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Intussusception in adults and the role of evolving computed tomography technology

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Abstract

BACKGROUND: The purpose of this study was to describe a single institution's experience with adult intussusception and determine how this was influenced by evolving computed tomography (CT) technology.

METHODS: Adults treated between 1978 and 2013 for intussusception were reviewed. CT utilization and utilization of multislice technology over time were determined. Sensitivity of CT was calculated.

RESULTS: A total of 318 patients were identified. CT utilization was 72% and it increased over time. The number of channels ranged from 1 to 128. CT sensitivity was greater than 85% for single and multislice scanners. A lead point was identified in 69% of patients and a malignancy in 40%. Surgical exploration was required in 60% of patients and 40% were managed nonoperatively.

CONCLUSIONS: The diagnosis of intussusception in adults is increasing over time, particularly idiopathic intussusception. This is associated with increased utilization of highly sensitive CT technology, which facilitates the safe nonoperative management in many patients.

Intussusception, or telescoping of a proximal segment of intestine (ie, the intussusceptum) into a more distal segment (intussuscipiens), is the most common cause of obstruction in patients younger than 5 years of age.[1] It is rare, however, in the adult population, as only 5% of cases occur in patients aged older than 18 years.[2,3] Although pediatric patients may present with the classic triad of currant jelly stools, colicky abdominal pain, and a palpable abdominal mass, adults typically present with obstructive symptoms.[4,5] Diagnosis is increasing because of widespread availability and use of computed tomography (CT), which identifies intussusception as a sausage—shaped mass with a target sign. Intussusception in adults has traditionally been highly associated with a malignant lead point and, thus, required surgical exploration.[6]

This belief has been questioned recently given the rapid advancement in CT technology over the past 30 years. CT technology has evolved over the years by the introduction of multislice CT scans, with a sensitivity of 58% to 100% and specificity of 57% to 71% in recognizing the intussusception.[3,7,8] Given this fact, transient and asymptomatic intussusceptions without a lead point have been recognized more frequently as well. We aimed in this study to describe the etiology, diagnosis, and management of intussusception in adults, with emphasis on the role of CT scan technology advancement.

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The authors declare no conflicts of interest.

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Patients and Materials

Institutional Review Board approval was obtained to perform a review of patients diagnosed with intussusception in our institution between 1978 and 2013 using the Mayo Clinic Life Sciences Services/Data Discovery Query Builder. It is maintained collaboratively with IBM, Armnonk, NY by dedicated information technologists, regularly audited, and validated in the literature as accurate for International Classification of Diseases 9th Revision (ICD-9) searches.[9] The Data Discovery Query Builder was queried for ICD-9 code for intussusception (560.0). A formal review of patients' clinical charts was done to collect data that included demographic features of age and sex, as well the presenting signs and symptoms, method of diagnosis, radiological findings, method of management (surgical vs nonsurgical), pathological and surgical findings, and duration of follow-up. Patients were excluded if they had rectal intussusception and those who had intussusception related to their stoma or after intestinal intubation. Transient intussusceptions were defined as asymptomatic intussusceptions noted on CT imaging, which were not present on subsequent imaging. Lead points were verified with CT findings and/or surgical findings and classified etiology: tumor (benign vs malignant), inflammatory, adhesive, foreign body, and idiopathic. The number of data channels (slices) for each CT study was also identified when available. This information was first available in 1995. Patients were categorized according to the site of intussusception:

1. Small bowel to small bowel;
2. Ileocolic where the ileum intussuscepts through a stationary ileocecal valve;
3. Ileocecal where the ileocecal valve is part of the intussusceptum;
4. Colocolic.

Continuous variables were presented as mean (ranges) and categorical variables as percentages. True positive CT results for intussusception and false negative CT results were used to calculate the sensitivity of CT. Trends were evaluated using the Cochran Armitage Trend Test. Statistical significance was set at P value less than .05.

Results

A total of 318 patients were identified with a mean age of 51 years (range 18 to 94), of whom 57% were women (n = 184). The most common presenting symptoms were abdominal pain (77%, n = 245), complete obstruction (27%, n = 87), partial obstruction (15%, n = 47), heme-positive stool (12%, n = 39), and a palpable mass (8%, n = 25). Forty-five patients were asymptomatic at the time of diagnosis (14%). Of the 229 patients (72%) who underwent CT, 206 (65%) had findings positive for intussusception on the scan. The remaining 112 patients were diagnosed by endoscopy (16%, n = 51), intraoperative findings (14%, n = 45), small bowel contrast study (3%, n = 9), and magnetic resonance imaging (2%, n = 7). The 45 asymptomatic patients had the diagnosis found incidentally on CT (n = 33), small bowel contrast studies (n = 3), endoscopy (n = 7), or operative exploration (n = 2) for presumed other etiologies.

The frequency of intussusception increased with time (Fig. 1), and there was a significant trend toward increased CT utilization over time ($P < .001$). The number of channels (slices) of the CT scans was available for 153 of the 209 patients who underwent CT scan in 1995 or later. CT technology used in patients ranged from single slices to 128-slice scanners. The use of multislice technology increased with time, with most patients from 2007 to 2013 undergoing 64- or 128-slice scans (Table 1). Increasing resolution, however, did not appear to impact sensitivity of the test, which was 86% for single slice scans, 93% for 4 slice, 100% for 8 slice, 97% for 16 slice, 93% for 64 slice, and 85% for 128 slice scans. False negatives (CT scans that failed to show intussusception) occurred in 23 patients who went on to have intussusception diagnosed by contrast study (n = 6), endoscopy (n = 3), and intraoperatively (n = 14).

The site of the intussusception was most commonly confined to the small bowel (75%, n = 230), followed by colocolic in 14% (n = 43), ileocecal in 8% (n = 26), and the least common site was ileocolic in 5% (n = 19). Lead points were identified in 220 patients (69%). A tumor was identified as the lead point for the intussusception in 128 patients (40%), of which 59 (19%) were malignant and 69 (21%) were benign. Of the malignant tumors, 34 (58%) were primary to the intestine, while the remainder were metastatic (42%, n = 25). Other causes of intussusception included adhesions (15%, n = 47), inflammatory processes (ie, Crohn's disease, celiac sprue, appendicitis, or other infections; 11%, n = 35), Meckel's diverticulum (2%, n = 5), and ischemic bowel (2%, n = 5). Twenty patients (8%) had a history of Roux-en-Y gastric bypass. Most (60%) involved the roux limb or jejunojejunostomy, while others involved the common channel or the location in the small bowel could not be pinpointed on CT. Nineteen of the 20 patients were diagnosed on CT scan, while 1 was diagnosed

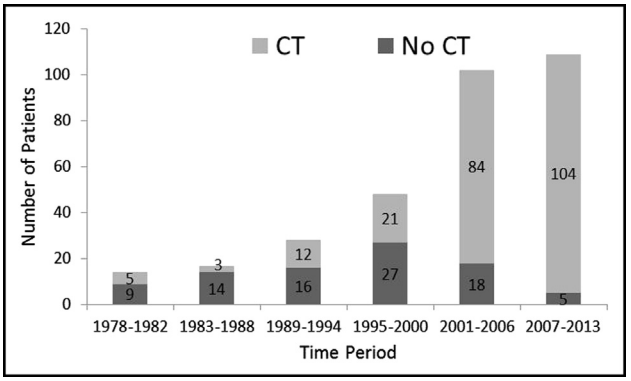

Figure 1 Both the frequency of intussusception and the utilization of CT increased over time.