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ORIGINAL ARTICLE

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Intussusception: As the Cause of Mechanical Bowel Obstruction in Adults

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Background/Aims: Intussusception in adults is rarely seen and causes misdiagnosis due to its appearance with various clinical findings. The cause of intussusception in adults is frequently organic lesions. In this study, the underlying etiologic factors, diagnostic methods and alternative methods of treatment are discussed in the light of the literature.
Methods: In this study, a retrospective evaluation was performed on 47 cases with the diagnoses of intussusception, who were operated on for bowel obstruction between 1990-2011 in Department of Surgery of Necmettin Erbakan University Meram Medical Faculty. Data related to presentation, diagnosis, treatment and pathology were analyzed.
Results: Twenty-four of the patients (51%) were female, and 23 were male (49%). Mean age (year) was 49 (range: 23-78) in female group, and 50 (range: 17-72) in male group. All patients presented mechanical bowel obstruction findings and underwent operation. Intussusception was caused by benign and malignant tumors in 38 patients, and other reasons in 3 cases. No reason could be determined in the other 6 cases. Only small intestine resection was applied in 29 cases, and large intestine resection was also applied in 17 cases. Reduction and fixation surgery was performed in one patient. No postoperative mortality was observed.
Conclusions: Adult intussusception remains a rare cause of abdominal pain. Diagnosis of intussusception in adults is still difficult. Main treatment was surgical in most cases. **(Korean J Gastroenterol 2013;61:17-21)**

Key Words: Intussusception; Bowel obstruction; Adult; Malignancy

INTRODUCTION

"Intussusception" is defined as telescopic invasion of an intestinal segment into the distal segment of the intestine. Intussusception observed frequently in children, is the infrequent cause of rare bowel obstruction in adults. Adult intussusception represents 5% of all cases of intussusception and only 1-5% of intestinal obstruction.[1] While the underlying conditions is idiopathic in children, an organic lesion (tumor mass) is mostly held responsible from intussusception in adults.[2,3] In children, pneumatic or hydrostatic reduction of the intussusception is sufficient to treat the condition in 80% of patients.[4] Most surgeons accept that surgical resection is required for adult intussusception. However, reduction before resection remains controversial.[5] In adults, it is usually difficult to diagnose intussusception in the preoperative period in those patients hospitalized to general surgery wards with the diagnosis of ileus.

Since it is rarely encountered among the causes of bowel obstruction and presents itself in various clinical findings, it is difficult to diagnose it in preoperative period. We have assessed our subjects under the literature knowledge in order to draw attention to the matter.

SUBJECTS AND METHODS

Patient files of 47 cases with a diagnosis of intussusception, who were operated because of mechanical bowel

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obstruction between January 1990 and January 2011 in General Surgery Clinics of Medical Faculty in Necmettin Erbakan University were investigated retrospectively.

We reviewed demographic data (age, sex, service in which they were diagnosed, etc.) together with clinical signs, complementary tests, presumptive diagnosis, treatment applied, etiology and location of the head of the invagination, follow-up, and complications.

We decided to define the following types of invagination: enteric invagination, when the intussusception was located in the small bowel alone (jejuno-jejunal, jejuno-ileal and ileo-ileal); ileo-colic invagination, if it included the small bowel and large bowel at the same time; and colo-colic invagination, involving just any part of the colon.

We also classed the etiology of the lesions composing the lead point for invagination as benign or malignant. The cases in which no causal lesion was found were included in the benign lesion group.

RESULTS

1. The clinical characteristics

Twenty-four of the patients (51%) were female, and 23 were male (49%). Mean age was 49 (range: 23-78) in female group, and 50 (range: 17-72) in male group. General properties of the subjects are shown in Table 1. During the admission, all the patients had complaints of abdominal pain, nausea-vomiting, and obstipation. Bloody diarrhea was observed in one case. Interval of application to the clinic from the onset of the complaints was 17.0 days (range: 1-90). Acute intestinal obstruction and acute abdominal findings were noted in 34 (72%) cases.

2. Laboratory findings

In routine examinations, blood glucose was found to be over 200 mg/dL in 6 (12.8%) cases. Leukocyte count was over 10,000 mm^3 in 40 cases (85%).

3. Radiological examination

Air-fluid levels were observed in all subjects in standing direct abdominal graphs. Ultrasonography (US) was applied in 31 cases and CT in the final 15 cases, and one each case was applied colonoscopy and MRI respectively. Of the patients who underwent US, 10 were reported to indicate possible invagination, while one was reported to have parasites within lumen. Twelve cases to whom CT were applied were reported to have invagination. A tumor mass lesion was determined in one case. In the case with Peutz-Jeghers syndrome, multiple polyps as far as splenic flexure were found in colonoscopy, and in addition, polyps were observed in ileum.

4. Etiology and locations (Table 1)

The most common locations were ileocolic (38 cases), followed by enteric (3 cases) and colocolic (2 cases). The types of intussusception were classed in turn according to their benign or malignant etiology at the lead point. The nature of the lesion in the ileocolic invaginations was divided equally between benign and malignant. Benign causes included ileum polyp (41%), idiopathic (13%), parasite (2%), Meckel's diverticula (2%), ileum fibroma (2%), following appendectomy

Table 1. General Characteristics of the Subjects

Type		Cause		Procedure applied	
Ileocecal	38 (81)	Ileum polyp	19 (41)	Ileum resection + primary anastomosis	25 (53)
Jejunoileal	3 (7)	Cecal adenocarcinoma	12 (26)	Right hemicolectomy + ileotransversostomy	14 (30)
Colocolic	2 (4)	Idiopathic	6 (13)	Jejunum resection + primary anastomosis	4 (9)
Sigmoidorectal	2 (4)	Sigmoid adenocarcinoma	2 (4)	Anterior resection	2 (4)
Ileocecal + Ileoileal	1 (2)	Parasite	1 (2)	Right hemicolectomy + colostomy	1 (2)
Jejunojejunal	1 (2)	Meckel diverticule	1 (2)	Reduction + fixation	1 (2)
		Ileum fibroma	1 (2)		
		Following appendectomy	1 (2)		
		Ileum mucinous adenocarcinoma	1 (2)		
		Ileum adenocarcinoma	1 (2)		
		Jejunum polyp	1 (2)		
		Rhabdomyosarcoma	1 (2)		
Total	47 (100)		47 (100)		47 (100)

Values are presented as number (%).

(2%) and jejunum polyp (2%). Malignant causes included cecal adenocarcinoma (26%), sigmoid adenocarcinoma (4%), ileum mucinous adenocarcinoma (2%), ileum adenocarcinoma (2%) and rhabdomyosarcoma (2%).

5. Treatment modality

Mean interval between hospitalization and operation time was 2.6 days after the admission. While 35 cases (74.5%) underwent operation within 24 hours under emergency conditions, 5.0 (range 2-8) days were taken in other 12 cases. The case with Peutz-Jeghers syndrome was operated on twice. Intussusception was ileocecal type in 39 cases, ileoileal in 6 cases and illeocecal+ileoileal in one case. Free abdominal fluid was present in 15 cases. In all cases except those 12 with cecal tumors, deinvagination was first applied in an attempt to narrow resection boundary. In 14 cases, right hemicolectomy and ileotransversostomy were performed due to right colon ischemia. In 2 cases, right hemicolectomy and colostomy were performed due to dirty abdomen. Following appendectomy, invagination reduction and fixation were performed. In 24 cases, partial ileum resection and primary ileum anastomosis were performed. In 4 cases, partial jejunum resection and primary jejunum anastomosis were performed.

Hospitalization time was determined as 12.6 (range: 7-27) days. No early mortality was observed. Sixteen cases caused by tumors were followed regularly. One case with ileum polyps received endoscopic colon polypectomy after 26 months. One case having polyps in the ileum died after 26 months of cerebral hemorrhage caused by hypertension, and another case having cecal tumor died after 45 months due of liver metastasis.

DISCUSSION

Intussusception is an unusual cause of bowel obstruction in adults. Intussusception, first described by Barbette in 1692, is more frequent in especially boys under the age of two, although it can be encountered at any age.[1,2] Etiology and pathology of invagination in children and adults are different. In the vast majority of cases, there is an underlying enteric or colonic lesion.[6] Infantile invaginations constitute more than 80% of infantile bowel obstruction, and 90% of the cases do not indicate any etiological cause or thought to be caused by enlarged nodes associated with an adenoviral infection.[5,6] In contrast, adult invaginations are rare, and constitute 5% of all invaginations and less than 1% of all mechanical bowel obstruction.[1-3] During the study period, it was determined that among the 456 bowel obstruction cases in our department, only 3.3% was invagination. In 90% of adult cases, there was an organic pathology. Benign and malign tumors constitute 60-75% of the causes. Among the benign tumors, appendix mucinous cystadenoma, leiomyoma of small intestine, submucous lipoma, neurofibroma, adenomatosis and inflammatory polyps, and Peutz-Jeghers syndrome are the causes.[1-3,7] Among malignant causes, lymphoma, leimyosarcoma and large intestine adenocarcinoma can be listed. Metastatic malignant melanomas are also among the causes of invagination.[7,8] Included among non-tumor causes are, appendix granuloma, Meckel's diverticula, parasites, amebic dysentery, and typhoid fever.[3] Besides, "postoperative idiopathic invagination" can be observed in 2-3% of laparotomies.[9]

Several studies report that in adult invaginations pathologic causes constitute 69-100% of the underlying reasons.[10-13] Causes of invagination which is seen mostly in small intestines are benign lesions, and those responsible for the invagination of large intestine are malignant lesions. The types of intussusception were classed in turn according to their benign or malignant etiology at the lead point. Benign type tumoral lesions were determined as 44.7%, and malign lesions were 36.2%. The nature of the lesion in the ileocolic invaginations was divided equally between benign and malignant. Our benign causes were ileum polyp (41%), idiopathic (13%), parasite (2%), Meckel's diverticula (2%), ileum fibroma (2%), following appendectomy (2%) and jejunum polyp (2%). Our malignant causes were cecal adenocarcinoma (26%), sigmoid adenocarcinoma (4%), ileum mucinous adenocarcinoma (2%), ileum adenocarcinoma (2%) and rhabdomyosarcoma (2%).

Intussusception appears as in ileocolic form in children while as enteroenteral, ileocolic or colocolic type in adults. Ileocolic invagination was more frequently seen in our patients. Findings of conventional invagination triad in children, pain, abdominal mass and intestinal bleeding are rarely observed in adults. Symptoms and physical examination findings are non-specific in adults, and it is difficult to make a pre-operative diagnosis.[3,14] The usual initial clinical signs

are those of bowel obstruction while the diagnosis, in contrast with children, is difficult and in almost 50% of the cases it is established intra-operatively.[6] For this reason, misdiagnosis and delays in treatments may occur. In the majority of the subjects, diagnosis can only be made with laparotomy.[3] Intussusception should be considered especially in recurrent non-specific abdominal pains in the subjects with malignant melanoma.[14] In subjects with full intestinal congestion, a triad consisting of abdominal pain, bloody-mucous feces and a mass in the abdomen may be determined. One rare finding which can facilitate diagnosis is spontaneous excretion of necrotic intestinal section from the rectum, or prolapse of the mass of the sigmoid colon cancer causing invagination.[15] Only 35% of the patients appear with the diagnosis of acute bowel obstruction.[11] Exact diagnosis was made with laparotomy in all of our subjects. Laboratory findings are not helpful to make the diagnosis. The presence of leukocytosis is important with regard to strangulation. It was observed that 40 subjects (85.1%) in our series had more than 10,000/mm^3 of leukocytosis.

Radiological examinations are more valuable for diagnosis. Bowel obstruction findings can be observed by direct X-ray graphics. Diagnosis of invagination can be made by barium examination of the small intestines. By this way, both type of the invagination can be determined and its reduction may be possible.[16] It is recommended that CT is useful in subjects describing abdominal pain attacks, and that it should be the first examination to be made.[8,17] In transverse cuts it shows a "target" or "doughnut" sign while in the oblong cuts it shows the image of a pitchfork. US is easy to perform and non-invasive. US has high specificity and sensitivity, which makes it a valuable diagnostic tool. The major limitation of US for evaluating acute obstructive symptoms is the presence of air in the bowel, which leads to poor transmission and difficulties in image interpretation. But, US examination provides minimal help in adult cases, whereas it is an important diagnostic aid in children. Like sonography, CT scanning can be used to identify the intussusception. However, the underlying cause can still be difficult to determine. Despite US being the most frequently used technique it does not guarantee a diagnosis on most occasions, which is why subsequent abdominal CT is recommended, which does reveal the intussusception and its location.[11] Other methods which can be useful for the exact diagnosis are colonoscopy and magnetic resonance (MR) examination.[7,11,18] During recent years, cases diagnosed and treated by endoscopy, colonoscopy and laparoscopy have been reported.[19] Findings of bowel obstruction were determined in all our subjects by direct X-ray graphics. In respectively two cases, invagination was determined with US and CT. Diagnosis of invagination was made by MR examination in the last case. In one case who underwent colonoscopy, several polyps were detected and polypectomy was performed. Barium enema under fluoroscopy and hydrostatic reduction is the preferred method in infantile invagination.[3,20] In contrast, treatment modality in adult invaginations is surgery.[10-12] Because, there is an organic lesion which is mostly absorbing.

In enteroenteric invaginations, intestinal vitality should be evaluated. First, reduction should be tried, and resection should be applied in subjects with deteriorated intestinal vitality. Where reduction is not successful and/or in the presence of malignity, resection and primary anastomosis are the preferred methods of the treatment.

Risk of strangulation is high in ileocolic invagination, since invaginated intestinal segment is compressed by ileocecal valve. Reduction was applied in the case caused by appendectomy stump. In the other cases, intestinal vitality increased partially, and resection area became narrowed after deinvagination.

In colonic invaginations, resection should be applied without the trial of reduction due to high risk of malignity.[12] If the diagnosis of benign lesion has been confirmed with colonoscopy and biopsy in colonic invagination, a more limited resection may be applied. In our series, direct resection was applied in 3 subjects with adenocarcinoma in the cecum.

In conclusion, diagnosis of intussusception causing mechanical bowel obstruction in adults is difficult. Among the reasons of this difficulty, an important factor is the rare occurrence of invaginations in adults as well as the difficulty in diagnosis of small intestinal tumors. The presence of invagination should be considered during the diagnostic period, and attention should be given to the patient history. CT, MR, US and endoscopy, especially in colonic lesions, should be considered as a method of early diagnosis to reduce resection boundary and postoperative morbidity.

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