Intestinal Intussusception

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ABSTRACT

Intussusception is defined as the invagination of one portion of the bowel into an immediately adjacent portion. Etiology, symptoms, diagnosis, and treatment are different in the pediatric and adult populations. In the pediatric population, most cases are idiopathic and result in the common scenario of ileocolic intussusception. Factors involved in causation include anatomic features of the developing gastrointestinal tract and infectious influences. In adults, the intussusceptum is typically the result of a mucosal, intramural, or extrinsic lead point that acts as a focal area of traction pulling the proximal portion of bowel into the peristalsing distal portion. The diagnosis and management in the pediatric population is relatively standardized with nonoperative reduction via air or contrast enemas attempted first. In the adult population, intussusception presents a preoperative diagnostic challenge; although surgical intervention is mandatory, intraoperative management remains controversial.

KEYWORDS: Intussusception, intestinal obstruction

Objectives: On completion of this article, the reader should be able to: (1) define the pathophysiology of intussusception; (2) understand the differences in etiology, presentation, and treatment between pediatric and adult intussusception; (3) recognize the challenges associated with the preoperative diagnosis and intraoperative management of adult intussusception.

Intussusception is defined as the invagination of one portion of the bowel into an immediately adjacent portion, much like the pieces of a collapsible telescope slide into one another. The proximal segment, or intussusceptum, is carried by progressive smooth muscle contractions into the distal segment, or intussusciptens. This occurrence may be transient, and therefore asymptomatic if reduction occurs spontaneously. However, more commonly, the intussusception persists because of the continued peristaltic contractions, which can lead to bowel obstruction accounting for the majority of the presenting symptoms. If left untreated, the mesentery involved in the intussusception may become stretched and compressed leading to vascular insufficiency, strangulation, and necrosis of the associated

bowel. These events, in turn, may lead to perforation, peritonitis, and death.

Formation of the intussusceptum occurs differently in the pediatric and adult population. In the pediatric population, most cases are idiopathic and result in the common scenario of ileocolic intussusception. Factors involved in causation include anatomic features of the developing gastrointestinal tract and infectious influences. In adults, the intussusceptum is typically the result of a mucosal, intramural, or extrinsic lead point that acts as a focal area of traction pulling the proximal portion of bowel into the peristalsing distal portion. The diagnosis and management in the pediatric population is relatively standardized with nonoperative reduction attempted first. In the adult population, intussusception

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presents a preoperative diagnostic challenge, and management remains controversial.

ETIOLOGY

Stimulation of the intestine by a food bolus produces an area of constriction above the bolus and relaxation below. Any lesion in the bowel wall, which alters the normal peristaltic pattern, is capable of initiating invagination. Intussusception may occur anywhere in the small or large intestine. Nomenclature reflects location in the bowel: enteroenteric, appendiceal, appendiceal-ileocolic, ileocolic, colocolic, rectoanal, and stomal. For the purposes of this article, rectoanal and stomal intussusception will not be discussed and are not included in the statistics involved in this discussion. Rectoanal intussusception is discussed in a separate chapter. The duodenum, stomach, and esophagus are rarely involved in intussusception because they are less redundant and less mobile within the abdomen. In addition, the most common locations are at the junctions between freely moving segments and areas that are either fixed to the retroperitoneum or to other structures through adhesions.

Intussusception is most commonly encountered in children and has been reported to be the most common abdominal emergency in early childhood and the second most common cause of intestinal obstruction after pyloric stenosis.¹ It typically occurs from age 6 to 18 months and occurs more commonly in boys than girls. After 2 years of age, the incidence of intussusception declines. Only 30% of all cases of intussusception occur in children older than 2 years.

A precipitating lesion in children is only identified 10% of the time.² Consequently, the etiology in the majority of cases is considered idiopathic. However, several factors appear to contribute to the pathophysiology of pediatric intussusception (Table 1). Certain anatomic features in the developing gastrointestinal tract may contribute to the easy formation of an intussusceptum in the pediatric patient. The variations were suggested by Scheye et al³ in their post-mortem investigation of 15 autopsy specimens, 3 of the specimens were used for detailed examination of the anatomy of the ileocecal valve. These features include anterior insertion of the terminal ileum with respect to the cecum, decreased rigidity of the cecum secondary to the absence of the teniae coli, papillary arrangement of the ileocecal valve, and participation of the longitudinal muscles fibers of the colon in the constitution of the valve. In other words, the decreased rigidity in the wall of the pediatric cecum (secondary to delayed development of the teniae coli) naturally allows for easy intussusception of the thickened muscle of the ileocecal valve which, as children, tends be more anteriorly located and therefore more mobile and prone to prolapse.

Table 1 Predisposing Factors in the Development of Pediatric Intussusception

Anatomic
Anatomic variations in the developing gastrointestinal tract
Appendix
Celiac disease
Crohn's disease
Intestinal duplication
Hamartomas
Hypertrophied Peyer's patch
Lipomas
Lymphangioma
Leiomyosarcoma
Lymphomas
Meckel's diverticulum
Peutz-Jeghers polyp or cancer
Polyps
Associated infections
Adenovirus
Rotavirus
Parasites
Bleeding disorders
Henoch-Schönlein purpura
Hemophilia
Leukemia
Associated disease processes
Neuronal intestinal dysplasia
Celiac disease
Cystic fibrosis

Other conditions may contribute to the development of the intussusceptum. Infections in the pediatric population, most commonly adenovirus and rotavirus, are thought to cause hypertrophy of Peyer's patches, resulting in an intussusceptum. The incidence has a seasonal variation, with peaks coinciding with seasonal viral gastroenteritis in some populations.⁴ Approximately 30% of patients experience an antecedent viral illness (upper respiratory tract infection, otitis media, flu-like symptoms) before the onset of the intussusception. In addition, reports of an increased risk of intussusception in children receiving oral rotavirus immunization, especially in the weeks following its administration, led to the drug being withdrawn from the market in 1999. A more recent study disproves this theory.⁵ Enlargement of lymph nodes and Peyer's patches can also occur with non-infectious conditions such as intestinal allergies, celiac sprue, and Crohn's disease. Altered peristalsis in focal areas of the bowel wall leading to aperistaltic segments that feed into peristaltic areas; for example, submucosal hemorrhages that occur in Henoch-Schönlein purpura, allow for the formation of an intussusceptum. In addition, altered peristalsis may occur as a result of functional deficits such as in

neuronal intestinal dysplasia where bowel dysmotility is caused by aberrant neuronal development. Foreign bodies, intestinal parasites, and inspissated feces from cystic fibrosis may produce subacute intestinal blockages that may then act as lead points for intussusception. In cystic fibrosis, these impactions commonly occur in the ileum, leading to ileocolic intussusception.

Intussusception may be associated with malrotation in a condition called Waugh's syndrome.⁶ The pathophysiology involves easy prolapsing of the ileocolic region into the nonfixed ascending colon found in the midabdomen in children with malrotation. Because the ascending colon is not fixed to the retroperitoneum, the intussusceptum often advances into the descending colon and rectum without compromising the vascularity of the bowel. At the time of surgery for this dual condition, the diagnosis is usually made and confirmed by the location of the cecum and the pathognomic presence of the peritoneal bands from the ascending colon across the duodenum. As non-surgical reduction is becoming more popular and successful, the chances of missing this association are high. It is imperative during surgery, during hydrostatic reduction of intussusception, and in cases of recurrent ileocolic intussusception, to keep in mind the possibility of Waugh's syndrome.

In less than 10% of pediatric cases, a lead point or underlying cause may be found. These nonidiopathic causes may be due to congenital gastrointestinal tract abnormalities, such as Meckel's diverticulum and intestinal duplication, or due to the presence of neoplastic lead points such as polyps, hamartomas, or lipomas. With increasing age, the nonidiopathic causes tend to become more prevalent. Malignant causes of intestinal intussusception in pediatrics include lymphomas, carcinoma as associated with juvenile polyposis syndrome, and leiomyosarcoma.

In contrast to pediatric intussusception, adult intussusception is rare accounting for only 5% of all reported cases of intussusception and only 1 to 5% of all cases of adult bowel obstruction (see Table 2).^{2,7} The mean age for intussusception in adults is 50 years, and the incidence is about the same in men and women. In contrast to pediatric intussusception, 90% of adult intussusceptions will have a lead point, while the remaining 10% are idiopathic.⁸⁻¹⁴

Benign or malignant neoplasms cause two thirds of these cases with a lead point; the remaining cases are caused by infections, postoperative adhesions, Crohn's granulomas, intestinal ulcers (*Yersinia*), and congenital abnormalities such as Meckel's diverticulum. Of the cases caused by neoplasms, 50% of them are malignant.^{8-10,13,14} Independent predictors of malignancy include site of intussusception (more often colonic than enteric) and presence of anemia (hemoglobin < 12).¹²

Table 2 Causes of Nonidiopathic Adult Intestinal Intussusception

Enteric benign
Adhesions
Adenoma
Cantor tubes
Celiac disease
Crohn's disease
Endometriosis
Malignant stromal (GIST) tumor
Hamartoma
Hemangioma
Inflammatory polyp
Kaposi's sarcoma
Lipoma
Meckel's diverticulum
Neurofibroma
Peutz-Jegher polyp
Tuberculosis
Submucosal hemorrhages from unregulated anticoagulation
Enteric malignant
Adenocarcinoma
Carcinoid tumor
Leiomyosarcoma
Lymphoma
Metastatic carcinoma (melanoma most common)
Malignant GIST
Neuroendocrine tumor
Colonic benign
Adenoma
Inflammatory pseudopolyp
Lipoma
Colonic malignant
Adenocarcinoma
Lymphoma
Sarcoma

Most adult intussusceptions are enteric (arise from the small bowel), and most enteric lesions are benign with a rate of 50 to 75% in most series.^{2,8-14} The most common lesions are adhesions and Meckel's diverticulum.^{8,11} Other lesions include lymphoid hyperplasia, lipomas, leiomyomas, and hemangiomas. Other conditions that predispose to small bowel intussusception include anorexia nervosa and malabsorption. The increased flaccidity of the bowel wall facilitates invagination. Unregulated anticoagulant therapy may cause submucosal hemorrhages that can lead to intussusception. Other malignant causes of small bowel intussusception include primary leiomyosarcomas, malignant stromal (GIST) tumors, carcinoid tumors, neuroendocrine tumors, and lymphomas. Less commonly, malignant tumors may act as lead points with metastatic disease being the most common. In several reports, ~50% of malignant lesions causing

small bowel intussusception were metastatic melanomas.^{8,11} Finally, idiopathic causes of adult intussusception are more likely to occur in the small intestine than in the colon.^{2,8,14}

Intussusception in adults occurs less frequently in the colon than in the small bowel with a rate of 20 to 25%.^{2,8-14} Some reports indicate that colonic lesions are more likely to have a malignant lesion as the lead point because of the increased prevalence of malignancies in the colon versus the small bowel.^{9,11,12,14} Other studies reveal that the proportion of benign-to-malignant lesions appear to be similar in both the colon and enteric locations, with benign being more common.^{8,10,13} The most common malignant cause is primary adenocarcinoma and the most common nonmalignant cause is lipoma.¹¹ In a few reports, a third and separate category of adult intussusception, ileocolic, is made. Ileocolic lesions appear to have a high propensity for malignancy with a 100% rate in two recent moderately sized series.^{10,13}

A historical cause of both antegrade and retrograde small bowel intussusception in adults is the use of long cantor tubes.¹⁵ Antegrade intussusception in this situation occurs as telescoping of the bowel over the tube especially when it is fixed in place with tape at the nose. Retrograde intussusception occurs during or after the tube is removed, especially if removed quickly and with force.

The etiologies for adult intussusception defined above apply mainly to the Western developed world. In central and western Africa, primary adult intussusception is known as "Ibadan intussusception" or "tropical intussusception" and is most commonly cecocolic.¹⁶ This geographic variation in pathology has been attributed to the fiber content of the diet (which affects fecal load), dietary habits (large amount of beans and rice after several days without eating producing excess colonic peristalsis), and chemicals in the gut from parasites (ascaris toxins are smooth muscle stimulants) or food, and genetics (mobile right colon with a long mesentery).

CLINICAL PRESENTATION

Most children under 2 years with typical ileocolic intussusception present with sudden onset of abdominal pain exhibited by the drawing up of the knees, screaming, and lethargy between painful bouts. The onset of pain is shortly followed by obstructive symptoms such as bilious vomiting and abdominal distension. Half of cases progress to bloody, mucoid "currant jelly" stools within 12 hours. However, the classic triad of pain, a palpable mass, and currant jelly stool is seen in less than 15%.¹⁷ Depending on timing of presentation they may or may not have fever and leukocytosis. Physical exam reveals a sausage-shaped mass in the right upper quadrant or

epigastrium with absence of bowel in the right lower quadrant (Dance's sign).

In contrast, the adult entity may present with acute, chronic, or intermittent symptoms. The spectrum of clinical presentation depends on the site of the intussusception, the timing of clinical presentation, and the predilection for spontaneous reduction. Whether it is acute or chronic, the presentation of adult intussusception is similar to that of small and large bowel obstruction. The classic triad of symptoms of abdominal mass, tenderness, and bloody discharge from the rectum are rare.^{2,7,8} The most common symptom is abdominal pain, which occurs in 78 to 100% of patients.⁸⁻¹⁴ Other symptoms that occur in decreasing order of frequency include nausea/vomiting, diarrhea/constipation, rectal bleeding. Duration of symptoms is variable. A short time to presentation in a majority of patients was seen in some series.^{10,14} Other series demonstrated a more chronic process. In the series by Azar and Berger, the mean duration of symptoms was 37.4 days with a range of 1 to 365 days.⁸ Duration of symptoms was longer in benign lesions as compared with malignant lesions and was longer in enteric lesions as compared with colonic lesions. In the study by Barussaud et al,¹¹ more than 50% had symptoms for more than 3 weeks. In particular, 73% of the colonic intussusceptions had duration of symptoms for more than 10 days. In the study by Goh et al,¹² 57% had symptoms for greater than 2 weeks.

Common physical findings include distension, hypoactive bowels, abdominal tenderness, and guaiac positive stools.^{2,7,8,18} Abdominal mass is identified infrequently; it is noted in ~10% of patients in most series.^{8,13,14} However, one series reported an incidence of 33% and was more frequently seen in the intussusception of a colonic lesion.¹¹ In those with colonic lesions, up to 47% can demonstrate a mass compared with 14% of those with enteric lesions.¹¹

If the presentation is late in the course of the condition, signs of bowel ischemia such as pain out of proportion to examination or generalized peritonitis may result with corresponding signs of shock such as hypotension and tachycardia. Because the signs and symptoms are similar to other causes of intestinal obstruction and because of the rarity of this condition in adults, it is not often suspected in the differential diagnosis. Table 3 summarizes several of the recently published case series of adult intussusception with respect to presenting symptoms, diagnosis, and final pathology.

PATIENT EVALUATION

The evaluation of patients with intussusception using radiologic studies differs for pediatric and adult populations. In pediatrics, intussusception is common and is typically idiopathic/benign. Consequently, quick non-invasive studies are chosen that are cost-effective and in

Table 3 Presentation and Etiology of Adult Intussusception

	Ekran et al, 2005 ¹⁰	Barussaud et al, 2006 ¹¹	Goh et al, 2006 ¹²	Azar & Berger, 1997 ⁸	Zubaidi et al, 2006 ¹³	Takeuchi et al, 2003 ⁹	Wang et al, 2007 ¹⁴
Patients	13	44	60	58	22	7	24
M/F	6/7	6/7	36/24	37/21	9/13	2/5	13/11
Age (years)	45	51	58	54	57	65	50
#1 complaint							
Abd pain	100%	38%	95%	78%	86%	100%	79%
Constip	69%	32%		9%	23%		8%
N/V	61%		42%	78%	59%	14%	46%
Diarrhea	15%	32%	28%	7%	9%		21%
GI bleed	15%	11%	23%	29%	27%	14%	8%
Mass		25%	33%	11%	9%		8%
Obstruction		34%		50%			
Dx preop	31%	52%	52%	32%	14%	57%	75%
SB	77%	66%	52%	44%	64%	57%	42%
LB	15%	34%	48%	14%	27%	28%	8%
ICV	8%				9%	14%	50%
Path Dx Total	92%	95%	90%	93%	86%	86%	83%
Idiopathic	8%	5%	10%				17%
Total Benign	58%	57%	53%	54%	43%	57%	55%
Total Malig	42%	43%	47%	46%	57%	43%	45%
Malig SB	40%	37%	26%	48%	29%	25%	19%
Benign SB	60%	63%	74%	52%	71%	75%	21%
Malig Ileocolic	100%	—	—		100%	100%	60%
Malig LB	33%	58%	69%	43%	33%	66%	100%
Benign LB	67%	42%	31%	57%	67%	33%	0%

Abd, abdominal; constip, constipation; N/V, nausea/vomiting; GI, gastrointestinal, Dx, diagnosis; SB, small bowel; LB, large bowel; ICV, ileocolic volvulus; malig, malignant.

many cases are diagnostic and therapeutic. These include ultrasound and contrast studies; however, a lack of experienced radiologists comfortable in performing these studies is a limitation. In adults, intussusception is rare and the diagnosis not typically at the top of the differential list. Consequently, the choice of imaging is usually based on the most suspected diagnosis, physicians' preference, and access to certain radiologic services.¹⁹

Because obstructive symptoms dominate the clinical picture in both groups, plain films are usually the initial imaging study. They provide information about the possible site of the obstruction as well as evaluate for pneumoperitoneum. However, although plain films may indicate obstruction, they are not useful in making the diagnosis of intussusception.^{8,10,12}

In children, abdominal ultrasound and air or contrast studies are the most useful. Ultrasound is quick and cost-effective when done by an experienced radiologist with sensitivity and specificity approaching 100%. Because of its noninvasive nature, ultrasound is ideal for reluctant pediatric patients of all ages. The classic feature is the target or donut sign caused by the edematous intussusceptions forming an external ring around the centrally based intussusceptum.²⁰ On transverse view, the intussusception is identified by the pseudokidney

sign formed by the layers of the intussusception. Abdominal ultrasound is a useful and an appropriate technique, though it is less accurate in adults. The classic features of intussusception include the target, donut, or bull's eye signs on transverse view and the pseudokidney sign on longitudinal view. If color flow Doppler is used, the presence of bowel necrosis may be demonstrated by showing compromised blood flow to the intussusceptum. In addition, ultrasound can be combined with a water enema for therapeutic reduction; it has also been used to image the intussusception postreduction, which can confirm a successful complete reduction.

Contrast/pneumatic enemas are also effective in pediatric intussusception because of the dual role of diagnosis and therapeutics. Water-soluble and radio-opaque contrast agent are used and demonstrate an air crescent sign on films caused by the filling of the contrast around the "head" of the intussusception at the end of the contrast column.

In adults, intussusception typically manifests as an acute or chronic obstruction. After plain films to confirm obstruction, computed tomography (CT) is often subsequently performed to evaluate the location and the cause of the obstruction. It is probably the best test to reveal the signs of obstruction including the target sign

on transverse view or sausage-shaped mass on transverse view.^{8,9,12,13} As CT improves with the addition of coronal along with axial views, the likelihood of preoperative diagnosis will also improve. Reported diagnostic accuracy is ~58 to 78%.⁸⁻¹⁴ However, CT is not great at differentiating between neoplastic lead points from thickened bowel, but may be of further advantage by providing clues to the etiology of the intussusception. The presence of lymphadenopathy or metastatic lesions, for example, may point to a malignant cause.

Ultrasound is less useful in adults because massive air in distended bowel loops and obesity limit image quality. Success is operator dependent. In several series of adult intussusception, ultrasound correctly diagnosed adult intussusception in 0 to 38% of the cases.^{8,10-12,14}

When chronic intermittent small bowel obstruction is the initial presenting sign and adult enterointerintussusception is suspected, barium small bowel follow through may prove advantageous. Signs of intussusception in this test include a spiral, "coil spring" or "stacked coin" appearance with narrowed central canal. These signs result from the retrograde filling of the contrast between the walls of the invaginated bowel loop. The narrowed central canal is the edematous, obstructing intussusceptum. Accuracy rates range from 20 to 45%.^{8,11,12}

When colonic obstruction is the primary differential on plain films, barium enema and colonoscopy are effective in detecting intussusception. Barium enema reveals the intussusception in 50 to 85% of cases.^{8,11,14} Likewise, colonoscopy plays a role in the evaluation of large bowel obstruction caused by intussusception by defining benign from malignant causes. It can be used as part of the preoperative assessment or, if the intussusception is found intraoperatively as most commonly occurs, can be performed intraoperatively to facilitate appropriate surgical management.

Laparoscopy, although not an imaging study, is obviously an excellent evaluation tool when intussusception is suspected in a patient with bowel obstruction. It allows for identification of the location, the nature of the lead point, and the presence of compromised bowel. It aids in the choice of an appropriate location for the incision that would minimize length.¹¹ Isolated cases of these procedures are described in the literature. Successful completion of the procedure laparoscopically varies on an individual case basis.

Because of the rarity of adult intussusception and because of the nonspecific symptoms/physical finding, and signs on imaging, preoperative diagnosis is a challenge with success ranging from 14 to 75% of the time.^{2,8-14} Much of the variation may be attributed to access to CT scans and to trained radiologists experienced in signs of intussusception on imaging studies. Consequently, the majority of patients are brought to the operating room with the preoperative diagnosis of bowel

obstruction and an intussusception seen at the time of exploration. Cotlar and Cohn stressed the difficulties of making a correct preoperative diagnosis, and the importance of early operation to increase survival in this condition. The most important factors in arriving at the correct diagnosis are an awareness of the possibility of this condition existing in any patient with symptoms, suggesting prior episodes of partial intestinal obstruction, and the vigorous approach toward complete radiographic examination in such patients.²¹

TREATMENT

For all patients who present with signs of perforation, shock, or peritonitis, immediate laparotomy is necessary. In the absence of these signs, the therapeutic approach to pediatric and adult intussusception is different.

Pediatric intussusception is common, typically ileocolic, and commonly idiopathic. Consequently nonoperative techniques have been developed and advocated and involve nonoperative reduction via contrast or pneumatic enemas. Barium suspension with air under fluoroscopic guidance, or saline plus/minus soluble contrast media under sonographic guidance are successful in a majority of cases, up to 90% in some series.²² However, most institutions have a success rate of ~60%.²³ Water-soluble contrast agents have the benefit of not staining the peritoneum should perforation occur. Pneumatic reduction has become increasingly popular as a clean, efficient technique that allows for less radiation exposure.²⁴ Air is introduced with a manometer with the pressure kept under 120 mmHg. The main risk of hydrostatic or pneumatic reduction is perforation, which occurs in less than 1% of patients.²⁵ When polyps, tumor, or Meckel's are the lead point, nonoperative reduction is rarely successful and the diagnosis frequently made at laparotomy.

In adults, intussusception is rare; it is typically caused by a pathologic lead point, frequently involves malignancy, and is rarely diagnosed preoperatively. Consequently, definitive surgical intervention is mandatory and preoperative reduction with barium or air is not recommended as a part of definitive treatment.^{2,9,11,18} However, optimal intraoperative treatment remains controversial. Most of the debate centers on whether to resect the intussusception en bloc or to reduce the intussusception first. En bloc resection eliminates the possibility of recurrence, is beneficial in patients at risk for short gut, and avoids enterotomy/anastomosis in edematous or compromised bowel. In addition, en bloc resection without reduction avoids the theoretical risks of perforation, seeding microorganisms or tumor into the peritoneal cavity or venous system after manipulating ischemic, friable bowel that often harbors malignancy. Consequently, some surgeons advocate en bloc resections of

all intussusception in adults regardless of location (enteric or colonic) or cause (benign or malignant).^{2,8,26} Weillbaeher et al²⁶ were the first to establish the principle of resection without reduction. Subsequent authors have reinforced the need for en bloc resection even in small bowel cases because of the inability to differentiate benign from malignant etiology preoperatively. The exception to this concept is postoperative adhesions, which are felt to be safe to reduce without resection as long as the bowel is viable.⁸ In addition to the en bloc technique, resection of colonic lesions should be approached from an oncologic standpoint with adequate harvest of lymphovascular tissue if the presence of malignancy cannot be excluded.^{8,14,26} The exception to this is obvious metastatic disease in association with or as a cause of the intussusception where extent of resection does not impact overall prognosis.

Alternatively, more recent authors recommend a selective approach to resection, taking into consideration the site of the intussusception, which is reflective of the type of pathology. These authors advocate en bloc resection of all colonic lesions, due to the higher rate of malignancy, but a more limited resection of small bowel, where malignancy is less common.^{2,7,9,10,13,18} Proponents of this approach advocate initial reduction first of enteric lesions, especially in cases where the preoperative diagnosis is presumed benign, in whom no bowel ischemia is noted, and in patients at risk of short gut. In addition, many malignancies causing enteric intussusception are metastatic implants in which the benefit of a formal oncologic resection is questionable, but where resection is advocated to prevent recurrence. The underlying theme is the concept of tailoring the surgery to the suspected pathology in cases of enteric lesions. Colonic intussusception requires a more thorough investigation as to the clues of etiology. Because of the high incidence of malignancy, resection should be accompanied by oncologic approach. Thorough evaluation of the abdomen in search of distant metastases should be undertaken to evaluate the necessity of this approach.

Because of the high incidence of malignancy identified in ileocolic lesions, Wang et al recommends performing colonoscopy at the time of laparotomy to determine the nature of the lesion and if found to be benign, these lesions were reduced first with limited bowel resection to preserve ileocecal valve and avoid diarrhea and ileus.¹⁴ In addition, these authors recommended limited surgical management of both the large and small intestine if benign etiology is suspected with appendectomy, enterotomy, polypectomy, or diverticulectomy performed in specific situations for uncompromised bowel after reduction. However, these recommendations were made with the disclosure that more data needed to substantiate the validity of these methods.

For modern surgeons, adult intussusception remains a rare encounter. The surgeon should maintain a high clinical suspicion of intussusception in patients with recurrent episodes of obstructive symptoms. Preoperative evaluation should be directed toward suspected location of the obstruction with CT being the most informative test and barium enema and colonoscopy used judiciously in large bowel obstructions. Because of the vague signs and symptoms, most diagnoses of intussusception will be made at the time of exploration. Once encountered at laparotomy, the surgery should be tailored to the suspected diagnosis, whether it is benign or malignant, with initial reduction reserved for enteric lesions suspected of being benign with minimal compromise to the bowel. Colonic intussusception can be better evaluated intraoperatively with colonoscopy, but approach should include oncologic resection in the absence of obvious metastases because of a high rate of malignancy. Because of the rarity of this condition, comparison of long-term data with respect to outcome of various methods remains impossible.

CONCLUSION

Intussusception in pediatric patients is common and often benign; the diagnosis is usually made at clinical presentation, and the standard treatment involves non-operative reduction. Intussusception in adults is rare. Preoperative diagnosis is a challenge because of longstanding, intermittent, nonspecific symptoms. Most cases are diagnosed at emergency laparotomy. Treatment involves surgeon awareness of variations in etiology and requires resection with a selective approach to initial reduction.

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