic and open inguinal hernia repair in children: a retrospective study from a single center in China. BMC Surgery. 20(1): 244. doi: 10.1186/s12893-020-00912-7.
16. Mollen KP, Kane TD. (2007). Inguinal hernia: what we have learned from laparoscopic evaluation of the contralateral side. Curr Opin Pediatr. 19(3): 344-348. doi: 10.1097/MOP.0b013e3281574597.
17. Moreira-Pinto J, Correia-Pinto J. (2015). Scarless laparoscopic repair of epigastric hernia in children. Hernia. 19(4): 623-626. doi: 10.1007/s10029-015-1369-2.
18. Muensterer OJ, Gianicolo E. (2019). Contralateral processus closure to prevent metachronous inguinal hernia: A systematic review. Int J Surg. 68: 11-19. doi: 10.1016/j.ijsu.2019.06.001.
19. Nakonechnyi A, Kuzyk A, Nakonechnyi R. (2016). Surgical correction of inguinal hernias in children using minimally invasive PIRS method. Paediatric surgery (Ukraine). (1-2): 78-81.
20. Öberg S, Andresen K,Rosenberg J. (2017). Etiology of Inguinal Hernias: A Comprehensive Review. Front Surg. 4: 52. doi: 10.3389/fsurg.2017.00052.
21. Patkowski D, Czernik J, Chrzan R, Jaworski W, Apoznański W. (2006). Percutaneous internal ring suturing: a simple minimally invasive technique for inguinal hernia repair in children. J Laparoendosc Adv Surg Tech A. 16(5): 513-517. doi: 10.1089/lap.2006.16.513.
22. Pereyaslov A, Dvorakevych A. (2016). Uskladnennya khirurhichnoho likuvannya pakhvynnykh hryzh u ditey iz vykorystannyam vidkrytykh i maloinvaziynykh metodiv. Paediatric Surgery Ukraine. (3-4): 34-37.
23. Pogorelić Z, Stanić P,Bašković M. (2024). Comparison of Percutaneous Internal Ring Suturing (PIRS) versus Open Ligation of the Patent Processus Vaginalis for the Treatment of Communicating Pediatric Hydrocele. Children (Basel). 11(4). doi: 10.3390/children11040437.
24. Prytula V, Rybalchenko I. (2015). Diagnosis and treatment of inguinal-scrotal hernias in infants. Pathologia. (2): 48-51.
25. Salgaonkar H, Shah R. (2023). Laparoscopic Pediatric Inguinal Hernia Repair. In D. Lomanto, W. T.-L. ChenM. B. Fuentes (Reds.), Mastering Endo-Laparoscopic and Thoracoscopic Surgery: ELSA Manual: 573-578. Singapore: Springer Nature Singapore.
26. Sözübir S, Ekingen G, Senel U, Kahraman H, Güvenç BH. (2006). A continuous debate on contralateral processus vaginalis: evaluation technique and approach to patency. Hernia. 10(1): 74-78. doi: 10.1007/s10029-005-0047-1.
27. Tatekawa Y, Yamanaka H,Hasegawa T. (2013). Single-port laparoscopic repair of an epigastric hernia using an epidural needle. Int J Surg Case Rep. 4(3): 262-264. doi: 10.1016/j.ijscr.2012.12.007.
28. Thomas DT, Göcmen KB, Tulgar S,Boga I. (2016). Percutaneous internal ring suturing is a safe and effective method for the minimal invasive treatment of pediatric inguinal hernia: Experience with 250 cases. J Pediatr Surg. 51(8): 1330-1335. doi: 10.1016/j.jpedsurg.2015.11.024.
29. Wolak P, Strzelecka A, Piotrowska A, Wolak P, Piotrowska I, Dąbrowska K et al. (2022). Percutaneous Internal Ring Suturing (PIRS) – The Benefits of Laparoscopic Inguinal Hernia Repair. Therapeutics and Clinical Risk Management. 18: 135-144. doi: 10.2147/TCRM.S348197.

Відомості про авторів:

Максименко Олександр Сергійович *– доктор філософії, PhD, викладач каф. анатомії людини ПДМУ. Адреса: м. Полтава, вул. Шевченка, 23. Лікар-хірург дитячий, лікар-уролог дитячий ТОВ «Медичний лікувально-діагностичний центр «МЕДІОН». Адреса: м. Полтава, вул. Сінна 37. https://orcid.org/0000-0003-1502-1464.*

Лисенко Руслан Борисович *– д.мед.н., доц., проф. каф. хірургії №1 ПДМУ. Адреса: м. Полтава, вул. Шевченка, 23. https://orcid.org/0000-0003-4409-4013.*

Осіпов Олександр Сергійович *– к.мед.н., асистент каф. хірургії №3 ПДМУ. Адреса: м. Полтава, вул. Шевченка, 23. https://orcid.org/0000-0002-6823-0211.*

Савченко Роман Борисович *– доктор філософії, PhD, асистент каф. хірургії №2 ПДМУ. Адреса: м. Полтава, вул. Шевченка, 23. https://orcid.org/0000-0001-9790-8821.*

Гринь Володимир Григорович *– д.мед.н., проф., зав. каф. анатомії людини ПДМУ. Адреса: м. Полтава, вул. Шевченка, 23. https://orcid.org/0000-0001-5894-4416.*

Стаття надійшла до редакції 24.02.2025 р., прийнята до друку 10.06.2025 р.