Archives of Anesthesiology and Critical Care (Mar-Apr 2026); 12(2): 154-157.

Available online at http://aacc.tums.ac.ir

Research Article

Assessment of Chronic Postoperative Inguinal Hernia Pain (CPIP) in Children

Mehdi Sarafi[1], Behzad Azimi[2], Aminollah Vasigh[3], Gholamreza Ebrahimisaraj[1]*

[1]Mofid Children's Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

[2]Department of General Surgery, Imam Hossein Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

[3]School of Medicine, Ilam University of Medical Sciences, Ilam, Iran.

ARTICLE INFO

Article history:
Received 01 May 2025
Revised 22 May 2025
Accepted 05 June 2025

Keywords:
Pain;
Inguinal hernias;
Postoperative pain

ABSTRACT

Background: A hernia is defined as the protrusion of an organ, tissue, or part of an organ through a structure that normally contains it. Inguinal hernias are a type of hernia that causes pain.

Methods: In this study, 62 individuals aged 4 to 18 years who met the inclusion criteria were enrolled. The tools used included a demographic characteristics form, a patient clinical characteristics form, and the Widder Scale questionnaire. After completing the questionnaires, data related to CPIP (likely an abbreviation for a pain assessment measure, but further information is needed for confirmation) and its influencing factors were entered into SPSS version 18 software and analyzed.

Results: According to the findings, out of 62 patients studied, 3 (4.8%) patients had CPIP, with the prevalence of CPIP being higher in men than in women. Also, none of the postoperative complications, including readmission, hydrocele, infection, and recurrence status, were observed in the patients. Also, regarding the duration of pain, it was shown that the pain of 36 patients was within the time range of up to one week, and the pain of 19 patients was within the time range of one week to one month.

Conclusion: It is essential to follow up on factors affecting CPIP in children undergoing hernia surgery on an ongoing basis or even one year after surgery.

Introduction

A hernia is defined as the protrusion of an organ, tissue, or part of an organ through a structure that normally contains it. This condition occurs when a portion of the intestine protrudes through a weakened area in the abdominal muscles. Hernias observed in the groin region are called inguinal hernias. An inguinal hernia manifests as a lump or bulge in the upper groin area, resulting from a weakness or tear in the supporting wall of the intestines [1-3].

Diagnosis of inguinal hernias is often possible through clinical examination and typically does not require diagnostic imaging. If the intestine becomes trapped in the hernia site, blood flow to it is compromised, potentially leading to damage. In such cases, surgical repair under anesthesia is necessary. Surgery is the definitive treatment for inguinal hernias and is one of the most common surgical procedures in children [3-5].

Inguinal hernias are classified into two types: direct and indirect. The indirect type is caused by the persistence of the processus vaginalis, allowing abdominal contents to enter it, while the direct type is associated with collagen diseases, connective tissue disorders, or recurrence of operated inguinal hernias [6-8]. Indirect hernias are more common than the direct type and are more frequently seen in males, whereas umbilical hernias are more common in obese or pregnant individuals [9].

The authors declare no conflicts of interest.
*Corresponding author.
E-mail address: gholamrezaebrahimisaraj@gmail.com
DOI: 10.18502/aacc.v12i2.20954

Inguinal hernias are approximately 7 times more common in men than in women, and their prevalence increases with age, particularly after 40 years. The condition can cause a bulge in the abdominal or groin area, which may enlarge with standing or coughing. Symptoms of inguinal hernias may include pain during coughing, exercise, or bending; a burning sensation; severe pain; and a feeling of heaviness in the groin [10-12].

Following surgical incision, sensitization of the central nervous system and increased excitability of the sympathetic nervous system can exacerbate postoperative pain. The use of anesthesia, by reducing sensitivity to pain, prevents its transmission to the central nervous system. The body's physiological responses to pain and surgical trauma include respiratory, cardiovascular, gastrointestinal, urinary, neuroendocrine, metabolic, and psychological complications [13-14].

Postoperative pain is an unpleasant experience, and its management can generally lead to increased patient satisfaction and reduced impairment of the immune system, disability, weakness, financial costs, length of hospital stay, and psychological symptoms. Despite numerous studies in the field of pain in patients, pain management in these individuals is still not optimally performed [15]. On the other hand, children and adolescents, as the future builders of the community's health and dynamism, require special attention, supportive interventions, and preventive measures against diseases; as preserving and promoting their health plays a decisive role in shaping a healthy and sustainable future for society [16, 17]. Therefore, this study was conducted.

Methods

In this study, 62 individuals aged 4 to 18 years who met the inclusion criteria were enrolled. These criteria included access to telephone contact information, access to virtual space for completing the questionnaire, informed parental consent to participate in the study, and having undergone inguinal hernia surgery. Patients who, during the sampling period, had a chronic illness affecting pain or another new illness were excluded from the study.

The tool used included information in the following areas: age, sex, readmission, days in hospital, localization of the hernia, surgical procedure, postoperative complications (hydrocele, infection, recurrence status), duration of pain, pain level, pain medication, and admission to the ICU [18, 19].

Follow-up on postoperative pain was performed using the instrument used by Widder et al. [19].

The relevant questionnaires were designed online and sent to parents. After completing the questionnaires, data related to CPIP (likely an abbreviation for a pain assessment measure, but further information is needed for confirmation) and its influencing factors were entered into SPSS version 18 software and analyzed.

Results

According to the findings, out of 62 patients studied, 3 (4.8%) patients had CPIP, with the prevalence of CPIP being higher in men than in women. Also, none of the postoperative complications, including readmission, hydrocele, infection, and recurrence status, were observed in the patients (Table 1). Also, regarding the duration of pain, it was shown that the pain of 36 patients was within the time range of up to one week, and the pain of 19 patients was within the time range of one week to one month (Table 2).

Table 1- Comparison of demographic characteristics of patients in the CPIP and No-CPIP groups

Variable		Total 62(100%)	No-CPIP 59(95.2)	CPIP 3(4.8%)	P value
Age		5.56(1.27)	5.55(1.29)	1.15 (5.66)	0.73
Days in hospital		1.91(0.27)	1.91(0.28)	2.0(0.0)	0.60
Sex	Male	47(75.8)	45(76.3)	2(66.7)	0.71
	Female	15(24.2)	14(23.7)	1(33.3)	
Localization of the hernia	Both sides	28(45.2)	27(45.8)	1(33.3)	0.40
	Left	28(45.2)	26(44.1)	2(66.7)	
	Right	6(9.7)	6(10.2)	0(0)	
Readmission	No	62(100)	62(100)	62(100)	-
	Yes	0(0)	0(0)	0(0)	
Postoperative Hydrocele	No	62(100)	62(100)	62(100)	-
	Yes	0(0)	0(0)	0(0)	
Postoperative Infection	No	62(100)	62(100)	62(100)	-
	Yes	0(0)	0(0)	0(0)	
Postoperative Recurrence Status	No	62(100)	62(100)	62(100)	-

	Yes	0(0)	0(0)	0(0)	
Admission In PICU	No	3(4.8)	3(5.1)	3(100)	-
	Yes	59(95.2)	56(94.9)	0(0)	
Pain level	On movement	35(56.5)	33(55.9)	2(66.)	0.72
	At rest	27(43.5)	26(44.1)	1(33.3)	
Pain medication	No	57(91.9)	57(96.6)	0(0)	0.000
	Paracetamol	3(4.8)	2(3.4)	1(33.3)	
	Opioids	0(0)	0(0)	2(66.7)	
	Ibuprofen	2(3.2)	0(0)	0(0)	
	Combination	0(0)	0(0)	0(0)	

Table 2- Comparison of Duration of pain of patients in the CPIP and No-CPIP groups

Variable		Total 62(100%)	No-CPIP 59(95.2)	CPIP 3(4.8%)	P value
Duration of pain	Up to one week	36	19	17	<0.05
	One week – one month	19	9	10	
	One – three months	2	0	2	
	Four – six months	2	0	2	
	Seven – twelve months	0	0	0	
	Longer than one year (till now)	3	0	3	

Discussion

In this study, the number of male patients was higher than female patients. In the study by Chen et al., the male-to-female ratio was 7:1, while in the group of children undergoing surgery, this ratio was 3.5:1 [20]. In a review study by Reinpold, risk factors for developing hernias were categorized into three groups: strong, moderate, and low significance. Strong factors included severe preoperative pain, young age, female gender, open surgery, and the presence of chronic pain other than CPIP. On the other hand, neurolysis and postoperative complications were in the moderate group, and factors such as inexperienced surgeons and genetic predisposition were in the low significance group [21].

In this study, out of 62 patients examined, 3 had CPIP. In the study by Pierides et al. between 2003 and 2010, 932 patients were evaluated, and CPIP was observed in 99 (11.5%) of them. Factors such as positive recurrence, older age, and mid-density mesh were effective in the development of CPIP [22]. In the study by Bande et al. between 2009-2010, 1761 patients were enrolled in the study. The pain rate at four months was 13.6%, and neuropathic pain was present in 38.5% of patients at 4 months. At 2 years, 28.2% of patients received analgesics, and 52.1% of patients reported moderate to severe pain [23]. In the study by Forester et al. between 2008-2020, 960 patients were examined, and 6% of patients had CPIP. Factors such as female gender, history of surgery, age of 45 years, and indwelling urinary catheter were effective in the development of CPIP [24].

In the study by Kristensen et al., postal questionnaires were sent to 156 individuals aged 6 months to 12 years, but only 96 people responded to the questionnaires. According to the findings, one month after surgery, 83% of children were pain-free. Also, persistent pain up to 12 months after surgery was observed in only 7 children [25]. In the study by Aasvang et al., pain in patients who underwent surgery before the age of 5 years was evaluated. Out of 651 patients examined, pain was observed in 88 (13.5%), of which 13 (3%) had moderate or severe pain. Pain intensity was higher in patients who underwent surgery before 3 months of age compared to other patients. Pain at rest was observed in 35 (5.2%), and pain during activity was observed in 88 (13.5%) [26].

Given that previous published studies have shown that conducting interventional studies can lead to the improvement of patient health-related parameters, including quality of life, beliefs and health literacy of individuals, disease prevention, as well as pain management [27-30], it is proposed that interventional studies be conducted in the field of pain reduction in patients using CPIP.

Conclusion

It is essential to follow up on factors affecting CPIP in children undergoing hernia surgery on an ongoing basis or even one year after surgery.

References

[1] Olesen C, Mortensen L, Öberg S, Rosenberg J. Risk of incarceration in children with inguinal hernia: a systematic review. Hernia. 2019; 23:245-54.

[2] Taylor K, Sonderman KA, Wolf LL, Jiang W, Armstrong LB, Koehlmoos TP, et al. Hernia recurrence following inguinal hernia repair in children. J Pediatr Surg. 2018;53(11):2214-8.

[3] Yeap E, Nataraja RM, Pacilli M. Inguinal hernias in children. Aust J Gen Pract. 2020;49(1/2):38-43.

[4] Weaver KL, Poola AS, Gould JL, Sharp SW, Peter SDS, Holcomb III GW. The risk of developing a symptomatic inguinal hernia in children with an asymptomatic patent processus vaginalis. J Pediatr Surg. 2017;52(1):60-4.
[5] Morgado M, Holland AJ. Inguinal hernias in children: Update on management guidelines. J Paediatr Child Health. 2024;60(11):648-53.
[6] Peyvaste M, Askarpour S, Sherafatmand S, Toghyani Dolatabadi M. Comparing the Complications and Recurrence Rate after Inguinal Hernior-rhaphy by Open and Laparoscopic Surgical Methods in Pediatric Patients: A Case-Control Study. Jundishapur Sci Med J. 2022; 20:612-9.
[7] Kingsnorth A, LeBlanc K. Hernias: inguinal and incisional. Lancet. 2003;362(9395):1561-71.
[8] Feliz E, Martínez MVM. Inguinal Hernia in Children: A Literature Review. IntechOpen; 2025.
[9] Wang K, Tan SS, Xiao Y, Wang Z, Peng C, Pang W, et al. Characteristics and treatments for pediatric ordinary and incarcerated inguinal hernia based on gender: 12-year experiences from a single center. BMC Surg. 2021;21:1-7.
[10] Ravikumar V, Rajshankar S, Kumar HR, MR NG. A clinical study on the management of inguinal hernias in children on the general surgical practice. J Clin Diagn Res. 2012;7(1):144.
[11] Hader HA, Alrashidi TN, Alshehri YA, Abdulhadi NY, Hosiky MF, Alrazhi FS, et al. Clinical Characteristics of Inguinal Hernia Repair in Children: A Retrospective Study. Med Sci. 2020;24(105):3683-9.
[12] Perez Lara F, Del Rey Moreno A, Oliva Muñoz H. Do we really know the symptoms of inguinal hernia? Hernia. 2015;19:703-12.
[13] Kazemnejad K, Hosseini SM, Haydari A, Ghourchaei A. Comparison of the effect of subcutaneous injection of Ketamine and Lidocaine in reducing postoperative pain in patients undergoing elective inguinal hernia surgery under general anesthesia. J Gorgan Univ Med Sci. 2020;22(1):1-6.
[14] Hurley RW, Wu CL. Acute postoperative pain. Miller's anesthesia. 2010:2757-81.
[15] Correll DJ, Vlassakov KV, Kissin I. No evidence of real progress in treatment of acute pain, 1993-2012: scientometric analysis. J Pain Res. 2014;7:199-210.
[16] Siawan MJ, Huusein HA. Proneness to anxiety and depression among middle school students: Does emotion expression matter. Social Science. 2022;12(2):7205-12.
[17] Al-Showaily JS, Saiwan MJ, Dawood MA. Mothers of Autistic Children Insisting Needs. InMedical Forum Monthly. 2025; 36(11).
[18] Widder A, Reese L, Lock JF, Wiegering A, Germer CT, Kindl GK, et al. Postoperative Analgesics Score as a Predictor of Chronic Postoperative Inguinal Pain After Inguinal Hernia Repair: Lessons Learned From a Retrospective Analysis. World J Surg. 2023;47(10):2436-43.
[19] Widder A, Bucher H, Reinhold AK, Maroske L, Meyer T, Wiegering A, et al. Chronic postoperative inguinal pain (CPIP) after pediatric inguinal hernia repair-a retrospective analysis. Hernia. 2025;29(1):62.
[20] Chen Y-H, Wei C-H, Wang K-WK. Children With Inguinal Hernia Repairs: Age and Gender Characteristics. Glob Pediatr Health. 2018;5:2333794X18816909.
[21] Reinpold W. Risk factors of chronic pain after inguinal hernia repair: a systematic review. Innov Surg Sci. 2017;2(2):61-8.
[22] Pierides GA, Paajanen HE, Vironen JH. Factors predicting chronic pain after open mesh based inguinal hernia repair: A prospective cohort study. Int J Surg. 2016;29:165-70.
[23] Bande D, Moltó L, Pereira JA, Montes A. Chronic pain after groin hernia repair: pain characteristics and impact on quality of life. BMC Surg. 2020;20(1):147.
[24] Forester B, Attaar M, Chirayil S, Kuchta K, Denham W, Linn JG, et al. Predictors of chronic pain after laparoscopic inguinal hernia repair. Surgery. 2021;169(3):586-94.
[25] Kristensen A, Ahlburg P, Lauridsen M, Jensen T, Nikolajsen L. Chronic pain after inguinal hernia repair in children. Br J Anaesth. 2012;109(4):603-8.
[26] Aasvang EK, Kehlet H. Chronic pain after childhood groin hernia repair. J Pediatr Surg. 2007;42(8):1403-8.
[27] Saiwan MJ, Shafik SA, Nizamli FM, Ahmad L, Abdel-Aziz NI, Awarke AH. Effect of a Health Belief Model-Based Educational Program on University Students' Knowledge and Beliefs Regarding Sexual Harassment. International Journal of Body, Mind & Culture. 2025;12(6): 48-60.
[28] Bakytbekovich On, Al-Hili A, Hamid Ali D, Kamal Mahmoud A, Hachin Muhammad E, S Abed A, et al. The effect of intervention using stages of change method to improve pap smear screening for cervical cancer. Journal of Obstetrics, Gynecology and Cancer Research. 2023;8(3):277-84.
[29] Sawaheny M, Watt-Watson J, Mcgillion M. A pain education intervention for patients undergoing ambulatory inguinal hernia repair: a randomized controlled trial. Canadian journal of nursing research. 2017;49(3):108-17.
[30] Kockerling F, Schug-Pass C. Early surgical intervention following inguinal hernia repair with severe postoperative pain. Frontiers in surgery. 2017; 4:67.