

Childhood Intussusception: Ultrasonography Effectiveness in Imaging Modalities for the Diagnosis

Betül Tiryaki Baştuğ*

Radiology Department, Emergency Radiology, Medical Faculty, Eskişehir Osmangazi University, Turkey

*Corresponding author: Betül Tiryaki Baştuğ, Assistant Professor, Radiology Department, Emergency Radiology, Medical Faculty, Eskişehir Osmangazi University, Turkey, Tel: 05354101542; E-mail: betultryak@yahoo.com

Received date: August 10, 2018; Accepted date: August 17, 2018; Published date: August 24, 2018

Copyright: © 2018 Baştuğ BT. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Baştuğ BT (2018) Childhood Intussusception: Ultrasonography Effectiveness in Imaging Modalities for the Diagnosis. *Pediatr Emerg Care Med Open Access*. Vol.3 No.1:4.

Abstract

Intussusception is a term originated from the *Latin intus* (within) and *suscipere* (to receive). A bowel segment (intussusceptum) enters another just distal to it (intussusciens) leading to occlusion. The intestine itself can be a 'telescope' (a non-pathological starting point - up to 75%) or some pathology may be the focus point of invagination (pathological lead point). The mesentery of the intussuscepted bowel gets compressed. The intestinal wall becomes widened and the lumen gets obstructed. Peristalsis breaks down and this causes colic abdominal pain and vomiting. Lymphatic and venous occlusions occur and lead to ischemia. Mostly in children the intussusception is ileocaecal, but ileo-ileocolic and ileo-ileal or colocolic cases can be also seen.

Keywords: Intussusception; X-ray; Ileocecal; Ileo-ileal; Mesenteric lymphadenitis; Enema; Ultrasonography

Introduction

The term acute abdominal pain means a non-traumatic abdominal pain of rapid onset with duration of less than five days [1]. In children intussusception is a common etiology of acute abdominal pain. It is also the most common abdominal emergency which leads intestinal obstruction in young children and is the most common abdominal emergency in early childhood, particularly in children younger than two years of age [1]. Intussusception refers to the invagination of a part of the intestine into itself. In children most of cases are idiopathic, and in only 25 percent of cases pathologic lead points can be detected [2]. Early detection is very important because if untreated, this will proceed to bowel ischemia and may cause bowel necrosis, and perforation.

Materials and Methods

The study was designed as a retrospective investigation. The sample included 500 patients (284 males and 216 females) that were randomly selected from a pool of 1516 pediatric patients who had undergone standardized abdominal sonography between 2015 and 2016. The inclusion criteria were patients aged between 0 and 18 years and the presence of acute abdominal pain before or during consultation with the physician. The exclusion criteria were patients aged over 18 years or the absence of acute abdominal pain as a symptom before or during the examination. In the data analyses, frequency analysis was performed and percentages were calculated. Analyses were performed with SPSS 22.0 software. The images were created with Microsoft Excel 2017 software.

Results

There was no pathology identified in 76% (n=380) of the patients. In the study group, the minimum age was 0 years and maximum was 17 years. According to age, children were divided into the following (four) groups: (1) patients aged younger than 1 year old (26/500, 5.2%; 20 males and 6 females); (2) patients aged from 1-7 years old (106/500, 21.2%; 88 males and 18 females); (3) patients aged from 7-15 years (238/500, 47.6%; 155 males and 83 females); and (4) patients aged over fifteen years (130/500, 26%; 75 males and 55 (11.6%) females). In our study, acute abdomen in the pediatric age group was more prevalent in males than in females. Abdominal pain and vomiting were the most common clinical symptoms.

Of the 500 patients, 9 had intussusception. 6 of them were male and 3 of them were female. In our group 6 patients aged younger than 3 years old and 3 of them aged from 3-7 years old. 8 of them were ileocecal and 1 of them was distal ileo-ileal intussusception. In 3 of them, mesenteric lymphadenitis was detected as a lead point. Indeed, the presence of bloody stool is often a late sign indicating delayed presentation and ischemic bowel; in our group patients did not have bloody stool.

6 of them had normal radiographic. 3 of them had suspicious air-fluid levels. All the intussusceptions are detected on ultrasound (US). In all patients, we detected the target sign as a hypoechoic ring with an echogenic center on transverse US image. And ultrasonography should still be in the first imaging modalities for detecting the underlying pathology of the pediatric abdominal emergencies.

Discussion

Acute abdominal pain is one of the most common complaints in childhood, and one that frequently requires rapid diagnosis and treatment in the emergency department. The term acute abdominal pain refers to non-traumatic abdominal pain of rapid onset with duration of less than five days [1]. Acute abdominal pain can be divided in urgent and non-urgent conditions. Emergency causes require treatment within 24 hours to avoid serious complications [2]. Although acute abdominal pain is typically self-limiting and benign, there are potentially life-threatening conditions that require urgent management, such as appendicitis, intussusception or bowel obstruction.

Intussusception is an invagination of the bowel and usually involves both small and large bowel. Intussusceptum is the proximal bowel which herniates into the distal bowel. The bowel that contains intussusceptum is named as the intussusciens [3]. When the intussusceptum and its mesentery invaginate into the intussusciens, there can be a reduction of venous and lymphatic return that results in bowel wall edema. If untreated, this will proceed to bowel ischemia and may cause bowel necrosis, and perforation. Intussusception can occur both in large or small bowel, but is most commonly ileocecal.

Normally, intussusception occurs due to gastrointestinal pathologies. Mostly it is hard to identify the cause. The diseases that increase peristalsis such as enteritis, foreign body, heavy parasitism, previous intestinal surgery, intramural abscess/tumor, motility disorders, change in diet, bacterial infection can be a cause of an invagination. In most children, the cause cannot be found and there is no abnormality present. The intussusception seems to occur more often in the fall and winter and many children with the problem have flu-like symptoms so a virus is suspected to play role in this condition. Sometimes, a lead point can be identified as the cause of the condition and most frequently a Meckel's diverticulum is detected.

Sixty percent of patients that develop intussusception are between 2 months and 1 year of age. Intussusception is rare in newborn infants. In males, intussusception develops four times more than females. Although 80 percent of the children who develop the condition are less than 2 years old, intussusception may also be detected in older children, teenagers and adults.

Children with intussusception may have variable presentations. The classic triad is vomiting, colicky abdominal pain, and bloody (so called "red currant jelly") stool but is seen in less than 50% of patients [4]. Indeed, the presence of

bloody stool is often a late sign indicating delayed presentation and ischemic bowel.

The classical cases of intussusception are readily diagnosed clinically with reported accuracy of about 50%, but intussusception may mimic other conditions in children such as gastroenteritis which has a high prevalence in the tropics thus giving a confusing picture [5]. A "sausage-shaped" mass can be felt upon on physical examination of the abdomen.

We usually perform plain abdominal X-ray to exclude perforation or intestinal obstruction. But we must know that a normal X-ray does not exclude intussusception. Signs of intussusception on a plain X-ray include target sign (2 concentric circular radiolucent lines usually in the right upper quadrant) and crescent sign (a crescent shaped lucency usually in the left upper quadrant with a soft tissue mass).

Ultrasound scan is the diagnostic investigation of choice and is useful if there is a suggestive history but no mass palpable or signs on plain X-rays and may identify other pathologies. A longitudinal US image can show a "pseudokidney" sign of intussusception and enlarged mesenteric lymph nodes within the intussusceptum. A transverse US image can show a "target" sign with a hypoechoic ring of the intussusciens surrounding the central echogenic area of intussusceptum. Ultrasound can be helpful in searching for a lead point. US can provide a specific diagnosis in one-third of these cases. Ultrasound can reveal hypo-motile intestine with distension proximal to the obstruction [6,7]. Ultrasound imaging can be performed quickly and at the bedside, it does not involve exposure to x-rays, and it is relatively inexpensive compared to other frequently used techniques. The disadvantage of ultrasound arises when there is a lot of gas present inside of the bowels or excess abdominal fat, which makes imaging difficult, and the quality of the images depend on the experience of the person performing the ultrasound. However, ultrasound imaging occurs in real-time and does not require sedation, so the influence of movements can be assessed quickly.

For diagnosis and in some cases for the treatment for intussusception air or contrast enema procedure can be done. As an enema air or a contrast fluid can be given into the rectum. Narrow areas, blockages and other issues can be shown by an X-ray of the abdomen. The pressure exerted on the intestine can help the intestine to unfold and can correct the intussusception on some occasions.

A water-soluble contrast enema or an air-contrast enema can both affirm the diagnosis of an intussusception and successfully reduces it in most cases [8].

CT/MRI scanning is more often used in adults than in children [9].

Limitations

Firstly, this was a retrospective cohort study and did not evaluate the decision to perform imaging modalities prospectively. Limitations are inherent to retrospective studies based on patient data automatically queried. Data were

abstracted using an automated query, and, therefore, it is possible that there were a small number of patients inadvertently not included in the study sample.

Conclusion

The results of our study suggest that ultrasound should remain in the first imaging test of choice for evaluating pediatric patients with suspected intussusception. The advantages of ultrasound imaging are that the procedure can be performed quickly and at the bedside, it does not involve exposure to x-rays, and it is relatively inexpensive compared to other frequently used techniques, such as abdominal CT scan. For detecting pediatric emergent pathologic disorders, the disadvantage of ultrasound arises when there is a lot of gas present inside of the bowels or excess abdominal fat, which makes imaging difficult, and the quality of the images depend on the experience of the person performing the ultrasound. However, ultrasound imaging occurs in real-time and does not require sedation, so the influence of movements can be assessed quickly.

References

1. Lloyd DA, Kenny SE (2004) The surgical abdomen. In: Walker WA, Goulet O, Kleinman RE, et al. (eds.) *Pediatric Gastrointestinal Disease: Pathopsychology, Diagnosis, Management*. 4th edn. BC Decker, Ontario, Canada, p: 604.
2. Ntoulia A, Tharakan SJ, Reid JR, Mahboubi S (2016) Failed Intussusception Reduction in Children: Correlation Between Radiologic, Surgical, and Pathologic Findings. *Am J Roentgenol* 207: 424-433.
3. Applegate KE (2009) Intussusception in children: evidence-based diagnosis and treatment. *Pediatr Radiol* 39: 140-143.
4. Samad L, Marven S, El Bashir H, Sutcliffe AG, Cameron JC, et al. (2012) Prospective surveillance study of the management of intussusception in UK and Irish infants. *Br J Surg* 99: 411-415.
5. Ein SH, Duneman A (2003) Intussusception. In: Ziegler MM, Azizkhan RG, Weber TR (eds.) *Operative Paediatric Surgery*. McGraw-Hill Professional, New York, USA, pp: 647-655.
6. Daldrup-Link HE, Gooding CA (2010) *Essentials of Pediatric Radiology: A Multimodality Approach*. Cambridge University Press, New York, USA.
7. Hodler J, von Schulthess GK, Zollikofer CL (2010) *Diseases of the Abdomen and Pelvis 2010-2013: Diagnostic Imaging and Interventional Techniques*. Springer Science & Business Media, Milan, Italy.
8. Hadidi AT, El Shal N (1999) Childhood intussusception: a comparative study of nonsurgical management. *J Pediatr Surg* 34: 304-307.
9. Byrne AT, Goeghegan T, Govender P, Lyburn ID, Colhoun E, et al. (2005) The imaging of intussusception. *Clin Radiol* 60: 39-46.