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Review Article

OVERVIEW OF INTUSSUSCEPTION IN THE EMERGENCY DEPARTMENT AMONG PEDIATRICS

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Abstract:

Introduction: Intussusception is a major cause of intestinal obstruction among children, and it necessitates immediate treatment in the emergency department (ED). Therapeutic air or liquid enema is frequently used to treat intussusception, but if it is not done right away, it can cause peritonitis, intestinal gangrene, and intestinal perforation, all of which may necessitate emergency surgery. Intussusception should, therefore, be screened for and caught early in the emergency department. Adult intussusception is uncommon and difficult to diagnose. On the other hand, the management is rather simple. Early diagnosis of the illness process is essential to preventing complications before or even during surgery in order to obtain positive results. It may be difficult to identify intussusception by analyzing the clinical signs or simple abdominal radiographs.

Aim of the Study: The purpose of the present review is to understand the pathophysiology, etiology, history, physical findings, and management in the emergency department, as well as the significance of an interprofessional team in improving patient outcomes.

Methodology: The review is a comprehensive research of PUBMED since the year 1998 to 2023.

Conclusion: Intussusception ought to continue to be treated as an emergency, with non-surgical methods of reduction being tried as soon as possible. Bowel intussusception in adults is a rare and difficult condition. Non-specific symptoms may result in missing or delayed preoperative diagnosis. A high mortality rate might result from delayed treatment for intussusception, which is a surgical emergency. An interprofessional team composed of a radiologist, an emergency room doctor, a general surgeon, and maybe a gastroenterologist manages this condition.

Keywords: Intussusception, emergency, surgical reduction, etc.

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INTRODUCTION:

A portion of the intestine invaginating (telescoping) into itself is referred to as intussusception. An invagination (telescoping) of a portion of the intestine into a more distal tract is referred to as intussusception. The distal section into which it telescopes is known as the intussusciptiens, and the proximal segment is known as the intussusceptum. It is the most frequent stomach emergency in young children, especially those under two years old. Only 25% of cases involving children had pathologic lead points identified, and the majority of pediatric cases are idiopathic. Adult intussusception is uncommon, and the diagnosis is frequently missed. The majority of adult cases have a pathogenic etiology found.^[1]

Hutchinson reported about the first infant with intussusception who had effectively undergone surgery in 1871. Hirschsprung reported enema-based intussusception treatment in 1876. Compared to the death rates following surgery, this approach had a mortality rate of about 35 percent. The reduction of intussusception by fluoroscopy-guided enema was first described in 1927, and radiologists soon introduced it to their repertoire of skills. Ultrasound is now an additional imaging option that is part of the technique's continued evolution. Barium or other liquid contrast agents were traditionally used to reduce (hydrostatic enema), although air or carbon dioxide can also be used (pneumatic enema).^[2]

Infants and young children are most commonly affected by intussusception. The most frequent cause of intestinal obstruction in this age group, with a peak incidence between 4 and 36 months of age. Infants under three months account for 1% of instances, followed by children between three and twelve months (30%), one and two years (20%), two and three years (25%), and three and four years (10%). Intussusception was found to occur in 38, 31, and 26 cases per 100,000 live births in the first, second, and third years of life, respectively, in a population-wide survey in Switzerland.^[3]

Although intussusception is more frequent in newborns and young children, it is vital to take children outside of this age range into consideration when making this diagnosis. Children over the age of five account for 10% of instances, and those over the age of 10 account for 3% to 4% [6,7]. A pathologic lead point, which could include reactive lymphoid hyperplasia, is likely to be present when intussusception occurs outside of the usual age range. The majority of episodes affect youngsters who are generally healthy and well-fed. A male-to-female ratio of about 3:2 tends to indicate a little male predominance in intussusception.^[3]

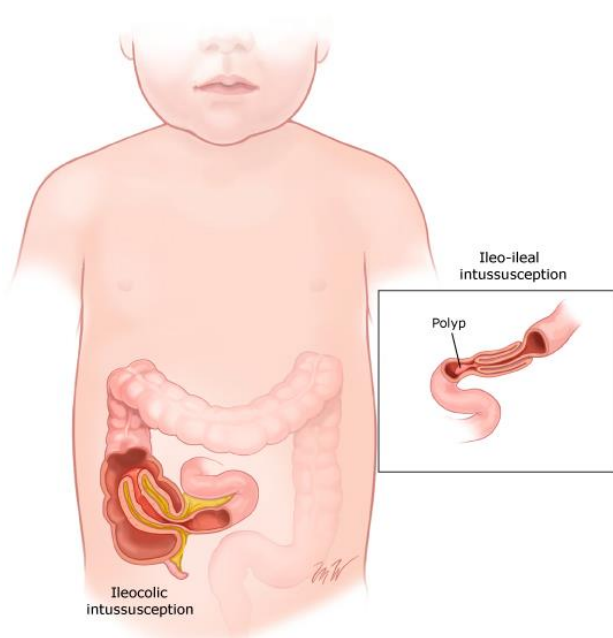


Fig. 1 Illustration of a child with intussusception. The ileum telescopes through the ileocecal junction and into the colon in ileocolic intussusception.^[5]

The position determines the type of intussusception; it can be broadly classified as:

1. Ninety percent of all cases of ileocolic intussusception involve **the ileocecal junction**.
2. There have also been cases of **ileo-ileal, ileo-ileo-colic, jejuno-jejunal, ileo-ileal, or colo-colic intussusception** reported. An ileo-ileal intussusception that telescopes farther past the ileocecal valve and into the right colon is referred to as an ileo-ileo-colic intussusception.^[4]

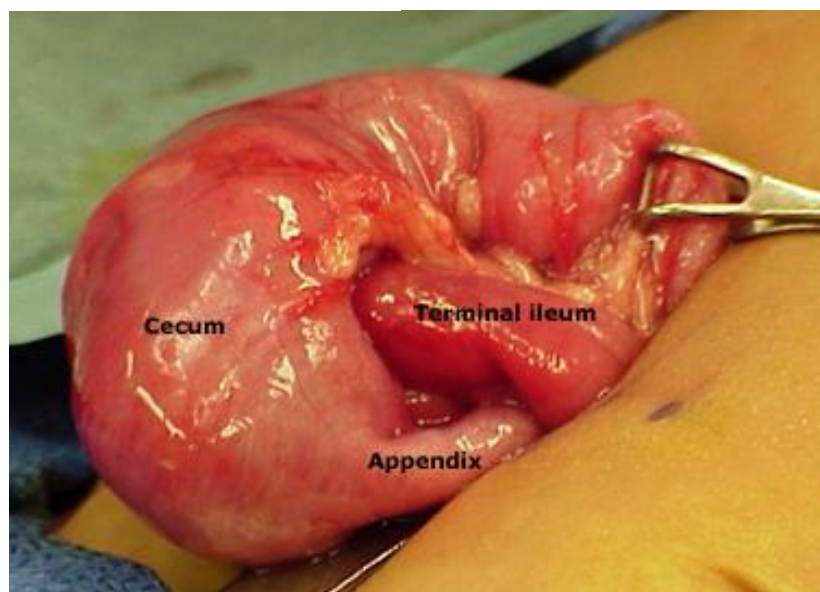


Fig. 2 Surgical section of the most common form of intussusception (ileocolonic intussusception) ^[5]

Pathogenesis and Aetiology

If there is no discernible mass in the intussuscepted (no "lead point"; see "Lead point" below), the intussusception is regarded as idiopathic. Even if there was a plausible or potential etiology, such as a viral or other gastrointestinal infection, the intussusception may still be idiopathic. The mesentery enters the gut as the intussusception progresses. As a result, intestinal edema develops because of venous and lymphatic congestion. Ischemia, perforation, and

peritonitis may eventually result from the procedure if it is left untreated.

Idiopathic – Since there is no obvious illness trigger or pathologic lead point, approximately 75% of instances of children's intussusception are idiopathic. The most prevalent age range for idiopathic intussusception in children is between three months and five years.^[1]

Influence of viral factors — There is mounting evidence that suggests that in some circumstances,

viral triggers may be involved, as shown by the following observations: In some populations, the frequency of intussusception varies seasonally and peaks coincide with seasonal viral gastroenteritis. Intussusception has been linked to various rotavirus vaccination formulations. An early version of the vaccine (RRV-TV: Rotashield) was taken off the market because infants who received it experienced a 22-fold increase in intussusception.^[3]

Another gastroenteritis, intussusception – is also linked to bacterial enteritis. 37 patients (or 12.6% of all intussusceptions observed at these facilities) experienced intussusception as a result of a series of 1412 cases of bacterial enteritis seen at military treatment centers. This correlation was discovered for infections caused by *Shigella*, *Campylobacter*, *Salmonella*, or *E. coli*. The majority of intussusception cases started within a month after the bacterial enteritis.^[6]

Lead point – A lead point is an intestinal lesion or variation that causes intussusception when it is carried

into a distal section of the intestine by peristalsis. An intussusception lead point could be a Meckel diverticulum, polyp, duplication cyst, tumor, hematoma, or vascular abnormality.^[7]

Underlying disorders – An underlying disease, which may be localized or diffuse, generates a pathologic lead point for the intussusception in about 25% of cases. A more significant percentage of intussusception cases in children older than five years or younger than three months are caused by underlying disease processes. It's crucial to watch for pathological lead points in kids of all ages.^[8]

Adult intussusception is a rare cause of intestinal blockage, making up just 1 to 5% of cases. Adult non-idiopathic intestinal intussusception has the following causes: Adhesions, Adenoma, Cantor tubes, Celiac disease, Crohn's disease, Endometriosis, Malignant stromal (GIST) tumor, Hamartoma, Hemangioma, Inflammatory polyp, Kaposi sarcoma, Lipoma, Meckel diverticulum.^[9]

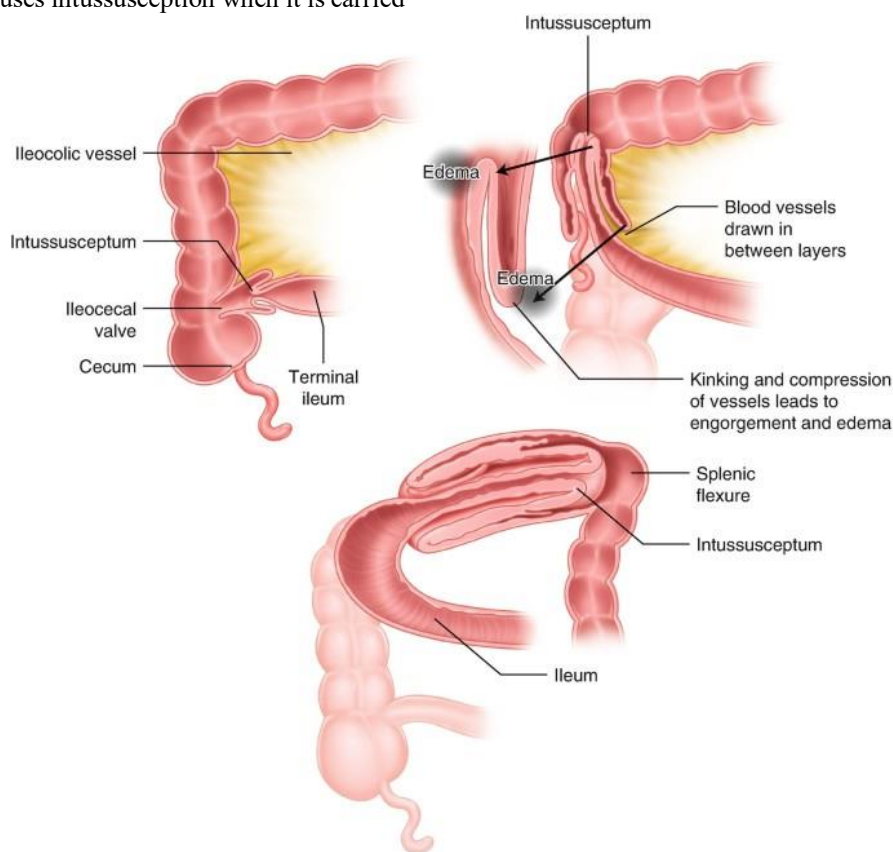


Fig 3 Illustration of causes and pathogenesis of intussusception. ^[10]

Clinical Presentation

Intussusception presents clinically in a variety of forms but is typically characterized by abdominal pain

and bowel blockage symptoms. It is one of the most frequent stomach emergencies among children. Knees drawn to the chest, increased irritability, sobbing, and

acute onset colicky abdomen pain are typical symptoms in children under 2 years old. As the discomfort gets progressively worse, the youngster may resume their usual level of activity between attacks, or they may appear listless and lethargic. Vomiting could happen quickly after the pain starts. A "currant jelly"-like stool with blood and mucus is the next stage in nearly half of cases.^[9]

A palpable "sausage-shaped mass" in the right upper quadrant or epigastric region of the abdomen may be seen during a physical examination, but this finding occurs only in around 60% of cases. Less than 15% of children have the classic pediatric triad of stomach pain, a palpable abdominal mass, and bloody stools. Adults may appear with a vague clinical manifestation of intussusception rather than the traditional triad of abdominal pain, a palpable lump, and bloody stools. Instead, it manifests as little or big intestinal blockage symptoms. The most typical presenting symptom is abdominal discomfort, which is often accompanied by other signs and symptoms that point to partial obstruction, such as nausea, vomiting, obstipation, gastrointestinal bleeding, changes in bowel habits, constipation, or bloating.^[9]

Management

Intussusception is evaluated differently in pediatric and adult populations. In children, intussusception is often idiopathic and benign, and a strong index of suspicion can hasten diagnosis. It often represents blockage in adults caused by a potentially cancerous etiology. In either situation, the diagnosis is initially made using speedier, less invasive, and less expensive methods.

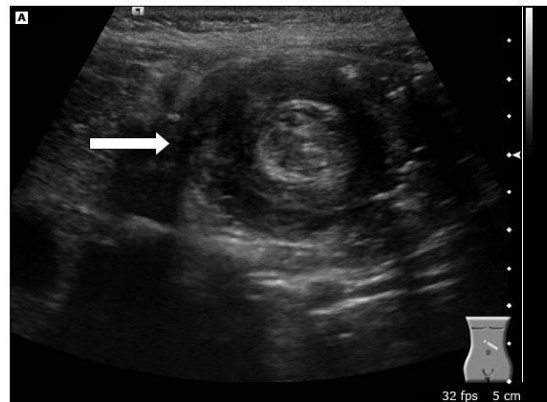


Fig.4. Ultrasound depicting classic doughnut sign.^[5] Acute abdominal series (plain abdominal films) are frequently the first step in evaluation. Plain films generally show symptoms of intestinal obstruction or perforation, such as grossly enlarged bowel loops without colonic gas, as well as information about where the obstruction is in the GI tract.^[9]

Ultrasound is virtually 100% sensitive and specific, especially in children, in contrast to plain films. The preferred imaging modality for diagnosing children is ultrasonography since it is non-invasive and has been shown to be a quick, accurate screening method for intussusception. The target or doughnut sign, which results from the edematous intussusciens forming an exterior ring around the intussusceptum's core base, is the characteristic feature. The layers of the intussusception provide the pseudo-kidney look in the transverse view. The accuracy of ultrasound in adults is generally lower than in children, but it can still detect the target or doughnut sign on the transverse view and the pseudo-kidney on the longitudinal view.^[9]



Fig. 5 CT scan of Ileoileal adult intussusception with classic "bull's-eye" appearance with concentric rings.^[9] Due to the anatomical arrangement of the outer and core intussusception, which provides the appearance of a bowel within a bowel, classic CT findings include "target," "bull's-eye," or sausage-shaped lesions as concentric hyperdense double rings.^[9]

The emergency department management is supportive. Depending on the patient's condition, it's critical to administer pain medication, antiemetics, IV fluids, a nasogastric tube, and maybe antibiotics. Patients who you think have intussusception should be put on the NPO list in preparation for surgery. Due to the high prevalence of cancer, surgical intervention is required for adult intussusception. Due to the high occurrence of underlying bowel cancer, formal resections using suitable oncologic procedures are advised in patients with ileocolic, ileocecal, and colo-colic intussusceptions. Risks associated with tumor manipulation include the spread of tumor cells.^[11]

The type of surgery to be performed depends on the site, extent, and underlying cause of the intussusception, as well as the viability of the intestine. Laparotomy typically identifies the intussusception's root cause. The clinical state of the patient and, in particular, the surgeon's extensive laparoscopic experience determine whether a laparoscopic or open treatment is necessary.^[12]

Treatment for ileocolic (IC) and colocolic (CC) intussusception might be surgical (operative, manual reduction and/or resection or enterostomy intervention as needed) or non-surgical (pneumatic or hydrostatic pressure enemas under fluoroscopy or USG), depending on the clinical circumstances. Based on the location of the lesion, the subsequent approach is adopted.^[13]

"Colo-Colic intussusception:" It is frequently debated whether to handle intussusception of the colo-colic type. Laparotomy is also recommended for reduction since adult intussusception nearly often has underlying disease. The only issue remaining is that the intussusception lesions should be minimized during the procedure. According to earlier studies' findings, lesions should be reduced before being reset. The

potential for malignant cells to spread beneath the surface is the only drawback to this approach. On the other hand, a different school of thought supports it because it could lessen needless intestinal resections and because small gut syndrome is easily avoidable.^[12] "Gastroduodenal intussusceptions:" The decrease of the lead point is usually followed by surgical resection of the lead point when treating gastroduodenal intussusceptions.^[12]

"Coloanal intussusceptions:" In coloanal intussusceptions, physicians frequently concur that the lesion should be reduced before being surgically removed. This method, which results in sphincter preservation, is also beneficial for the patient's long-term quality of life. However, decreasing the lesion can be difficult and can encourage the spread of the cancerous cells. Most doctors use the abdominal method for resections, while in more recent times, clinicians are also more regularly using the perianal and anal approaches. It is now much simpler for doctors to do surgical resections transanally because of the development of several transanal platforms for the insertion of equipment like Geloport and SILS.^[12]

Fluoroscopic or sonographic guidance: The most frequent method for reducing intussusception is hydrostatic (saline or contrast) or pneumatic (air) enemas, both of which are administered under fluoroscopic guidance. Another increasingly popular choice is ultrasound guiding, which has the advantage of avoiding ionizing radiation and better pathologic lead point detection than the fluoroscopic method. In order to lessen ileocolic intussusception, certain healthcare professionals who are skilled in this approach choose to use ultrasound guidance. The fact that ultrasound is limited to hydrostatic reduction is a drawback. The success rates for reducing intussusception using fluoroscopy and ultrasound-guided procedures are comparable, ranging from 80 to 95 percent.^[5,14]

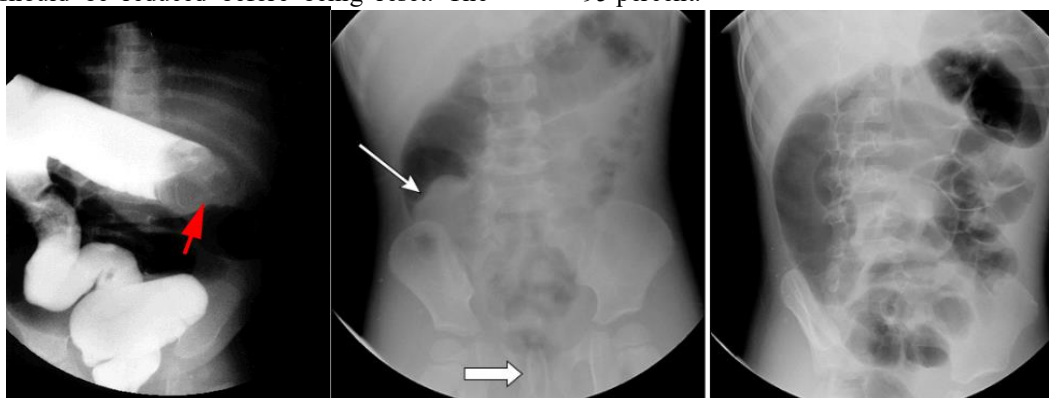


Fig.6 Mid-transverse colon with Barium contrast enema showing intussusception (Red arrow), Air (negative contrast) making the intussusception visible (white arrow) and following pneumatic reduction.^[5]

Sonographic guidance:

Because using air would impair ultrasound visualization, sonographic guidance requires a hydrostatic approach (saline enema) to generate retrograde pressure. The absence of intussusception and the emergence of water and bubbles in the terminal ileum are both sonographic indicators of a successful reduction.^[5,14]

Fluoroscopic guidance:

The intussusceptum for a typical ileocolic intussusception appears as a filling defect within the gut lumen under fluoroscopy. When air is utilized as a negative contrast with pneumatic reduction procedures, this is either shown as a low-density filling defect when contrast is employed for hydrostatic reduction or as a greater-density filling defect. Any area of the large bowel, including the rectum, is susceptible to intussusception. On rare occasions, contrast may cover the intussusciens' exterior, creating the appearance of a coiled spring pattern.^[5,14]

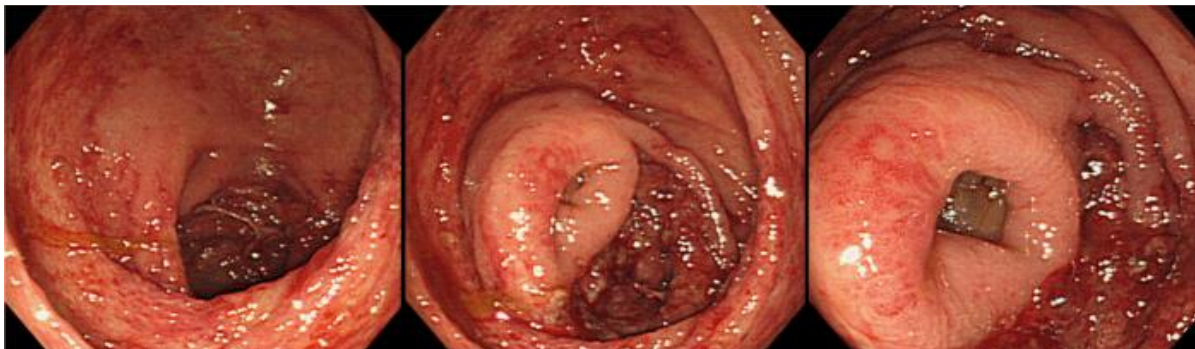


Fig.7 Cecum and ileocecal valve in Endoscopic imaging prior reduction.^[16]



Fig.8 Cecum and ileocecal valve in Endoscopic imaging after reduction.^[16]

Hydrostatic or pneumatic reduction:

For the purpose of reducing intussusception in patients who are stable, either the pneumatic (air) or hydrostatic (saline or contrast) approach is suitable. The radiologist's level of competence, comfort, and the accessibility of the required tools all play a role in the procedure selection. In our institution, pneumatic reduction—rather than hydrostatic reduction—is the preferred technique. This is due to the somewhat improved success rates and decreased risk of perforation associated with pneumatic reduction of intussusception. Placing a reservoir of contrast one meter above the patient to create consistent hydrostatic pressure is the conventional reduction technique. A clinician may perform a more aggressive decrease (i.e., raise the reservoir higher above the patient to increase hydrostatic pressure) depending on the patient's clinical condition.^[15]

CONCLUSION:

Intussusception is a challenging disease to treat. Non-specific symptoms may result in missing or delayed preoperative diagnosis. A high mortality rate might result from delayed treatment for intussusception, which is a surgical emergency. An interprofessional team composed of a radiologist, an emergency room doctor, a general surgeon, and maybe a gastroenterologist manages this condition. The patient needs to be revived and made ready for surgery after the diagnosis is made. The procedure is typically an emergency. Nurses must closely follow the patient in the postoperative phase because many patients also have other comorbid conditions that raise the risk of complications.

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