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BRIEF ARTICLE

Intussusception due to inflammatory fibroid polyp: A case report and comprehensive literature review

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Abstract

AIM: To give an overview of the literature on intussusception due to inflammatory fibroid polyp (IFP).

METHODS: We present a new case of ileal intussusception due to IFP and a literature review of studies published in English language on intussusception due to IFP, accessed *via* PubMed and Google Scholar databases. For the search, the keywords used were: intussusception, IFP, intussusception and IFP, intussusception due to IFP, and IFP presenting as intussusception. The search covered all articles from 1976 to November 2011.

RESULTS: We present a 38-year-old woman who was admitted 10 d after experiencing abdominal pain, vomiting, and nausea. Ultrasonography demonstrated small bowel intussusception. An ileal intussusception due to a mass lesion 50 cm proximal to the ileocecal junction was found during laparotomy. Partial ileal resection and anastomosis were performed. A diagnosis of ileal IFP was made based on the immunohistochemical findings. In addition, a total of 56 reports concerning 85 cases of intussusception due to IFP meeting the aforementioned criteria was included in the literature review. The patients were aged 4 to 81 years (mean, 49 ± 16.2 years); 44 were women (mean, 51.8 ± 14.3 years) and 41 were men (mean, 46 ± 17.5 years). According to the location of the IFP, ileal intussusception was found in 63 patients, while 17 had jejunal, three had colonic, and two had ileojejunal intussusception.

CONCLUSION: Although IFPs are rare and benign, surgery is the only solution in case of intestinal obstruction. Differential diagnosis should be made *via* immunohistochemical examination.

Key words: Intussusception; Inflammatory fibroid polyp; Vanek's tumor; Immunohistochemical stain

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INTRODUCTION

Intussusception occurs when a more proximal portion of the bowel (intussusceptum) invaginates into the more distal bowel (intussuscipiens)[1-5]. The pathomechanism is thought to involve altered bowel peristalsis at the intraluminal lesion, which is then a lead point for the intussusceptum[1]. Although intussusception is a common condition in children, it is rare in adults. Adult intussusception differs from pediatric intussusception in various respects, including etiology and clinical characteristics[1-4]. Adult intussusception represents 5%-16% of all cases of intussusception and 1%-5% of all cases of intestinal

obstruction in adults[1-3,5-11]. In children, 90% of cases are idiopathic, whereas 70%-90% of cases of adult intussusception are secondary to an underlying pathology, with approximately 65% being due to benign or malignant neoplasms[1,4,12]. Non-neoplastic processes represent 15%-25% of cases, while idiopathic intussusception accounts for about 10% of cases[2,5,6,12-14]. The presentation of pediatric intussusception is often acute with sudden onset of intermittent colicky pain, vomiting, and bloody mucoid stools, and the presence of a palpable mass. In contrast, adults may present with acute, subacute, or chronic nonspecific symptoms[2-4].

Up to 90% of occurrences in adults have a lead point, defined as a well-definable pathological abnormality. Most lead points in the gastrointestinal tract involve primary or metastatic malignancy, lipomas, leiomyomas, adenomas, neurofibromas, postoperative adhesions, Meckel's diverticulum, foreign bodies, vascular anomalies, lymphoid hyperplasia, trauma, celiac disease, cytomegalovirus colitis, lymphoid hyperplasia secondary to lupus, Henoch-Schönlein purpura, Wiskott-Aldrich syndrome, appendiceal stump, or inflammatory fibroid polyps (IFP)[1,4,14-16].

IFPs are rare, benign, tumor-like lesions of the gastrointestinal tract. They are most commonly localized to the gastric antrum, but can develop anywhere in the gastrointestinal tract. The small bowel is the second most common site of origin, where IFPs usually present as intussusception or obstruction[15,17-20]. Here, we present a rare case of ileoileal intussusception due to IFP in a 38-year-old woman. A review of 85 cases reported in the English literature is also presented.

MATERIALS AND METHODS

Here, we present and discuss a new case of ileo-ileal intussusception caused by IFP. In addition, a search of the English-language medical literature using PubMed and Google Scholar was conducted for articles related to gastrointestinal intussusception due to IFP; the key words used were intussusception, IFP, inflammatory fibrous tumor, intussusception and IFP, intussusception due to IFP, and IFP presenting as intussusception. The search covered all articles from 1976 to November 2011. If there were any missing data, the corresponding authors of the articles in question were contacted by email. Articles containing adequate information, such as publication year, patient age, sex, duration of complaint, radiological tools, presence of palpable mass, surgical approach, tumor location, and tumor size, were included, while studies and comment articles with insufficient clinical and demographic data were excluded.

RESULTS

Case report

A 38-year-old female patient presented to our emergency clinic with a 10-d history of abdominal pain, vomiting, and nausea. Upon auscultation of the abdomen, bowel sounds were found to be consistent with mechanical bowel obstruction. Physical examination revealed muscular defense and rebound tenderness. Digital rectal examination did not reveal the presence of feces, mucus, or blood. Laboratory investigations showed blood urea nitrogen, 38 mg/dL (normal: 5-23 mg/dL); creatinine, 1.7 mg/dL (normal: 0.6-1.2 mg/dL); and C-reactive protein, 58 mg/L (normal: 0-0.5 mg/L). Blood cell counts revealed a leukocyte count of 8.77/L (normal: 4-11.000/L), a hemoglobin level of 11.4 g/dL (normal: 12-16 g/dL), and a platelet count of 275/L (150-450 000/L). Other serum parameters were within the normal limits. An upright plain abdominal film revealed small bowel obstruction, with marked small bowel air-fluid levels (Figure 1). Abdominal ultrasound revealed a hypoechoic, round, soft tissue mass measuring 35 mm × 38 mm at the end of a dilated, thick-walled ileal loop at the right iliac fossa. The clinical symptoms and ultrasonographic images were consistent with intussusception or mechanical intestinal obstruction caused by a tumoral mass. Thus, laparotomy with midline incision was performed. On exploration, an ileoileal intussusception was found 50 cm proximal to the ileocecal valve. The intussuscepted intestinal segments were obstructing the lumen, causing dilatation in the intestine proximal to the intussusception (Figure 2). Segmental resection of the intussuscepted ileum and end-to-end anastomosis were performed. Macroscopically, the resected segment of the ileum was 20 cm in length. Histopathological examination showed an IFP measuring 4 cm × 4 cm, composed of an edematous stroma containing spindle-shaped stromal cells, lymphoid nodules and eosinophils. On immunohistochemical analysis, the

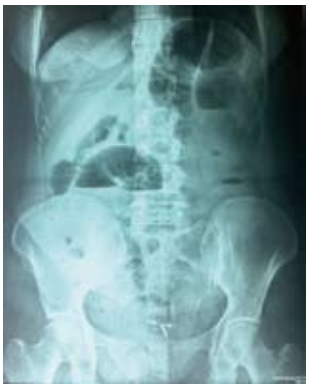

Figure 1 Upright plain abdominal radiography revealed small bowel obstruction with marked small bowel air-fluid levels.

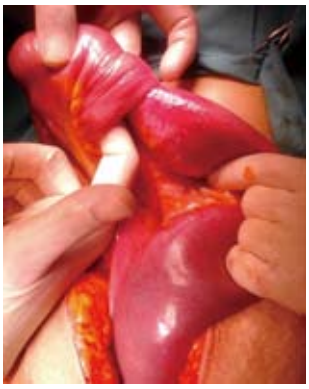

Figure 2 Intraoperative photograph of ileoileal intussusception.

spindle cells were negative for CD117, smooth muscle actin, desmin, S100 protein and CD34. A diagnosis of IFP (Vanek's polyp) of the ileum was made. The patient recovered without complications and has remained well and symptom-free until at least 6 mo after discharge.

Literature review

The English-language medical literature published between 1976 and November 2011 was searched using PubMed and Google Scholar. A total of 56 reports concerning 85 cases of intussusception due to IFP meeting the aforementioned criteria were included in this review. The patients were aged from 4 to 81 years (mean, 49 ± 16.2 years); 44 were women (mean, 51.8 ± 14.3 years) and 41 were men (mean, 46 ± 17.5 years). According to the localization of the IFP, 63 patients had ileal intussusception, while 17 had jejunal, three had colonic, and two had ileojejunal intussusception. The clinicopathological characteristics of the 85 patients are summarized in Table 1.

DISCUSSION

Intussusception was first described by Barbette in 1674 and later by Hunter in 1789. Sir Jonathan Hutchinson was the first surgeon who operated on intussusception in a child in 1871[2,5,6,17,21]. Intussusception, defined as invagination of a proximal part of small bowel along with its mesentery into an adjacent segment, can lead to impaired peristalsis, obstruction, and possible vascular compromise[3,6,11,15,17]. The precise mechanism of intestinal intussusception remains unclear. However, it is believed that any lesion in the bowel wall or irritant within the lumen that alters normal peristaltic activity, forming leading edges for the intussusceptum, may initiate invagination. Ingested food and subsequent peristaltic activity of the bowel produces an area of constriction above the stimulus and relaxation below, thus telescoping the lead point through the distal bowel lumen[3-5].

Intussusceptions have been classified according to location into three major categories, i.e., enteroenteric, ileocolic or ileocecal, and colocolic. Enteroenteric intussusception is confined to the small bowel. In ileocolic intussusception, the ileum invaginates through the ileocecal valve. Colocolic intussusception is confined to the colon[1,5]. Adult intussusception occurs more frequently in the small bowel (50%-88%) than in the large bowel (12%-50%)[1].

Intussusception can be classified according to the underlying etiological factors as primary (idiopathic) or secondary (benign or malignant lesion). Primary or idiopathic adult intussusception accounts for about 10% of cases and is more likely to occur in the small intestine. Secondary intussusception, which is more common in the adult population, is associated with a pathological condition involving a lead point. The etiologies of intussusception in the small bowel and the colon are quite different. In the small intestine there is a predominance of benign processes, with up to 90% of cases, including hamartomas, lipomas, leiomyoma neurofibromas, adenomas, Peutz-Jeghers syndrome, IFP, adhesions, Meckel's diverticulum, lymphoid hyperplasia, trauma, celiac disease, intestinal duplication, Henoch-Schönlein purpura, appendiceal stump, and tuberculosis. Malignant lesions (either primary or metastatic) account for 14%-47% of cases of intussusception in the small intestine. On the other hand, intussusception occurring in the large bowel is more likely to have a malignant etiology and accounts for 43%-80% of cases[4,8,12,21]. Colon adenocarcinoma is the most important cause of malignant large bowel intussusception. Benign lesions provoking large bowel intussusception include lipomas, leiomyomas, adenomatous polyps and endometriosis. We reviewed the published literature regarding intussusception, and the underlying cause in most cases of enteroenteric intussusception was benign, whereas it was mostly malignant in the ileocolic and colocolic cases. That is, the potential for malignancy increased from proximal to distal intussusception. Thus, the most important factors in the surgical decision process in an adult patient without a histopathological diagnosis in the preoperative period and intussusception was detected during a surgical operation are the location and size of the mass and viability of the invaginated segment. Benign tumors, often lipomas, are the most common specific causes of adult intussusception. IFPs have been reported as a rare cause of adult intussusception[22,23]. As the main topic of this report is intussusception due to IFPs, a discussion of the general features of gastrointestinal IFPs is presented below.

IFPs are rare, idiopathic pseudotumorous lesions of the gastrointestinal tract, which were first described by Vanek in 1949 as an eosinophilic submucosal granuloma. In that first report of six gastric lesions, Vanek called attention to the inflammatory nature of the lesions and their submucosal origin[24-28]. Various names for IFPs have been suggested, including eosinophilic granuloma, submucosal fibroma, hemangiopericytoma, inflammatory pseudotumor and fibroma. However, the term IFP first proposed by Helwig and Ranier in 1953 for gastric polyps has gained acceptance for similar lesions throughout the gastrointestinal tract[15,16,26,29,30].

IFPs can develop in many different locations in the gastrointestinal tract. The most common site is the gastric antrum (66%-75%), followed by the small bowel (18%-20%), colorectal region (4%-7%), gallbladder (1%), esophagus (1%), duodenum (1%), and appendix (< 1%)[18,21,26,31,32]. However, the ileal segment is the most common site where these polyps cause intussusception[21].

The precise etiopathogenesis of IFPs remains unknown, but trauma, allergic reaction, genetic tendency, bacterial, physical, chemical and even metabolic stimuli have been suggested as initiators of the process. The more common occurrence of these lesions in the stomach, with its coarse food content and active muscular contractions, supports a traumatic etiology, but it is dif-

Table 1 General characteristics of 85 cases of intussusception due to inflammatory fibroid polyp reported between 1976 and 2011

Ref.	Age	Sex	Duration of complaint	Palpable mass	Radiologic tools	Surgical approach	Tumor location	Tumor size (cm)
Yakan *et al*[4]	60	F	NS	NS	Urgent	S.Resection	Ileum	NS
	56	F	NS	NS	CT	R.Hemicol	Ileum	NS
	28	F	NS	NS	Urgent	S.Resection	Jejenum	NS
	62	F	NS	NS	CT	S.Resection	Ileum	NS
Mohamud *et al*[8]	70	M	6 yr	(-)	CT	R.Hemicol, Lap	Ileum	3
O'Kane *et al*[9]	65	F	1 mo	(-)	CT	S.Resection	Ileum	3.5
Coulier *et al*[10]	58	M	Several weeks	(+)	CT	Ileocecal resec.	Ileum	6
Malik *et al*[11]	31	M	3 d	(+)	US	R.Hemicol	Ileum	3.5
Karamercan *et al*[12]	56	M	1 d	(+)	US, CT	S.Resection	Ileum	4
Cawich *et al*[13]	50	M	3 d	(-)	Urgent	S.Resection	Jejenum	3
Hsieh *et al*[14]	56	M	NS	(-)	CT	S.Resection	Ileum	2.5
Akbulut *et al*[15]	73	F	5 d	(-)	US	S.Resection	Ileum	11
Gara *et al*[16]	76	F	NS	(-)	CT	S.Resection	Ileum	5.5
Toydemir *et al*[17]	54	M	2 mo	(-)	CT	W.Resection	Ileum	4
Szczepanow *et al*[18]	72	F	2 d	(-)	US	S.Resection	Ileo-jejunal	3
Ijaz *et al*[19]	10	M	3 d	(+)	US, Barium	S.Resection	Colon	NS
Bradley *et al*[20]	62	M	4 mo	(-)	Enteroclys	S.Resection	Ileum	8
Nonose *et al*[21]	56	F	45 d	(-)	CT	S.Resection	Ileum	4.5
Singhal *et al*[22]	65	M	NS	(-)	NS	S.Resection	Ileum	3
	45	F	NS	(-)	NS	S.Resection	Jejenum	1.5
Balci *et al*[23]	71	F	NS	(+)	MRI	S.Resection	Ileum	1.5
Morales-Fu *et al*[24]	42	M	8 d	(-)	CT	S.Resection	Ileum	3
Ruffolo *et al*[25]	44	F	3 d	NS	CT	S.Resection, Lap	Ileum	3.7
Costamagna *et al*[26]	62	M	3 wk	NS	NS	S.Resection	Ileum	4
Deschamps *et al*[27]	22	M	NS	(-)	CT	S.Resection	Ileum	3
Shih *et al*[28]	66	M	4 d	(-)	Urgent	S.Resection	Jejenum	5
Korkmaz *et al*[29]	30	M	NS	(+)	US, CT	S.Resection	Ileum	3
	60	F	NS	(-)	US, CT	S.Resection	Ileum	4
El Hajj *et al*[30]	52	F	10 d	(-)	CT	S.Resection, Lap	Jejenum	3.5
Dicle *et al*[31]	22	M	2 mo	(-)	US, Barium, CT	S.Resection	Ileum	NS
Bandyopad *et al*[32]	64	F	3 wk	(-)	US, Barium	S.Resection	Ileum	4
de la Plaza *et al*[33]	63	M	2 mo	(+)	US, Barium	R.Hemicol	Colon	3.5
Kuesterman *et al*[34]	34	F	5 wk	NS	CT	S.Resection	Jejenum	5
Farrell *et al*[35]	70	M	12 h	(-)	Urgent	R.Hemicol.	Ileum	2
Ling *et al*[36]	56	F	8 wk	NA	NA	NA	Jejenum	NA
Kim *et al*[37]	52	F	10 d	NA	NA	NA	Jejenum	NA
Aanestad *et al*[38]	31	M	36 h	(-)	Urgent	S.Resection	Ileum	NS
Nkanza *et al*[39]	NS	F	NS	NS	NS	S.Resection	Ileum	3.5
	40	F	NS	NS	NS	S.Resection	Ileum	5
	45	M	NS	NS	NS	S.Resection	Ileum	8
	50	M	NS	NS	NS	S.Resection	Ileum	4
	40	F	NS	NS	NS	S.Resection	Ileum	2.5
	45	F	NS	NS	NS	S.Resection	Ileum	8
	35	F	NS	NS	NS	S.Resection	Ileum	4
	62	M	NS	NS	NS	S.Resection	Ileum	4
	NS	F	NS	NS	NS	S.Resection	Ileum	3
	30	F	NS	NS	NS	S.Resection	Ileum	3
	55	F	NS	NS	NS	S.Resection	Ileum	4
	4	M	NS	NS	NS	S.Resection	Ileum	NS
Bays *et al*[40]	54	F	8 mo	(-)	US, CT, Ecl	S.Resection	Ileum	3.5
	17	M	2 mo	(-)	US, CT, Ecl	S.Resection	Jejenum	3
Santos Gda *et al*[41]	37	F	NS	NS	NS	S.Resection	Ileum	4
	29	M	NS	NS	NS	S.Resection	Ileum	2
	58	M	NS	NS	NS	S.Resection		2.5
Dalton *et al*[42]	17	M	5 mo	(-)	Barium	S.Resection	Jejenum	2.8
Gonul *et al*[43]	48	M	1 d	(-)	Urgent	S.Resection	Ileum	5
Miyata *et al*[44]	64	F	6 wk	(+)	US, CT, Enteros	S.Resection	Jejenum	4.5
Dawson *et al*[45]	47	F	12 h	(-)	Urgent	S.Resection	Ileum	3.5
Sampson *et al*[46]	43	F	4 d	(+)	US	S.Resection	Ileum	3
	60	F	5 d	(-)	Urgent	S.Resection	Ileum	3.5
Carlén *et al*[47]	55	F	3 d	(-)	Urgent	S.Resection	Ileum	2
Martin-Lor *et al*[48]	28	F	NS	NS	Urgent	R.Hemicol	Ileum	NS
Savargaon *et al*[49]	52	F	7 mo	(-)	CT	S.Resection	Ileum	3
	42	F	4 d	(-)	CT	Ileocecal resec.	Ileum	2.5
Parasi *et al*[50]	35	F	NA	NA	NA	S.Resection	Ileum	4

Jabar *et al*[51]	34	M	2 d	(+)	US	S.Resection	Ileo-jejunal	3
	47	M	4 mo	(-)		R.Hemicol	Ileum	NS
Vijayaragh *et al*[52]	20	F	3 wk	(-)	DL	S.Resection	Jejenum	6
Topaloglu *et al*[53]	56	M	10 d	(-)	US, CT	S.Resection	Jejenum	5
Sah *et al*[54]	45	M	2 wk	(-)	NA	NA	Jejenum	NA
Zager *et al*[55]	54	M	NS	(-)		Ileocecal resec., Lap	Ileum	2.5
	46	F	3 mo	(-)	CT	S.Resection	Jejenum	3
	36	M	2 d	(-)	CT	S.Resection, Lap	Ileum	3.5
Winkler *et al*[56]	61	M	7 d	(-)	Urgent	S.Resection	Jejenum	4
Rubinstein *et al*[57]	31	M	1 wk	(-)	Barium	S.Resection	ileum	3
	28	M	2 d	(-)	Barium	S.Resection	Ileum	6.5
Benjamin *et al*[58]	62	M	1 wk	(+)	Barium	R.Hemicol	Ileum	7
	56	M	6 wk	(-)	Barium	R.Hemicol	Ileum	7
	64	M	8 wk	(-)	Barium	S.Resection	Ileum	7
	61	M	NS	(-)	Barium	R.Hemicol	Ileum	5.5
McGregor *et al*[59]	38	F	12 h	(+)	NP	S.Resection	Ileum	2.8
Muniz *et al*[60]	56	F	5 mo	(-)	Scintigraphy	S.Resection	Jejenum	6
Widgren *et al*[61]	70	F	NS	NS	NS	S.Resection	Ileum	3
	77	F	NS	NS	NS	S.Resection	Ileum	10
Pritchett *et al*[62]	81	F	1 mo	(+)	Urgent	NS	Ileum	4

F: Female; M: Male; NP: Not-performed; S.Resection: Segmental resection; Col: Colonoscopy; NS: Not-stated; NA: Not-available; R.Hemicol: Right hemicolectomy; Ecl: Enteroclysis; DL: Diagnostic laparoscopy; US: Ultrasonography; CT: Computed tomography; MRI: Magnetic resonance imaging; Ileocecal resec.: Ileocecal resection; Lap: Laparoscopy; W.Resection: Wedge resection.

ficult to account for lesions in the lower ileum on this basis[33-39].

IFPs are usually asymptomatic, and are typically identified during endoscopic procedures and laparotomy. When they are symptomatic, the clinical symptoms depend on the location and size of the tumor[9,27,40-42]. Abdominal pain is the main symptom in patients with lesions in the stomach. Intussusception and obstruction are the most frequent initial symptoms when the polyp is located in the small intestine[10,26-28,40,43,44]. Other gastrointestinal symptoms, such as vomiting, diarrhea, bloody stools, tenesmus, and alterations in bowel habits, are also seen although their frequencies are low[30]. At the time of diagnosis, most IFPs usually measure between 2 and 5 cm in diameter. However, giant IFPs up to 20 cm in diameter have also been reported[9,10,15-17,26,27,33]. IFPs usually present in the sixth or seventh decade, but cases have been reported over a wide age range from 5 mo to 92 years old[35-38,45-47]. There is a slight predominance of the condition in men. Macroscopically, these tumors are pedunculated or sessile, measure 0.2-20 cm in diameter, arise from the submucosa, and project into the bowel lumen. The mucosal surface is usually ulcerated and pale. Microscopically, it is composed of mononuclear, spindle-shaped cells, forming a confused or whirl-like structure. The inflammatory infiltration also includes blood vessels, eosinophils, lymphocytes, macrophages, and mastocytes[10,14,18,19,25-27].

IFPs can mimic several other tumor and non-tumor processes of the gastrointestinal tract. Differential histopathological diagnoses include spindle cell lesions, such as inflammatory fibrosarcoma, spindle-cell carcinoids, and gastrointestinal stromal tumors (GISTs). Differentiation can be difficult, especially between IFPs and GISTs[10,15-17,22,26,48]. GISTs are common in the stomach and frequently present as polypoid masses. In the intestine, these tumors can present with intussusception similar to IFP. Immunohistochemistry is used to distinguish between IFPs and GISTs. Both tumors are positive for CD34 and vimentin, but GISTs are positive for CD117, while IFPs are not[13,24,26,49].

The preoperative diagnosis of intussusception is controversial. An accurate diagnosis is based on a good medical history, thorough physical examination, and specific imaging modalities, such as X-ray, ultrasonography (US), computed tomography (CT), magnetic resonance imaging (MRI), enteroclysis, endoscopic procedures, angiography, and capsule endoscopy[6,50-55]. Typically, abdominal X-ray examination is the first diagnostic tool used, because obstructive symptoms dominate the clinical picture in most cases[56-60]. Barium enema was the gold standard for diagnosis of intussusception until the mid-1980s when studies established that US could be used to diagnose the condition accurately. Around the same time, it was found that air could be used to diagnose and treat intussusception[5,61,62]. Today, enteroclysis is rarely used in the diagnosis of intussusception. This invasive double-contrast imaging method requires intubation using a special catheter with a double lumen and balloon to the proximal jejunum and is performed under fluoroscopy, MRI, or CT imaging. Although enteroclysis shows not only the inside of the lumen but also has high sensitivity and specificity for revealing small and mucosal lesions, its invasive nature limits its use[40]. Colonoscopy is useful only in cases in which colonic involvement is strongly suspected, and it allows the lesion to be diagnosed and biopsied. On colonoscopy, intussusception is seen as an intraluminal mass directed centrally and distally. However, diagnosis is rarely made by colonoscopy, and the diagnosis is usually made during surgery[4,48].

Capsule endoscopy and digital balloon endoscopy are newer means of diagnosing various gastrointestinal disorders[4,7]. Capsule endoscopy is a non invasive diagnostic test used to locate the source of gastrointestinal bleed-

ing and to identify the causes of other intestinal disorders, including intussusception and various tumors. On capsule endoscopy, intussusception has been reported to appear as mass lesion of the small bowel. Although obstructive symptoms are contraindicated for capsule endoscopy, this new method for evaluating the small bowel could be helpful in cases with long-standing abdominal pain and negative results on radiological examination, CT, or barium studies, to exclude the possibility of malignancy. Double-balloon enteroscopy, also known as "push-and-pull" enteroscopy, can be used to examine approximately 70-150 cm of the small bowel, and double balloon enteroscopy can examine the full length of the small bowel, both antegrade and retrograde[7,44]. Diagnostic laparoscopy (DL) may assist in the diagnosis of intussusception in cases in which the diagnosis is suspected but not confirmed by preoperative workup. Moreover, DL can help to establish the cause and is less traumatic than an exploratory laparotomy. US is considered a useful tool in the diagnosis of intussusception in both pediatric and adult cases[5-7,15,46]. Its classical imaging features include the target or doughnut sign in the transverse view and the pseudokidney, sandwich, or hayfork sign in longitudinal view[4,5,7,40]. However, obesity and the presence of a large amount of air in the distended bowel loops can limit image quality and subsequent diagnostic accuracy. Overall, US has a sensitivity of 98%-100% and a specificity of 88%-89% for diagnosing intussusception[3,17,29,40]. Abdominal CT is currently considered the most sensitive radiological method for confirming intussusception, with a reported diagnostic accuracy of 58%-100%[1-3,5,7,21]. On CT, a bowel-within-bowel configuration suggested by mesenteric fat and vessels compressed between the walls of the small bowel is pathognomonic of intussusception[3-6]. In contrast to US, CT is unaffected by the presence of gas in the bowel lumen. Therefore, we suggest that all patients presenting with an intestinal obstruction should undergo a CT scan as a routine diagnostic measure[3]. MRI is not applied routinely in diagnosis of intussusception in either children or adults. However, MRI can contribute to the radiological diagnosis of intussusception by demonstrating the "bowel-within-bowel" or "coiled-spring" appearance. This pattern can be seen more clearly with the use of the recently developed half-Fourier acquisition single-shot turbo spin-echo MRI modality. A polyp can be detected as a leading point using a combination of breathing-independent T2-weighted MRI and gadolinium-enhanced breath-hold T1-weighted imaging[4,23,30,34,40].

The appropriate management of adult intussusception remains controversial, with the debate focusing mostly on the issue of primary *en bloc* resection *vs* initial reduction followed by more limited resection. Reduction by surgery before resection may theoretically permit more limited resection; however, the risk of potential intraluminal seeding or venous tumor dissemination during the manipulation of a malignant lesion should also be taken into consideration. The incidence of malignancy as the cause of small intestinal intussusception ranges from 1% to 47%, and the majority of lesions are metastatic. Therefore, recent reports have recommended initial reduction of externally viable small bowel prior to resection. The likelihood of cancer in ileocolic and colocolic intussusception is 43%-100%. The vast majority of these lesions arise as a primary lesion, in which resection without reduction is recommended[1,2,4,5,48].

COMMENTS

Background

Intussusception occurs when a more proximal portion of the bowel invaginates into the more distal bowel. The pathomechanism is thought to involve altered bowel peristalsis at the intraluminal lesion, which is then a lead point for the intussusceptum. Inflammatory fibroid polyp (IFP) is a rare benign cause of intussusception.

Research frontiers

IFP is a benign gastrointestinal tumor that appears grossly as a localized, submucosal, sessile polypoid mass, occasionally involving the entire thickness of the gastrointestinal tract wall. In this study, the author performed an overall evaluation of the literature published in English language regarding the management approaches and diagnostic process in cases of intussusception related to IFPs and presented his own experience.

Innovations and breakthroughs

This study is the largest literature screening on intussusception due to IFPs.

Applications

This literature review demonstrates the importance of radiological assessment, surgical experience, and immunhistochemical staining in the differential diagnosis of IFPs.

Terminology

Intussusception is defined as invagination of a proximal part of the small bowel along with its mesentery into an adjacent segment; IFPs are rare, idiopathic pseudo tumorous lesions of the gastrointestinal tract, which were first described by Vanek in 1949 as an eosinophilic submucosal granuloma.

Peer review

The authors have prepared a literature review of 56 papers about IFP and intussusception published between 1976 and 2011 with a case that was treated in their clinic. Looking to the study in general, it seems simple and informative.

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