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Nonsurgical treatment of intussusception in pediatric patient

Pediatrik hastada invajinasyonun ameliyatsız tedavisi

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Abstract

Purpose: In this study, to show that the pre-diagnosis of intussusception should be kept in mind if there is a suspicious appearance in the abdominal X-ray in pediatric patients with intermittent abdominal pain or discomfort in the form of colic, even though there is no rectal bleeding and bile vomiting.

Material and methods: In this retrospective, single-center, cross-sectional descriptive study, we examined the records of 33 patients who were followed up due to intussusception between the ages of 0-18 at Pamukkale University Faculty of Medicine Pediatric Surgery Clinic between September 2017 and September 2020.

Patients were evaluated in terms of demographic data, hospital admission times, data on imaging methods, pneumatic reduction and surgery.

Results: The average age was 37.4±18.8 months. The time from the onset of the patients' complaints to admission to the hospital was 57.3±66.1 hours. 10 patients had ileus findings on abdominal radiography. 30 patients had the image of a champagne glass, typical of intussusception. Ultrasonography showed mesentery lymphadenopathy in 20 patients, and leading point in 3 patients. Ultrasonography of 1 patient was normal, but when the abdominal radiography of this patient was evaluated, there was a suspicion for intussusception. When this patient was evaluated under fluoroscopy and pneumotic reduction was performed. 3 patients who had leading point. Meckel's diverticulum was detected in 1 of 3 patients, Burkitt's lymphoma in 1, and neurofibroma in 1.

Conclusion: Pneumatic reduction is more preferred as it is a method that the surgeon can do in the operating room, under fluoroscopy and alone. Another advantage of trying pneumatic reduction under fluoroscopy in the operating room is to try the nonoperative technique in a controlled manner in patients with ileus findings and late arrivals.

Key words: Intussusception, invagination, vomiting, rectal bleeding, colic pain.

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Öz

Amaç: Bu çalışmada rektal kanaması ve safralı kusması olmasa da aralıklı ve kolik şeklinde karın ağrısı ile başvuran çocuk hastalarda karın grafisinde şüpheli bir görüntü varsa invajinasyon ön tanısının akılda tutulması gerektiğini göstermeyi amaçladık.

Gereç ve yöntem: Bu retrospektif, tek merkezli, kesitsel tanımlayıcı çalışmada, Pamukkale Üniversitesi Tıp Fakültesi Çocuk Cerrahisi Kliniği'nde Eylül 2017-Eylül 2020 tarihleri arasında 0-18 yaş arasında invajinasyon nedeniyle takip edilen 33 hastanın kayıtları incelenmiştir.

Hastalar demografik veriler, hastaneye yatış süreleri, görüntüleme yöntemleri, pnömotik redüksiyon ve cerrahiye ilişkin veriler açısından değerlendirildi.

Bulgular: Ortalama yaş 37,4±18,8 aydı. Hastaların şikâyetlerinin başlamasından hastaneye başvurularına kadar geçen süre 57,3±66,1 saatti. 10 hastada karın grafisinde ileus bulguları vardı. 30 hastada tipik invajinasyon bulgusu olan bir şampanya kadehi görüntüsü vardı. Ultrasonografi 20 hastada mezenter lenfadenopati ve 3 hastada “leading point” mevcuttu. 1 hastanın ultrasonografisi normaldi ancak bu hastanın karın grafisi değerlendirildiğinde invajinasyon şüphesi vardı. Bu hasta floroskopi altında değerlendirildiğinde pnömotik redüksiyon yapıldı. “Leading point” olan 3 hastanın 1'inde Meckel divertikülü, 1'inde Burkitt lenfoma ve 1'inde nörofibrom eksize edildi.

Sonuç: Pnömotik redüksiyon cerrahın ameliyathanede, floroskopi altında ve tek başına yapabileceği bir yöntem olduğu için daha çok tercih edilmektedir. Ameliyathanede floroskopi altında pnömotik redüksiyon denenmesinin bir diğer avantajı da ileus bulguları olan ve geç gelen hastalarda ameliyatsız tekniği kontrollü bir şekilde denemektir.

Anahtar kelimeler: İnvajinasyon, çilek jölesi dışkı, safralı kusma, rektal kanama, kolik ağrısı.

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Introduction

Intussusception is one of the most common causes of intestinal obstruction in children under 2 years of age, especially between 3-9 months [1]. Occurs with a frequency of 1.5-4/1000 [2]. First described by Barbette in 1674 [3]. It may occur secondary to the "leading point" or idiopathic. The most common pathological leading point cause is Meckel's diverticulum [4, 5]. Early diagnosis in intussusception can reduce the risk of adverse outcomes and increase the chance of successful reduction without bowel resection. However, symptoms are often not specific for the child age group [6]. A patient with a history of restlessness, bloody diarrhea like strawberry jelly, bilious vomiting, intermittent colic abdominal pain, a palpable mass in the abdomen on physical examination, is diagnosed with abdominal radiography and ultrasonography [7]. Non-surgical reduction methods have been used in the treatment of intussusception for a long time [8]. Non-surgical reduction methods are preferred if there is no long history, perforated bowel segment and leading point in ultrasonography [9]. Water soluble contrast agent [10], saline [11], ve barium [12] are also used for reduction. Pneumatic reduction is the more preferred method because it is clean, fast and has a high success rate and less morbidity [13-15].

Our aim in this study is to show that the pre-diagnosis of intussusception should be kept in mind if there is a suspicious appearance in the abdominal radiography in pediatric patients who present with the complaint of colic abdominal pain or discomfort even though there is no rectal bleeding and bile vomiting, even if the abdominal ultrasonography is normal.

Material and method

In this retrospective, single-center, cross-sectional descriptive study, we examined the records of 33 patients who were followed up due to intussusception between the ages of 0-18 at Pamukkale University Medical Faculty Pediatric Surgery Clinic between September 2017 and September 2020.

We evaluated the patients according to age, gender, blood values, time of admission to the hospital, abdominal radiography and abdominal ultrasonography findings, intestinal segment with intussusception, whether pneumatic reduction was performed, surgical reasons, postoperative pathology results, and whether there was re-invagination.

Under fluoroscopy for pneumatic reduction, 22 fr urinary catheters are advanced rectally, the balloon is inflated with 30 cc saline, air is given to a pressure of 60-80 mmHg and the abdominal pressure does not exceed 100 mmHg, and it is followed whether the invaginated segment is opened and whether there will be perforation. The reduction was done in a controlled manner. If the first pneumatic reduction is unsuccessful, we try again pneumatic reduction after 40 minutes.

Patients who underwent surgery were first evaluated laparoscopically and switched to laparotomy if manual reduction was not available and the leading point was present.

This study started after obtaining ethics approval from the Ministry of Health of Turkish Republic, Pamukkale University Local Ethics Committee.

Statistical analysis

In our study, we used the Windows SPSS 23.0 statistics program. Values are given as weighted mean ± standard deviation. The significance between two independent groups was evaluated by the Independent Samples T test and $p<0.05$ was considered significant.

Results

The average age of 33 patients who applied for intussusception was 37.4±18.8 months, 21 (63.6%) were male, 12 (36.4%) were female patients. No significant difference was found between the ages of the female and male patients at the time of admission ($p=0.09$). The mean age of male patients was 41.1±20.6 months, and the mean age of female patients was 30.8±13.5 months. The mean weight of the patients was 12.2±3.6 kilograms. A significant difference was found between the weight at the time of admission between the female and male patients ($p=0.02$).

Hemogram, biochemistry and C reactive protein values were studied in all patients at admission. Leukocyte was 11963±4899/mm³ (range: 4000-25560/mm³), C reactive protein was 3.0±3.5 mg/L (range: 0.2-19.4 mg/L). There was no significant difference in leukocyte values

between male and female patients (p=0.1). There was a significant difference between male and female patients in terms of C reactive protein values (p=0.04).

The time between the onset of the complaints of the patients and their admission to the hospital was 57.3±66.1 hours (range: 6 hours to 15 days). Vomiting in 19 (57.6%) patients at admission, colic abdominal pain in 31 (93.9) patients, rectal bleeding in 7 (21.2%) patients, abdominal distension in 13 (39.4%) patients, diarrhea in 15 (45.5%) patients, 28 (84.8%) The patient had dehydration and 4 (12.1%) patients had signs of peritonitis.

Abdominal radiography and abdominal ultrasonography were requested from all patients. There are ileus findings in 10 (30.3%) patients on direct abdominal radiography. 30 (90.9%) patients had a typical champagne glass appearance on abdominal X-ray (Figure 1). Twenty of the 33 patients had mesenteric lymphadenopathy on abdominal ultrasonography. The mean size of intraabdominal mesenteric lymphadenopathies was 7.2±4.0 millimeters. In the ultrasonography of 17 patients, there was free fluid inside the abdomen. Only 3 patients had leading point in intussusception.

Figure 1. Image of champagne glass seen in intussusception in the middle of the abdomen

(Two radiopaque objects, clothing accessory in the right lower and middle quadrant)

In ultrasonography, 18 (54.5%) of 33 patients had ileocecal, 8 (24.2%) ileoileal, 1 (3%) ileocolic, 5 (15.2%) had collocolic intussusception. Ultrasonographic evaluation of 1 patient was normal. Because of the suspicion of intussusception in the abdominal radiography, no invaginated segment was detected in his ultrasonography, and this patient underwent pneumatic reduction to the 4-centimeter invaginated segment extending from the right lower quadrant to the left upper quadrant under fluoroscopy.

All of the patients were admitted to the pediatric surgery service and intravenous fluid was started for all of them. Clinic and history were evaluated rapidly and a decision was made in terms of pneumatic reduction, laparoscopy and laparotomy. Pneumatic reduction was performed in 26 patients 5.7±7.6 hours after hospitalization. Classically, pneumotic reduction was performed in all patients with the same protocol. Pneumatic resuction was not performed in 7 patients. Laparotomy was performed in 3 of 7 patients who did not have pneumatic reduction after laparoscopic examination. 4 patients had spontaneous reduction.

Laparoscopic examination was performed when ileoileal intussusception was detected in ultrasonography of a 48-month-old male patient who admitted to the hospital 48 hours after the onset of symptoms. Manual reduction was performed. Leading point was present (Figure 2). Ileal resection and anastomosis was performed. When the pathology result was Burkitt's lymphoma, he was taken to oncology follow-up. Meckel resection and ileal resection anastomosis was performed in a 12-month-old female patient, who was admitted 48 hours after the onset of symptoms and whose ultrasound revealed collocolic intussusception and was the leading point. The third patient was a 59-month-old male patient who admitted to our hospital 15 days after the onset of his complaints. He had ileoileal intussusception in ultrasonography. Laparotomy was applied to the patient, manual reduction and jejunal resection and anastomosis was performed (Figure 3). When his pathology was compatible with neurofibroma, he was taken to oncology follow-up.

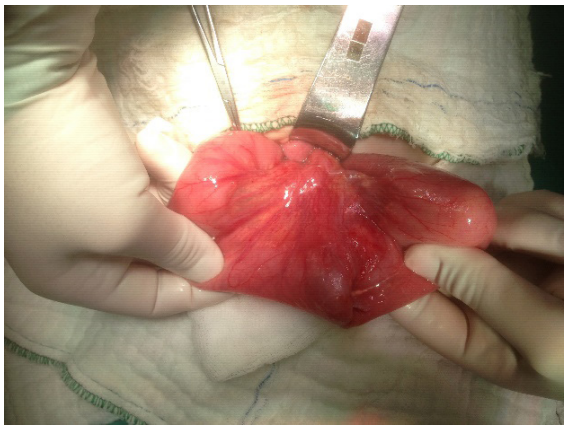

Figure 2. The image of the patient with Burkitt's lymphoma in the ileum during the operation

Figure 3. The image of the patient with neurofibroma detected in the jejunum at the time of operation

The patients were followed up with intravenous fluid support, analgesic and antibiotherapy in the pediatric surgery service after pneumotic reduction. Physical examination was performed intermittently. He was followed up for vomiting and bloody diarrhea. Two patients were reinvaginated. The first patient was reinvaginated 1 hour after the reduction, the second patient 2 months after the reduction, and two patients underwent pneumatic reduction again.

Discussion

Intussusception is the most common cause of acute abdomen after acute appendicitis in the childhood age group. Classical triad; colic abdominal pain, bile vomiting, and strawberry jelly stool [16]. The male / female ratio in publications is shown as 3/2 [2]. In our series, the ratio was found to be 1.7/1. In the literature, it is stated that intussusception is most common between 6-24 months [4, 17]. In our series, unlike the literature, we found the frequency of patients between 6-24 months to be 33.3%. Intussusceptions are most common as ileocecal (80%) [4]. In our series, we found the most frequent intussusception in the ileocecal region with a rate of 54.5%.

Surgeon is also exposed to radiation in every method under fluoroscopy that we use as a noninvasive non-surgical method for our patients [18]. For this reason, many surgeons prefer hydrostatic reduction with ultrasonography [19]. In our series, ultrasonography is performed before and after reduction under fluoroscopy. In other words, since we do the control with ultrasonography, it may be a preference to perform the whole procedure as hydrostatic reduction with ultrasonography.

The reduction rate is very low with pneumotic reduction in cases with symptoms over 48 hours [20]. In our series, surgery was preferred in 3 patients because of the leading point in ultrasonography, symptoms for more than 48 hours and signs of peritonitis on physical examination. Leading point is present in 1.5-12% of childhood intussusceptions [21]. In our series, 3 (9%) patients had leading point. As the leading point, Meckel's divikül is the most common. One of our cases was Meckel's diverticulum, but the other two were Burkitt's lymphoma and neurofibroma.

Some authors in the United States argue that direct radiography is not necessary for the diagnosis of intussusception [3, 6]. However, in our study, although the ultrasonography of one patient was normal, direct radiography was suspected and intussusception was considered and pneumotic reduction was performed. Classically, we perform direct radiography on all patients with abdominal pain. It enables us to make diagnoses such as intussusception, ileus, and perforation very quickly, and it is objective rather than subjective like ultrasonography in terms of comparison with other radiographs in the patient's follow-up.

There were many limitations in our study. We could not compare surgery with nonsurgical technique because the less invasive and non-surgical technique is our first choice. We did not compare non-surgical reduction methods within themselves, because we only perform

pneumatic reduction in our clinic. We are not the only hospital in our city and region, so the number of patients who apply is limited.

In conclusion, non-surgical methods are the first choice for intussusception. Although the rate of diagnosis of ultrasonography is 100% in the literature, it should be kept in mind that there may be findings in direct abdominal radiography in clinical suspicion and should be evaluated together with history and physical examination and attention should be paid. Although it is stated in the literature that pneumatic reduction is not applied in patients with ileus, we tried reduction and our success rate is 100%. Our success rate in patients who come to the hospital after 48 hours is good, contrary to the literature. For this reason, we recommend that pneumatic reduction be performed in the operating room and under fluoroscopy in a controlled manner by the surgeon. Hydrostatic reduction, like pneumatic reduction, can be preferred so that the patient and surgeon are exposed to less radiation. However, we prefer pneumatic reduction because the radiologist should also intervene in the patient urgently at the same time as the surgeon, and the surgeon can perform pneumatic reduction in the operating room with fluoroscopy, and surgery can be performed immediately in case of perforation or if the intussusception is not reduced.

Conflict of interest: All the authors approved the final version to be published; all authors agreed to all aspects of the work.

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Contribution of the authors

Study conception and design: I.G., O.U. Acquisition of data: I.G., O.U. Analysis and interpretation of data: I.G. Drafting of manuscript: I.G. Critical revision: I.G. All the authors approved the final version to be published; all authors agreed to all aspects of the work.