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A Child's Acute Intestinal Intussusception and Literature Review

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Abstract

Acute intestinal intussusception remains a surgical emergency in infants and young children aged 3 months to 3 years. It results from the incarceration of the upstream intestinal segment in the downstream segment. In the majority of cases it is idiopathic, but can be secondary to certain pathologies notably Meckel's diverticulum. The site is most often ileo cecal. The symptomatological triad is made up of pain, vomiting, and rectal bleeding. The diagnosis is confirmed by imaging, dominated by ultrasound which remains the reference imaging. We report the case of a 3 year-old boy, followed for a malformation who presented with abdominal distension, abdominal pain, and rectal bleeding. The diagnosis of acute ileo-ileal intussusception was made. After an attempt at hydrostatic reduction under ultrasound guidance, he underwent surgical management. The postoperative period was simple and uncomplicated. Intestinal intussusception remains a pathology with a low morbidity and mortality rate of 0% to 1% due to delayed diagnosis and delayed therapeutic management.

Keywords

acute intestinal intussusception, child, ultrasound, scanner, enema reduction, surgery

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Introduction

Acute intestinal intussusception (AII) is a surgical emergency and the most common cause of intestinal obstruction in infants and children between 3 months and 3 years of age.[1-3] The mechanism of acute intestinal intussusception is always the incarceration of the upstream intestinal segment into the downstream segment by a finger-like turning mechanism. The combination of the outer (intussusception) cylinder, the inner (intussusception) cylinder, and the intermediate cylinder(s) is known as the intussusception bladder.

In 1674, Paul Barbette made the first anatomical description. The first surgery was performed in 1871 by Jonathan Hutchinson. Hirschsprung was the first to report a series on hydrostatic reduction in AII by reduction.[2]

It requires early diagnosis and the symptomatology was dominated by abdominal pain, rectal bleeding, and vomiting. The radiologist plays an essential role in the diagnosis. Ultrasound is the first-line examination to confirm the diagnosis.

Surgery remains the treatment of choice. Non-invasive radiological reduction techniques are used in the first line with certain recurrence rate.

There is a certain amount of morbidity, particularly due to the delay in diagnosis and management (0%-1%).

Case Report

A 3-year-old child with William Beuren malformation was admitted to the pediatric emergency department with vomiting, followed by episodes of hematemesis.

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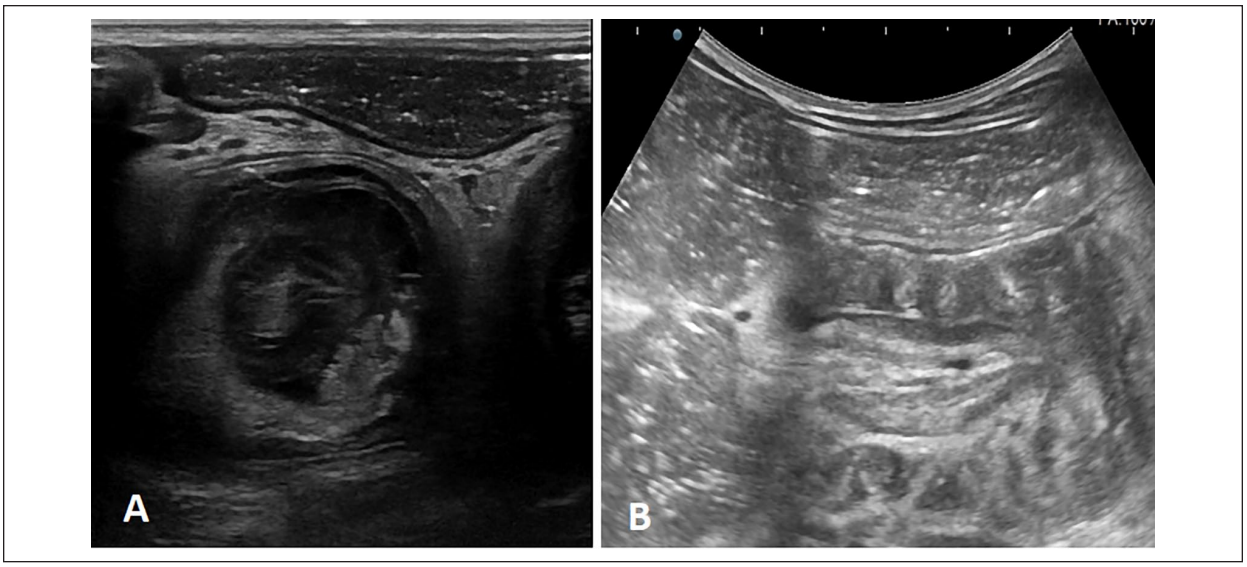

Figure 1. Ultrasound shows aspect of intestinal intussusception as succession of hypoechoic digestive layers on transversal section with target appearance (A) and longitudinal section so-called "sandwich" (B).

There was incessant crying, abdominal pain with constipation, all in a non-febrile context.

The clinical examination did not reveal any abnormality with a distended, flexible abdomen.

Biological Tests Were Normal

The unprepared abdomen radiography showed hydroaereic levels and bowel distension.

An ultrasound scan showed an intussusception sausage in the form of a heterogeneous echogenic mass in the right hypochondrium with successive layers of digestive tunics giving a sandwich appearance on longitudinal sections and a cocoon appearance on transverse sections with a central meso with vascular hyperhaemia on color Doppler in a concentric form within the intussusception sausage (Figure 1).

An additional abdominal CT scan has revealed proximal intestinal intussusception (ileo ileal), with a cocoon-like appearance, with turgidity of the intra-lesional vessels. It's associated with a little adjacent liquid effusion and several sub-centimetric lymph nodes, the largest measuring 8 mm in diameter.

There is significant colonic and bowel distension, measuring 35 mm in maximum diameter in the transverse colon, containing NHA (Figure 2).

The diagnosis of proximal acute intestinal intussusception with adjacent fluid effusion and occlusion was retained.

Ultrasound guided hydrostatic enema was initially done with saline solution without success. After this unsuccessful attempt, laparoscopic surgery was performed to treat the intussusception (Figure 3).

No etiological abnormalities were found during the surgery. The diagnosis of idiopathic acute intestinal intussusception was retained.

Discussion

Acute intussusception remains the second most common cause of acute abdomen in children after appendicitis, and the most common cause of bowel obstruction in young children. Its incidence worldwide ranges from 15 to 300/100 000 children per year.[4] Globally, this incidence varies from country to country; in Europe it represents about 20/100 000 and remains higher in developing countries.[2,3]

It affects children with a peak between 3 months and 3 years of age and a median age that varies between 4 and 9 months. The male sex is more affected about twice as much.[4,5] Intestinal intussusception in newborns is exceptional and secondary to intestinal malformation.[6]

In nearly 95% of cases, intussusception is idiopathic, and occurs in the ileo-colic junction, the site of lymphoid hyperplasia. The site may vary, giving rise to other types of intussusception, notably ileo ileal, colo-colic. Viral origin is suggested by adenovirus, herpes virus, and rotavirus. In 3% to 5% of cases, it could be secondary, notably due to the presence of a Meckel's diverticulum.[7]

Other local causes[8]:

- Tumors: benign angiomas, isolated juvenile, or hamartomatous polyps, multiple polyps in the context of juvenile polyposis or Peutz-Jeghers syndrome.

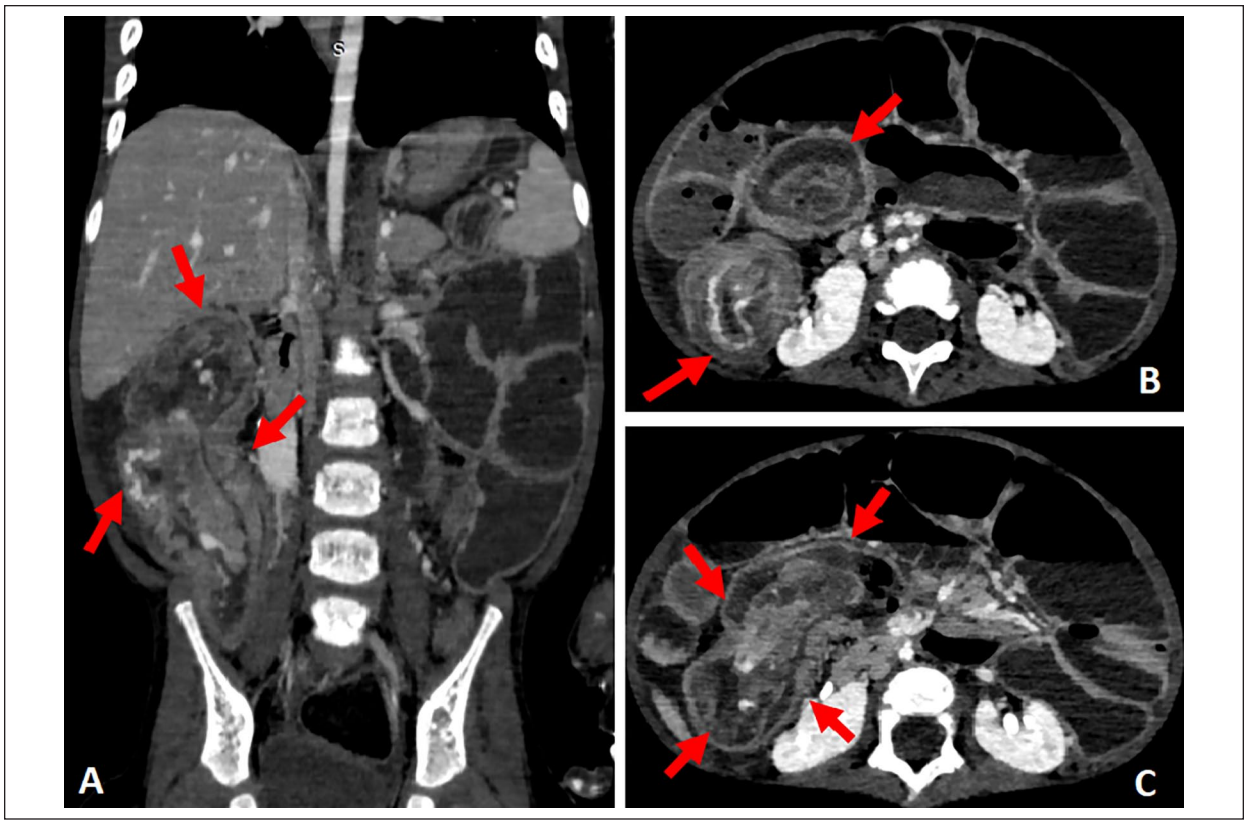

Figure 2. Enhanced abdominopelvic CT scan shows proximal intestinal intussusception (ileo ileal), with so-called "sandwich" on coronal and axial slice (A-C) and a cocoon-like appearance (B), with turgidity of the intra-lesional vessels (red arrows).

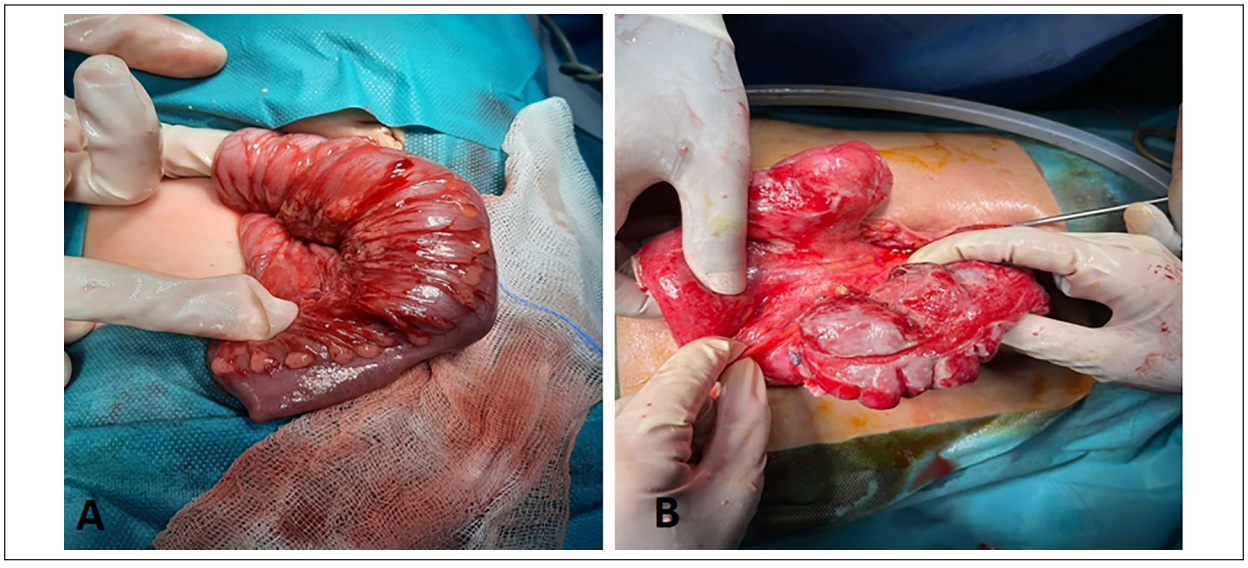

Figure 3. Post operative appearance of intestinal intussusception (A, B), without any intestinal segment abnormally.

- Appendicitis.
- Digestive malformations: duplications, pancreatic, or gastric heterotopias.

Certain general diseases have also been implicated, such as rheumatoid purpura, cystic fibrosis, coagulation disorders, hemophilia, and celiac disease.[9]

The anatomical diagnosis in order of frequency includes: ileocolic intussusception (80%), ileo-ileo-colic (10%), ileo-ileal (8%), and colo-colic (2%).[10]

The cardinal symptoms are abdominal pain, vomiting, and bedwetting. This classic triad has a positive predictive value of 93% but only affects 7.5% to 40% of patients.[2] The child's general condition is also important and notes the evolution of the intussusception by the presence of fever, fever, dehydration, asthenia, hypotonia, lethargy. The latter reflects the vagal reaction to intussusception and is predictive of acute intussusception.[2] The Brighton classification proposes major criteria (bilious vomiting, abdominal distension, hydro-air levels on abdomen without preparation, intussusception on ultrasound and CT scan. . .), and minor criteria (age $<$1 year, lethargy, pallor,. . .).

Ultrasound is the diagnostic test of choice with a sensitivity and negative predictive value close to 100% and a specificity of 88% to 100%.[2,11,12]

It presents itself:

- in transverse section: intussusception is identified as a mass with the appearance of a target, donut, or bull's eye with multiple rings of differing echogenicity and including an eccentric hyperechoic crescent which corresponds to the incarcerated mesentery;
- in longitudinal section: the so-called "sandwich" or "a hayfork sign" or "pseudokidney" or image which corresponds to the succession of hypoechoic digestive layers in relation to the more central hyperechoic mesenteric fat.[2,11,12]

The unprepared abdomen is not a decisive element in the positive diagnosis of intussusception. It has an approximate accuracy rate of 25% in ileocecal intussusception. It highlights the pathognomonic crescent sign, which is the presence of a curvilinear mass within the course of the colon. There are also signs of bowel obstruction at the level of the ileocecal valve with bowel dilation and air-fluid levels within the bowel proximal to it and the absence of bowel gas distal to it.[12]

CT scan is not generally used for the positive diagnosis of intussusception. It remains the imaging modality of choice especially in the presence of certain abdominal abnormalities. It has a sensitivity and specificity of 100%. It shows a target sign, a sausage-shaped mass of different layers of attenuation, or a less-defined kidney like mass. It also shows signs of complications such as submucosal edema, signs of peritonitis, or perforation and other abnormalities.[12]

The only differential diagnosis is transient acute physiological intestinal intussusception. It is similarly characteristic on ultrasound but is short with incessant peristalsis and integrity of the mucosal layers. These functional intussusceptions disappear during the examination or a few hours later.[10]

Following the diagnosis of intussusception, the patient should be offered treatment. Children with signs of shock, peritonitis, or perforation will benefit from immediate surgery.

The treatment of most intussusceptions remains non-invasive radiological reduction. If this fails, surgery is performed.[12,13]

The different non-invasive radiological reduction techniques with a low risk of perforation (1%) and respective success rates are[12]:

- fluoroscopy guided hydrostatic enema (67%)
- fluoroscopy guided pneumatic enema (81%)
- US guided hydrostatic enema (82%)
- US guided pneumatic enema (93%)

The most commonly used technique is the US guided hydrostatic enema, because it is non-radiating (principe du ALARA: As Low As Resonable), ultrasound monitoring is easy because it is liquid.[12]

Xie et al[14] in an 8-year study found that these non-invasive radiological reduction techniques are performed with a frequency of 61% to 95% with a success rate of 91.95% and a recurrence rate of about 8%. In case of multiple recurrences after non-invasive radiological reduction, surgery is performed.

Guo et al in his study of 1007 cases of intussusception over 5 years, has identified certain risk factors. These factors can be summarized as follows age ($>$1 year), symptom duration ($\leq$12 hours), the absence of vomiting, mass location (right abdomen), and pathological lead points were significantly predictive of recurrent intussusception.[15]

Morbidity is related to complications of intussusception (perforation, septic shock) and due to delayed diagnosis.

Mortality has decreased over the years and has gradually fallen from 75% in 1884 to 30% in 1939. In developed countries, it is between 0% and 1%. It is due to a delay in diagnosis or treatment, but also because of the cause of the intussusception in secondary forms. This mortality rate reaches 50% in developing countries.[2]

Conclusion

AII is a surgical emergency in infants and requires early diagnosis and management to reduce morbidity. It is of interest in the 3 months to 3 years age group. Clinical signs are indicative of the condition. Imaging plays an essential role in the positive diagnosis through

ultrasound. Non-invasive radiological treatment remains the first line of treatment, surgery is necessary in case of failure of these methods and when there are complications of the intussusception. Morbidity and mortality remain low and are not due to the intussusception itself but to the complications and pathology that cause secondary acute intussusception.

Author Contribution

YEHOUENOU TESSI Romeo Thierry: Conception of the work, writing original draft and editing; EL HADDAD Siham: review and editing; OZE K. Rita: review and editing; TRAORE M. Wend-Yam: review and editing; DINGA EKADZA Amour Jusly: review and editing; ALLALI Nazik: supervision, revising, final approval; CHAT Latifa: supervision, revising, final approval.

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