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Intussusception survey about practices among Turkish pediatric surgeons

Kıvılcım Karadeniz Cerit, Özge Kılıç Bayar

Intussusception is one of the most common abdominal emergency in children under three years of age.[1] In this pathology, the proximal intestine is invaginated into the distal intestine in a telescope-like manner. Inflammation and edema of the affected bowel segment results in impaired blood flow and bowel necrosis, which requires urgent diagnosis and intervention due to the risk of perforation. Releasing of the invaginated intestine with hydrostatic or pneumatic pressure is described as reduction of intussusception.[2]

There are many studies published on the subject and recommendations based on evidence-based data have been developed for management of intussusception in children.[3] However various aspects in management of intussusception remain controversial. The main reason for this variability across institutions is that not all centers have access to the same conditions in terms of diagnosis and treatment methods.

Controversial aspects of diseases or rare conditions are common problems in pediatric surgery. Due to the lack of evidence-based data, survey studies are an important research tool to evaluate practice patterns of pediatric surgeons.[4] In the present study, we aimed to provide

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Correspondence: Kıvılcım Karadeniz Cerit, MD.

E-mail: kcerit@yahoo.com

Department of Pediatric Surgery, Marmara University Faculty of Medicine, İstanbul, Türkiye.

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Abstract

Objectives: The aim of this study was to provide an overview of the pediatric surgery practices in the management of intussusception among different centers in Türkiye.

Materials and methods: Between June 2023 and August 2023, a survey was sent to the pediatric surgeons working in different provinces of Türkiye as the members of the Turkish Association of Pediatric Surgeons by e-mail and text messages, inviting them to complete questions about intussusception practices. Of a total of 1,029 pediatric surgeons, there were 200 respondents (120 males, 80 females; mean age 42.8±11.1 years; range, 24 to 72 years). Items survey included demographics, preferred radiological reduction techniques, contraindications, use of monitorization/sedation/other medications, maximum pressure/height, number and time interval between reattempts, length of hospitalization, surgical preference in case of failed reduction and additional appendectomy during procedure. Multiple answers were possible for some of the questions.

Results: A total of 200 surgeons (19.4%) completed the survey. Totally, 80.5% (n=161) of pediatric surgeons were working in centers that manage ≤5 cases of intussusception per month. While radiological reduction method was chosen as the first treatment method for intussusception by 87.5% (n=175) of respondents, 10.5% (n=21) still preferred laparotomy as the first option. Ultrasound-guided hydrostatic reduction was preferred by 74.5% (n=143) of the respondents. While sedation was used by 32.5% (n=62) respondents, steroids were administered by 13.5% (n=26). A total of 33% (n=63) of the respondents did not attempt another reduction. After a failed reduction, 39.3% (n=75) of the respondents preferred a laparoscopic approach, while 58.6% (n=112) chose laparotomy as their first option. Totally, 76.6% (n=151) of pediatric surgeons did not perform an additional appendectomy procedure during the operation.

Conclusion: Our study results indicate that various aspects remain controversial among institutions for the management of intussusception among Turkish pediatric surgeons. We believe that a better understanding of the current techniques and individual differences would facilitate to develop an evidence-based guideline to standardize care and improve clinical outcomes of intussusception.

Keywords: Intussusception, pediatric surgeon, survey.

an overview of the management of intussusception in children and evaluate the practice patterns of Turkish pediatric surgeons among different centers in Türkiye.

MATERIALS AND METHODS

This descriptive survey study was conducted at Marmara University Faculty of Medicine, Department of Pediatric Surgery between June 2023 and August 2023. The study protocol was approved by the Marmara University Faculty of Medicine Clinical Research Ethics Committee (date: 06.10.2023, no: 09.2023.1216). The study was conducted in accordance with the principles of the Declaration of Helsinki.

A survey was sent to the pediatric surgeons working in different provinces of Türkiye as the members of the Turkish Association of Pediatric Surgeons by e-mail and text messages, inviting them to complete questions about intussusception practices. The questionnaire was planned using the Google Forms. Multiple answers were possible for some of the questions. Of a total of 1,029 pediatric surgeons, there were 200 respondents (120 males, 80 females; mean age 42.8±11.1 years; range, 24 to 72 years). Since the participants did not answer each question, responses were expressed as percentage according to the number of participants for each question.

Data including demographics about the respondents (years of experience, institution, academic or community based), number of cases treated per/month, preferred radiological reduction techniques in intussusception, contraindications, use of monitorization/sedation/other medications during patient preparation, maximum pressure/height, number and time interval between reattempts, length of hospitalization, surgical preference in case of failed reduction and additional appendectomy during procedure were collected.

Statistical analysis

The questionnaire was planned in survey construction using Google Docs. The data collected were entered and analyzed on Google Analytics. Descriptive statistics were performed on each item of the survey.

RESULTS

Of a total of 1,029 pediatric surgeons, only 200 (19.4%) responded. Of them, 44.5% (n=89) were working in state hospitals, 40% (n=80) in university hospitals, and 15.5% (n=31) in private practice. A total of 80.5% (n=161) of pediatric surgeons were working in centers that manage ≤5 cases of intussusception per month. While radiological reduction method was chosen as the first treatment method for intussusception by 87.5% (n=175) of pediatric surgeons, 10.5% (n=21) of them still preferred laparotomy as the first option. Contraindications aside from perforation and peritonitis are summarized in Table 1.

Preparation (antibiotics/sedation/steroid)

Antibiotics were administered in 44.7% (n=85) of the patients before the procedure. During radiological reduction while sedation was used in 32.5% (n=62) of cases, steroids were administered in 13.5% (n=26) of cases after the procedure. Premedications used before radiological reduction are listed below in Table 2. A total of 74.5% (n=143) of the respondents predominantly preferred ultrasound (US)-guided hydrostatic reduction, while other options were rarely performed. The preferred radiological reduction methods are detailed in Table 3. Maximum height was

TABLE 1
Contraindications of radiological reduction (183 responses)

	n	%
Symptoms longer than 48 h	88	48
Pathologic leading point in ultrasonography	77	42
Severe dehydration	74	40
Hematochezia	59	32
Weakened blood flow in Doppler ultrasonography	59	32
>3 years of age	30	16

TABLE 2
Preparation of the patients before radiological reduction

	n	%
Sedation (191 response)	62	32.5
Antibiotics (190 response)	85	44.7
Steroids (192 response)	26	13.5

TABLE 3
Radiological reduction methods (192 responses)

	n	%
Ultrasonography guided hydrostatic reduction	143	74.5
Fluoroscopy guided pneumatic reduction	22	11.5
Fluoroscopy guided water-soluble contrast material reduction	21	10.9
Fluoroscopy guided barium enema reduction	6	3.1

TABLE 4
Time interval between reattempts (143 responses)

	n	%
0-15 min	31	21.7
16-30 min	27	18.9
31-60 min	23	16.1
61-120 min	30	21
>120 min	32	22.4

determined as 1 meter by 42.6% (n=75) of surgeons, 10.2% (n=18) of participants preferred 1.2 meters, and 24.4% (n=43) preferred 1.5 meters. While 11.9% (n=21) of surgeons performed hydrostatic reduction from as high as possible, 10.8% (n=19) of surgeons preferred other methods or did not measure the height during the procedure. In pneumatic reduction, maximum pressure measurement was performed by only 40.5% (n=53) of pediatric surgeons.

Reattempt

Although most pediatric surgeons repeated the procedure in case of failure, 33% (n=63) of the respondents did not attempt another reduction. If they reattempted the reduction, 33.5% (n=64) of respondents repeated the procedure once, 19.9% (n=38) twice, 13.1% (n=25) thrice, and 0.5% (n=1) four times. Details of time interval between reattempts are depicted in Table 4.

Length of hospitalization

After the radiological reduction procedure, 49.7% (n=95) of surgeons preferred monitoring patients in the hospital for a period of 13 to 24 h, while 36.1% (n=69) of them chose hospitalization longer than a day.

Surgical approach

After a failed reduction, 39.3% (n=75) of pediatric surgeons preferred a laparoscopic approach, while 58.6% (n=112) chose laparotomy as their first option. None of the respondents practiced laparoscopically assisted reduction. Also, 76.6% (n=151) of surgeons did not perform an additional appendectomy procedure during the operation.

DISCUSSION

Although intussusception is a common abdominal emergency in children, various aspects in management of intussusception remain controversial among institutions. To optimize healthcare resources, prevent unnecessary treatments and minimize differences in practices, we evaluated current practices of Turkish pediatric surgeons in intussusception. The present study showed that 44.5% (n=89) of surgeons were practicing in state hospitals, 40% (n=80) in university hospitals, and 15.5% (n=31) in private practice. In addition, 80.5% (n=161) of all respondents were working in centers that manage ≤5 cases of intussusception per month and 87.5% (n=175) of them performing radiological reduction as the first treatment option.

The first controversial issue is which patients are contraindicated for radiological reduction. Patients with signs of peritonitis, perforation/pneumoperitoneum and those who are hemodynamically unstable despite adequate resuscitation are not suitable for radiological reduction.[5] Severe dehydration, severe hematochezia, decreased blood flow on Doppler, free fluid and symptoms exceeding two days were also included in exclusion criteria in a survey study analyzing current practices of pediatric radiologists.[5] More interestingly, we noticed in our study that the attitude of pediatric surgeons were not as conservative as pediatric radiologists regarding contraindications of radiological reduction. More than half of them performed reduction even the patient presented with symptoms exceeding two days and had a pathological lead point in imaging.

To maximize success, various radiological reduction techniques have been described in intussusception. There are multiple studies comparing different techniques to show the optimal reduction method.[1,6] Although pneumatic reduction

is more popular in the United States, US-guided hydrostatic reduction is more frequently preferred in Europe. Similarly, in our study, most pediatric surgeons in Türkiye reported the use of US-guided hydrostatic reduction. This situation can be explained by the fact that these patients are initially evaluated by a pediatric radiologist in the United States, and they prefer pneumatic reduction with fluoroscopy as the first option in treatment. However, exposure to radiation in the fluoroscopic procedure can be considered among the disadvantages of pneumatic reduction. In addition, assuming that the procedure will be repeated after unsuccessful reduction, the patient will be exposed to radiation several times. Also, difficulty in maintaining maximum pressure control during the procedure may lead to complications; indeed, the use of maximum pressure measurement was reported by only 40.5% (n=53) of pediatric surgeons who performed pneumatic reduction with fluoroscopy in our study.

Lautz et al.[7] recently reported a study that clarified the question of whether reattempt was safe, if initial radiological reduction failed. In the aforementioned study, 64.3% of the patients who underwent delayed repeat enema did not require surgical intervention. In addition, bowel resection decreased significantly in patients who underwent surgery after delayed repeat enemas compared to the group of patients who had immediate surgery after unsuccessful initial enema reduction (11.8% *vs.* 26.6%). Based on these data, it was recommended that delayed repeat enema was safe, if there was progressive movement of the intussusception after the initial attempt, the patient was hemodynamically stable and there was no sign of peritonitis.[8] Also repeating up to four attempts was recommended in the intussusception management algorithm.[3] However, despite these data regarding the improved outcomes of reattempt in radiological reduction, 33% (n=63) of our respondents did not repeat the procedure in case of failure. Indeed, up to four reattempts were barely detected in our study. Although there is not enough data supporting optimal time interval between reattempts, 30 min to 4 h is considered safe.[5] Likewise, 59.5% (n=85) of our respondents considered a period of at least 30 min to be safe to repeat the procedure. However, the results of the study also yielded a disturbing data showing that 40.6% (n=58) of respondents waited less than 30 min between reattempts, which may lead to complications.

Some medications used before and during the procedure are also a controversial issue that varies between centers. Prophylactic antibiotic use is not recommended, as there is no evidence of reducing post-reduction complications.[9] Nevertheless, the attitude of respondents toward the use of antibiotics was more frequent than expected in our study. Furthermore, there are studies showing that midazolam has a positive effect on enema reduction results and improved success rate; in addition, dexamethasone was significantly found to be effective in preventing recurrence.[1,10] However, in our study, only 32.5% (n=62) of pediatric surgeons used midazolam during the procedure, and steroids were not used by the majority of respondents.

The observation period and safe timing for discharge after a successful reduction is also another debatable topic. Sujka et al.[11] examined the efficacy of outpatient management after successfully reduced intussusceptions. In their institutional protocol observation and discharge from emergency department (ED) after 4 h resulted in an increase in the rate of return to ED, yet only one-third of them had a recurrence. They believe that proper education about warning signs would improve the results of the protocol. In a meta-analysis supporting outpatient management emphasized that the risk of early (within 48 h) recurrence rate was low after successful reduction, regardless of the type of radiological reduction.[12] The incidence of recurrent intussusception was determined in a study analyzing nationwide readmissions. They observed that 1.4% of patients were readmitted for recurrence within 30 days of discharge, and only 2.6% of patients within one year. The authors found that median time to readmission was four days after reduction and only 1.5% of recurrence was experienced within 48 hours of discharge, which also supported the practice of early discharge after successful reduction.[13] Moreover, in a recent study analyzing risk factors; age ≥2 years, duration of symptoms ≥48 h, rectal bleeding, location of the mass (left over right side) and pathological lead point were found to be significant in terms of recurrence.[14] In our study, majority of pediatric surgeons preferred to follow their patients in their clinic after reduction; however, based on these data, it can be concluded that delaying the discharge is unnecessary considering the low risk of

recurrence within 48 h. In addition, it should also be emphasized that patients who had risk factors should be taken into consideration for recurrence and parents should be informed about early referral, if symptoms are observed in centers implementing protocols recommending early discharge.

It is also a controversial issue whether radiological reduction should not be attempted at all after a certain age and surgery should be the first stage of treatment. The underlying reason for this discussion is the possibility of missing a possible cancer diagnosis or other pathological lead points during radiological reduction. Savoie et al.[15] analyzed the management of intussusception and age at presentation reviewing Pediatric Health Information System database. Although the rate of Meckel's diagnosis was significantly higher in patients aged >3 years, cancer diagnosis was found to be similar with patients aged <3 years. They concluded that older age was not associated with an increased risk of recurrent admission and suggested that enema reduction might be safe and effective in children aged >3 years. In the light of these data, radiological reduction may be considered the first step in the treatment of intussusception at any age. Likewise, >3 years of age was not considered a contraindication among Turkish pediatric surgeons in our study.

There are many studies in the literature on which surgical approach to choose after unsuccessful reduction. There is insufficient evidence showing laparoscopic or open surgery is superior to each other in terms of recurrence rates or complications. However, considering the shorter length of hospitalization and similar complication rates, laparoscopic approach is recommended as the first treatment of choice in intussusception.[16] The results of a multi-center study conducted to determine the most accurate indication for laparoscopic approach in the treatment of intussusception are also of utmost importance.[17] In this study, the length of time from the onset of clinical symptoms, the presence of peritonitis or pathological lead point were significant in terms of the risk of conversion to open surgery. Based on these results, it can be suggested that patients with symptoms <1.5 days and no signs of peritonitis are the most appropriate candidates for a successful laparoscopic approach.[17] It has also been emphasized that use of air and saline enema may have a facilitating effect on laparoscopic reduction.[18] Although laparoscopy was not preferred frequently as the initial step of treatment among Turkish pediatric surgeons in our study, previous studies have revealed that laparoscopic approach can be considered the first choice of treatment in patients who are appropriate candidates for successful results.

Prophylactic appendectomy is another traditional approach during surgical treatment of intussusception. However, there is insufficient data to support this practice pattern among pediatric surgeons. Indeed, the necessity of incidental appendectomy during surgical treatment of intussusception has been discussed in a recent study.[19] Adjusted total cost and mean length of hospital stay were significantly higher in the appendectomy group. The aforementioned authors suggested to reconsider appendectomy during surgery for uncomplicated intussusception. Based on these data, appendectomy is recommended in the presence of inflammation and ischemia during surgical reduction of intussusception.[3] Consistent with these findings, most pediatric surgeons in Türkiye do not additionally perform an appendectomy procedure, as shown in our study.

Similar to other surveys, our results are based on the personal opinions of participants, not objective data which is a limitation of this study. Since the respondents work in centers with different volume of cases and due to the lack of homogeneous access to healthcare resources across institutions, wide range of responses on certain topics were observed. Moreover, the questionnaire was answered only by 19.4% of Turkish pediatric surgeons; we cannot consider the findings of this study sufficiently reflect the approach of pediatric surgeons in Turkey.

In conclusion, our study is the first to evaluate the management of intussusception among Turkish pediatric surgeons which has confirmed that various aspects remain controversial among institutions. We believe that a better understanding of the current techniques and individual differences would facilitate to develop an evidence-based guideline to standardize care and improve clinical outcomes of intussusception.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

1. Gluckman S, Karpelowsky J, Webster AC, McGee RG. Management for intussusception in children. Cochrane Database Syst Rev 2017;6CD006476. doi: 10.1002/14651858.CD006476.pub3.
2. Puckett Y, Greenspon J, Fitzpatrick C, Vane D, Bansal S, Rice M, et al. Utility of hospital admission for pediatric intussusceptions. Pediatr Surg Int 2016;32:805-9. doi: 10.1007/s00383-016-3924-z.
3. Kelley-Quon LI, Arthur LG, Williams RF, Goldin AB, St Peter SD, Beres AL, et al. Management of intussusception in children: A systematic review. J Pediatr Surg 2021;56:587-96. doi: 10.1016/j.jpedsurg.2020.09.055.
4. Zani A, Zani-Ruttenstock E, Eaton S, Pierro A. The value of surveys in pediatric surgery. Eur J Pediatr Surg 2015;25:500-3. doi: 10.1055/s-0035-1569465.
5. Stein-Wexler R, O'Connor R, Daldrup-Link H, Wootton-Gorges SL. Current methods for reducing intussusception: survey results. Pediatr Radiol 2015;45:667-74. doi: 10.1007/s00247-014-3214-7.
6. Xie X, Wu Y, Wang Q, Zhao Y, Chen G, Xiang B. A randomized trial of pneumatic reduction versus hydrostatic reduction for intussusception in pediatric patients. J Pediatr Surg 2018;53:1464-8. doi: 10.1016/j.jpedsurg.2017.08.005.
7. Lautz TB, Thurm CW, Rothstein DH. Delayed repeat enemas are safe and cost-effective in the management of pediatric intussusception. J Pediatr Surg 2015;50:423-7. doi: 10.1016/j.jpedsurg.2014.09.002.
8. Aslanabadi S, Badebarin D, Ghavifekr NH, Aslanabadi S, Zarrintan S, Hossein Ladan A, et al. Twenty years of experience in management of intussusception: saline enema reduction with ultrasound guidance. Cocuk Cerrahisi Derg 2021;35:148-54.
9. Al-Tokhais T, Hsieh H, Pemberton J, Elnahas A, Puligandla P, Flageole H. Antibiotics administration before enema reduction of intussusception: Is it necessary? J Pediatr Surg 2012;47:928-30. doi: 10.1016/j.jpedsurg.2012.01.050.
10. Giacalone M, Pierantoni L, Selvi V, Morabito A, Baldazzi M, Lima M, et al. Midazolam premedication in ileocolic intussusception: A retrospective multicenter study. Eur J Pediatr 2022;181:3531-6. doi: 10.1007/s00431-022-04524-6.
11. Sujka JA, Dalton B, Gonzalez K, Tarantino C, Schroeder L, Giovanni J, et al. Emergency department discharge following successful radiologic reduction of ileocolic intussusception in children: A protocol based prospective observational study. J Pediatr Surg 2019;54:1609-12. doi: 10.1016/j.jpedsurg.2018.08.042.
12. Gray MP, Li SH, Hoffmann RG, Gorelick MH. Recurrence rates after intussusception enema reduction: A meta-analysis. Pediatrics 2014;134:110-9. doi: 10.1542/peds.2013-3102.
13. Ferrantella A, Quinn K, Parreco J, Quiroz HJ, Willobee BA, Ryon E, et al. Incidence of recurrent intussusception in young children: A nationwide readmissions analysis. J Pediatr Surg 2020;55:1023-5. doi: 10.1016/j.jpedsurg.2020.02.034.
14. Xie X, Wu Y, Wang Q, Zhao Y, Xiang B. Risk factors for recurrence of intussusception in pediatric patients: A retrospective study. J Pediatr Surg 2018;53:2307-11. doi: 10.1016/j.jpedsurg.2018.03.023.
15. Savoie KB, Thomas F, Nouer SS, Langham MR Jr, Huang EY. Age at presentation and management of pediatric intussusception: A Pediatric Health Information System database study. Surgery 2017;161:995-1003. doi: 10.1016/j.surg.2016.09.030.
16. Benedict LA, Ha D, Sujka J, Sobrino JA, Oyetunji TA, St Peter SD, et al. The laparoscopic versus open approach for reduction of intussusception in infants and children: An updated institutional experience. J Laparoendosc Adv Surg Tech A 2018;28:1412-5. doi: 10.1089/lap.2018.0268.
17. Bonnard A, Demarche M, Dimitriu C, Podevin G, Varlet F, François M, et al. Indications for laparoscopy in the management of intussusception: A multicenter retrospective study conducted by the French Study Group for Pediatric Laparoscopy (GECI). J Pediatr Surg 2008;43:1249-53. doi: 10.1016/j.jpedsurg.2007.11.022.
18. Geltzeiler CB, Sims TL, Zigman AF. LAHRI: Laparoscopic-Assisted Hydrostatic Reduction of Intussusception. J Laparoendosc Adv Surg Tech A 2015;25:763-6. doi: 10.1089/lap.2014.0283.
19. Wang A, Prieto JM, Ward E, Bickler S, Henry M, Kling K, Thangarajah et al. Operative treatment for intussusception: Should an incidental appendectomy be performed? J Pediatr Surg 2019;54:495-9. doi: 10.1016/j.jpedsurg.2018.10.099.

