

Pictorial review

Adult intussusception—a CT diagnosis

¹G GAYER, MD, ²R ZISSIN, MD, ¹S APTER, MD, ³M PAPA, MD and ¹M HERTZ, MD

Departments of ¹Diagnostic Imaging, ³Surgery, Sheba Medical Center, Tel Hashomer 52621 and

²Department of Diagnostic Imaging, Sapir Medical Center, Kfar Saba, Israel

Abstract. Intussusception, usually thought of as a childhood condition, may be encountered in adults as well, and is then more often associated with underlying pathology. While the condition is mostly unsuspected clinically, as patients present with non-specific abdominal pain that is often of long duration, CT findings are characteristic. Examples are shown of intussusception both in the small bowel and colon. Awareness of these findings allows the radiologist to make the correct diagnosis.

Intussusception occurs when a proximal segment of bowel (intussusceptum) telescopes into an adjacent distal segment (intussusciens). After appendicitis, it is the second most common abdominal emergency in children and is idiopathic in 95% of cases [1].

In contrast, intussusception in adults is rare, making up only about 1% of patients with bowel obstruction [2]. Symptoms are often chronic, with intermittent abdominal pain being the main symptom. Unlike intussusception in children, an acute abdomen is a rare presentation in adults. An underlying pathological lead point or predisposing condition is frequently demonstrated and, consequently, non-operative reduction is not the treatment of choice in adults as it is in children.

Intussusception is often not considered clinically in the differential diagnosis of adult patients with vague abdominal complaints. With the widespread use of CT in the evaluation of non-specific abdominal pain, the diagnosis is nowadays most often made by the radiologist since the CT features of intussusception are virtually pathognomonic [3].

Clinical presentation

The most common symptoms of intussusception are abdominal pain, nausea and vomiting [2–4], and less frequently melena, weight loss, fever and constipation [2, 4]. Symptoms are in most cases of long duration (several weeks to several months), although the patient may occasionally present with an acute abdomen. When closely questioned, a history of prior episodes of crampy abdominal pain and symptoms suggesting intermittent partial intestinal obstruction can often be elicited.

Physical examination may demonstrate diffuse or localized abdominal tenderness, but is often unremarkable. An abdominal mass is detected in a minority of patients [3]. Laboratory studies may show mild anaemia and occult blood in the stool.

Pathogenesis, aetiology and prevalence

Intussusception can be classified according to location (small bowel or colon) or according to the underlying aetiology (neoplastic (benign or malignant), non-neoplastic or idiopathic).

About 80–90% of intussusceptions in adults are secondary to an underlying pathology, with approximately 65% due to benign or malignant neoplasm. Non-neoplastic processes constitute 15–25% of cases, while idiopathic or primary intussusceptions account for about 10% [5].

Intussusception arises in the small bowel in two-thirds of cases. The aetiology of intussusception in the small bowel and the colon is quite different.

Small bowel

Most intussusceptions in the small bowel are secondary to benign lesions [5, 6]. These include benign neoplasms (lipoma, leiomyoma, haemangioma, neurofibroma), adhesions, Meckel's diverticulum, lymphoid hyperplasia and adenitis, trauma, coeliac disease, intestinal duplication and Henoch–Schonlein purpura. Malignant lesions causing intussusception in the small intestine account for about 15% of cases [5] and are most often metastatic, melanoma being by far the most common metastasis to cause intussusception [2]. Idiopathic intussusception accounts for about 20% of all small bowel intussusceptions.

Colon

Intussusception in the large bowel is more likely to have a malignant aetiology (50–60%) [5, 6].

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This reflects the greater prevalence of malignant tumours in the colon compared with the small bowel [2, 5]. Primary malignant lesions (adenocarcinoma and lymphoma) are the most common underlying malignant lesions in the colon. Benign lesions constitute about 30% and include neoplasms such as lipoma, leiomyoma, adenomatous polyp, endometriosis (appendiceal) and previous anastomosis. Idiopathic intussusception occurs less often than in the small bowel (about 10%) [5].

Intussusception occurs when a mass in the bowel is pulled forward by normal peristalsis, with resultant invagination of the involved wall. In the absence of a mass, intussusception may be caused by functional disturbances without gross mural abnormality, such as in coeliac disease. In these cases the loss of normal tone in the small bowel owing to the toxic effect of gluten causes flaccid, dilated bowel loops that are more prone to non-obstructing intussusception.

A significant incidence of intussusception has been reported in patients with acquired immune deficiency syndrome (AIDS). This is due to the association of AIDS with a variety of infectious and neoplastic conditions of the bowel, including infectious enteritis, lymphoid hyperplasia, Kaposi's sarcoma and non-Hodgkin's lymphoma of the bowel [5, 7]. Intussusception should therefore be considered in the differential diagnosis of prolonged abdominal pain in patients with AIDS.

Intussusception following abdominal surgery may be related to a variety of predisposing factors, including intestinal anastomotic suture lines, previous jejunostomy site, adhesions, submucosal bowel oedema, intestinal dysmotility and electrolyte imbalance. Long intestinal tubes are known to cause telescoping of the bowel [1].

Transient intussusception has been observed on small bowel barium follow-through studies in patients with adult coeliac disease [8]. This phenomenon has more recently been noted on CT in patients with Crohn's disease, malabsorption syndromes, intestinal tumours [4, 9, 10] and even in the absence of either malabsorption syndromes or an organic lesion [3, 11]. It has been attributed to dysrhythmic contractions. Transient intussusception is more common in the proximal small bowel where the peristaltic activity is normally greater [11].

Previously, data regarding the aetiology of intussusception were based on surgical findings or a coded diagnosis on discharge. In contrast, a recent study reported substantially different data regarding the underlying pathology [3]. This study included 33 patients diagnosed on CT. A neoplastic lead point was found in only 10 patients (7 malignant, 3 benign) but in none of the other 23 patients, all with enteroenteric intussusception. A possible predisposing condition for the

intussusception was found in only 7 of these 23 patients and the intussusception was classified as idiopathic in the other 16 (48.5% of all patients). These authors suggested that intussusception in the small bowel, encountered on CT, may on occasion be innocuous and transient and does not necessarily need extensive evaluation in the absence of severe abdominal symptoms.

CT appearance

Intussusception can be confidently diagnosed on CT because of its virtually pathognomonic appearance. It appears as a complex soft tissue mass, consisting of the outer intussusciens and the central intussusceptum. There is often an eccentric area of fat density within the mass representing the intussuscepted mesenteric fat, and the mesenteric vessels are often visible within it (Figures 1 and 2). A rim of orally administered contrast medium is sometimes seen encircling the intussusceptum, representing coating of the opposing walls of the intussusceptum and the intussusciens (Figure 3). The intussusception will appear as a sausage-shaped mass when the CT beam is parallel to its longitudinal axis (Figures 1a and 2a), but will appear as a "target" mass when the beam is perpendicular to the longitudinal axis of the intussusception (Figures 1b and 2b).

While the appearance of intussusception is characteristic on CT, its aetiology cannot usually be established. Exceptions are lipoma, a long intestinal tube and known abdominal metastatic disease [1, 4]. A lipoma serving as a lead point is identified as a mass of fat density that does not contain blood vessels (Figure 4). Mesenteric fat entrapped in an intussusception also has fat density but has blood vessels coursing through it, and can thus be distinguished from lipoma (Figures 1 and 2). A long intestinal tube visualized in the centre of the intussusception is an obvious cause (Figure 5). When other masses are seen in addition to the intussusception, one may conclude that the intussusception is due to metastatic disease (Figures 3 and 6). The same level has to be examined either at the same session or later to establish the diagnosis of transient intussusception (Figure 7).

Warshauer and Lee [3] found that intussusceptions seen on CT that had a neoplastic lead point were significantly longer and had a significantly larger diameter than non-neoplastic ones. They also found proximal dilatation of small bowel to be significantly more common in intussusceptions with a neoplastic lead point.

The bowel loops proximal to the intussusception are usually of normal calibre and are only occasionally dilated, since intussusception in adults

only rarely presents as intestinal obstruction [4]. Although intussusception in adults may be diagnosed by many other imaging modalities, including barium enema, upper gastrointestinal series and ultrasound, CT is clearly superior. In contrast to ultrasound, CT is not affected by the presence of gas in the bowel and will clearly demonstrate the intussusception, whether in the small bowel or in the colon. Additional valuable information such as metastases or lymphadenopathy is readily obtained by CT and may point to an underlying pathology (Figures 1 and 4).

The most important factor for establishing the diagnosis is awareness of the possibility of

intussusception occurring in an adult patient with abdominal symptoms, especially those with prior episodes of partial intestinal obstruction. CT is then the examination of choice.

Treatment

There is no universal agreement upon the correct treatment of adult intussusception [5], although surgical intervention is considered necessary [2, 5, 12]. The type of intervention depends on the patient's medical history and intraoperative findings [2].

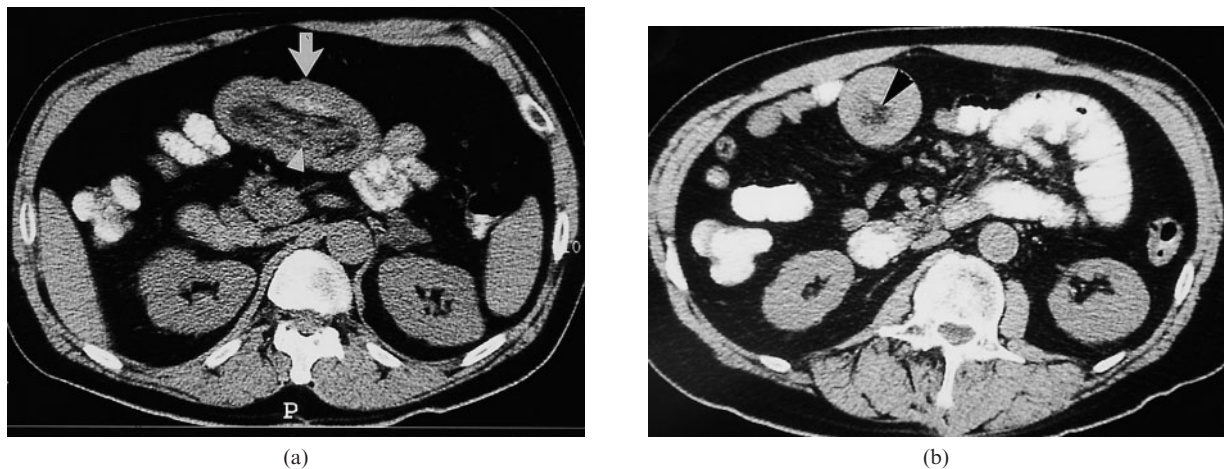


Figure 1. Small bowel intussusception due to a benign tumour. A 57-year-old man with recurrent abdominal pain of 1-month duration, weight loss and right upper quadrant tenderness. The intussusception appears differently relative to the slice axis. (a) An oval mass with soft tissue at its periphery (arrow) represents the bowel wall of the intussusciens and the intussusceptum, with fat density in its centre, representing mesenteric fat. Soft tissue linear densities within the mesenteric fat (arrowhead) are mesenteric blood vessels. This appearance is caused by the axis of the intussusception being parallel with the CT beam. (b) The intussusception now appears as a round mass with a “half-moon” shaped hypodense area of fat density close to its centre (arrowhead), the mesenteric fat. The beam is perpendicular to the axis of the intussusception in this more caudal section.

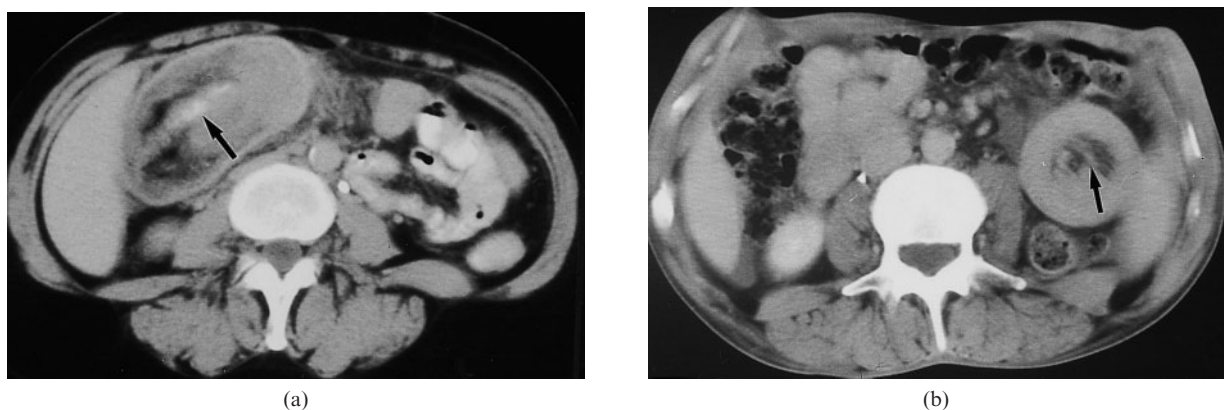


Figure 2. Lymphoma of the ileocaecal valve presenting as intussusception. A 56-year-old woman with abdominal pain of several weeks' duration. (a) CT image through the mid abdomen (parallel to the axis of the intussusception) shows an elongated mass lesion. A central sliver of contrast medium (arrow) represents the intussuscepted bowel loop, surrounded by mesenteric fat and the walls of the intussusciens. (b) Image 2 cm caudal to (a). A ring-shaped mass is now seen in the left midabdomen, with a thick soft tissue density representing opposing bowel walls. Mesenteric vessels course within the central low density mesenteric fat (arrow). Colocolic intussusception was found at surgery.



Figure 3. Patient with unsuspected metastatic melanoma of the small bowel and colon, the colonic metastasis causing intussusception. A 60-year-old man with weight loss and abdominal pain. CT at the level of the pelvis shows a round, target-shaped mass in the left iliac fossa (arrow). It consists of a central hyperdense area (contrast medium in the lumen of the intussusceptum) and a thick soft tissue mass around it with two “half-moon” shaped hypodense areas representing intussuscepted mesenteric fat. A peripheral rim of contrast medium outlines the space between the opposing walls of the intussusciens and the intussusceptum (arrow). Another large soft tissue mass (m) is seen in the right iliac fossa around a distal small bowel loop. Both the distal ileum and part of the left colon were resected.

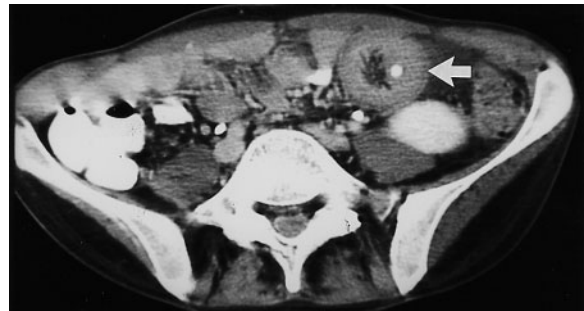


Figure 5. Jejunojejunal intussusception caused by a tube. A 22-year-old man with a head injury. A feeding tube was inserted via jejunostomy. Abdominal pain subsequently occurred. CT at the level of the lower abdomen shows a round, target-shaped mass in the left abdomen (arrow). The mass consists of a central hyperdense focus (the tube), a “half-moon” shaped hypodense area medial to it, the intussuscepted mesenteric fat and a soft tissue rim representing the opposing walls of the intussusciens and the intussusceptum.

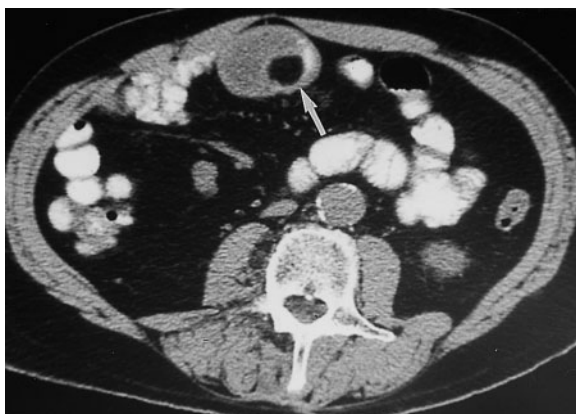


Figure 4. Small bowel intussusception caused by a lipoma as a lead point (same patient as Figure 1). CT at the level of the midabdomen shows a round hypodense mass, measuring 1.5 cm, in the tip of the intussusception surrounded by contrast medium (arrow). The fat density is homogeneous, characteristic of a lipoma. Ileoileal intussusception was confirmed at surgery.

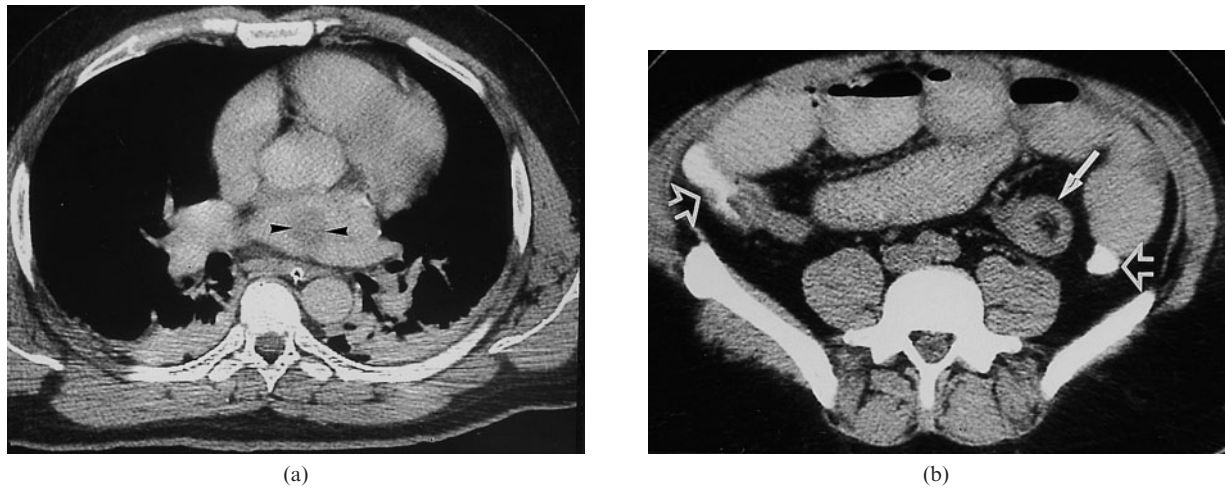


Figure 6. Small bowel intussusception caused by metastatic leiomyosarcoma. A 42-year-old man with malignant leiomyosarcoma of the left atrium, which had been partially resected 3 months earlier. He was admitted with abdominal pain and weight loss. (a) CT of the chest shows a round hypodense lesion in the left atrium (arrow-heads), representing the residual leiomyosarcoma. (b) CT of the abdomen shows a hypodense area in the centre of a small bowel loop in the left abdomen (white arrow), characteristic of invaginated mesenteric fat. The proximal bowel loops are dilated, some with an air–fluid level. Orally administered contrast medium is seen in the colon (open arrows) as evidence of only partial small bowel obstruction.

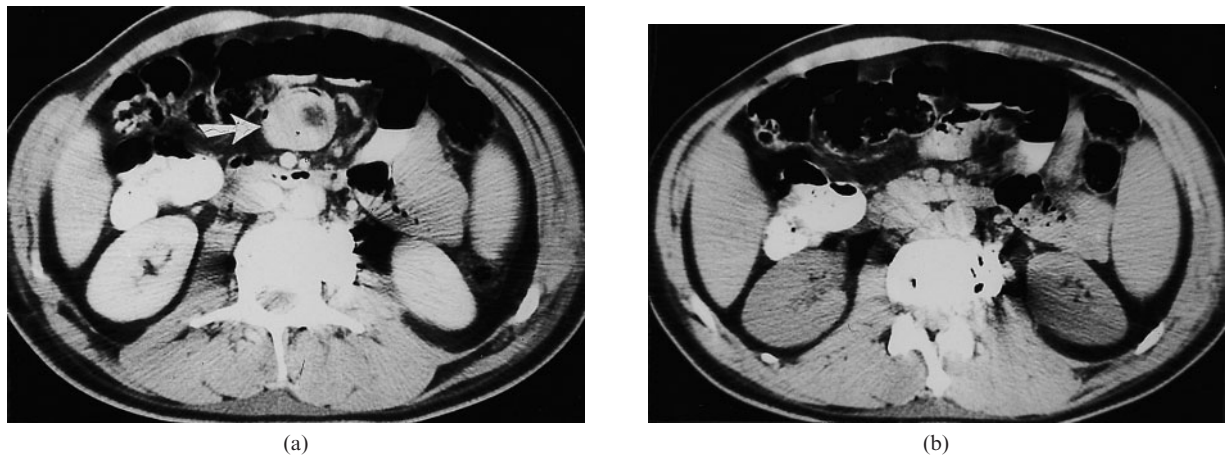


Figure 7. Transient small bowel intussusception. A 37-year-old man with abdominal pain 3 weeks after lumbar spine surgery following a motor vehicle accident. (a) Post-contrast CT image at the level of the midabdomen shows a slightly dilated proximal small bowel loop with fatty tissue within, consistent with small bowel intussusception (arrow). (b) No intussusception was detected on a pre-contrast CT image 5 min before (a). The patient underwent another CT study 1 week later; this scan again did not demonstrate intussusception. The abdominal pain gradually subsided.

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