

# Analysis of Clinical Cause and Management of Adult Intussusception: at a Single Institution Experience

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## Article

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# Abstract

The aim of the present study is to analyze the clinical outcomes of intussusception management in adult patients. The data of 56 patients who underwent treatment for adult intussusception from Jan. 2003 to Feb. 2021 were retrieved from a retrospective database and analyzed. The mean age of patients with adult intussusception was 49.9 years. The mean duration of symptoms was 4.8 days. The most common type of intussusception was entero-enteric type (n=30, 53.6%), and the second most common type was ileocolic (n=13, 23.2%). Small bowel intussusception was found in 40 patients (71.4%) and large bowel intussusception in 16 patients (28.6%). Emergency surgery was performed on 30 patients (53.6%). Among the causes of adult intussusception, tumorous lesion accounted for 60.7% (malignancy: 30.4%, benign: 30.4%) and the rate of no tumorous lesion was 39.3%. Forty-four (44) patients (78.6%) received surgical management and 12 patients (21.4%) received conservative management. Bowel resection was performed in 40 patients (71.4%) and manual reduction in 4 patients (7.1%). Conclusively, there are various causes and types of adult intussusception, and appropriate management should be provided to the patient after careful consideration of the cause and type of each intussusception case.

## Introduction

Unlike childhood intussusception, early diagnosis of adult intussusception is difficult because in most cases, it shows a chronic, sub-chronic, or acute course, with nonspecific signs and symptoms. Adult intussusception is known to be a rare disease compared to childhood intussusception. About 5% of all intussusception cases occur in adults and accounts for 1–5% of intestinal obstruction in adult patients [1]. Adult intussusception is associated with a pathological lesion involving lead points, such as a benign polyp, mesenteric lymph node hypertrophy, lipoma, Meckel's diverticulum, lymphoma, gastrointestinal stromal tumor, or primary/metastatic adenocarcinoma [2–3]. Due to this reason, adult intussusception requires a surgical approach for removing the lead point with the lesion for treatment [4]. However, management for adult intussusception still remains controversial for various situations. The present study attempts to clarify the cause of the leading point and describe the clinical features of adult intussusception after its management.

## Methods

Between Jan. 2003 and Feb. 2021, 56 patients were diagnosed with adult intussusception and underwent treatment. All data regarding the clinical and pathological features of the patients were reviewed retrospectively. The study is in accordance with relevant guidelines and regulations. Patients with rectal prolapse intussusceptions were excluded in the present study. All of the patients received abdomen or abdominopelvic computed tomography(CT) scans for diagnosis. Some patients underwent gastroduodenoscopy, colonoscopy and biopsy. Adult intussusception is classified into the following four types: 1) entero-enteric, 2) ileocecal, 3) ileocolic, and 4) colo-colic. Entero-enteric type is limited to the small intestine (duodenum, jejunum, ileum). Ileocolic intussusception is defined when the ileum invaginates into the ascending colon. Ileocecal type refers to the intussusception condition with the

ileum, not the appendix, invaginating into the cecum. Colo-colic type is limited to the colon and rectum without rectal prolapse and anal protrusion [5–6]. The present study retrospectively assessed the data of the patients regarding the intussusception type, leading point, cause of intussusception, age, sex, clinical symptoms, pathologic results, and management. The study was approved by institutional review boards of Soonchunhyang University Bucheon Hospital. The study was performed in accordance with the principles of the Declaration of Helsinki. Informed consent was waived from the institutional review boards of Soonchunhyang University Bucheon Hospital due to the retrospective design.

## Results

### Characteristics & clinical symptoms of patients

Mean age was  $49.9 \pm 18.3$  years. The youngest patient was 18 years old, and the oldest was 86 years old. The number of male patients was 30 (53.6%) and females 26 (46.4%). Mean weight was  $63.7 \pm 12.6$ kg and mean height was  $161.9 \pm 8.7$ cm. Mean body mass index (BMI) was  $22.3 \pm 3.5$  kg/m<sup>2</sup>. Fifteen (15) patients (26.8%) had previous abdomen surgical history.

Most clinical symptoms were abdominal pain (n = 56, 100.0%), and other symptoms included nausea (n = 4, 7.1%), vomiting (n = 4, 7.1%), diarrhea (n = 3, 5.4%), fever (n = 2, 5.4%), hematochezia/melena (n = 3, 5.4%), palpable mass (n = 2, 3.6%), and obstruction (n = 4, 7.1%). The duration of symptoms was  $4.8 \pm 9.9$  days. Forty-four (44) patients (78.6%) visited the emergency center and 12 patients (21.4%) visited the outpatient clinical for admission. Emergency surgery was performed in 30 patients (53.6%) (Table 1).

### Types and leading points of adult intussusception

The most common intussusception type was entero-enteric and the least common was ileocecal type. Thirty (30) patients (53.6%) were diagnosed with entero-enteric intussusception, while 1 patient (1.8%) had ileocecal intussusception. Ileocolic type was found in 13 patients (23.2%), while colo-colic type was in 12 patients (21.4%). Small bowel leading point was discovered in 40 patients (71.4%) and large bowel leading point was in 16 patients (28.6%). Regarding the small bowel leading point, jejunum (n = 22, 39.3%) was the most common, followed by ileum (n = 16, 28.5%) and ileocecal valve (n = 2, 3.6%). Concerning the large bowel leading point, cecum (n = 7, 12.5%) was most frequently discovered, followed by ascending colon (n = 6, 10.7%), transverse colon (n = 1, 1.8%) and descending colon (n = 2, 3.6%) (Table 2).

### Causes and treatment of adult intussusception

34 patients (60.7%) showed tumorous lesions for adult intussusception, while 22 patients (39.3%) had no tumorous lesions. Regarding tumorous lesions, malignancy tumor was found in 17 patients (30.4%) and benign tumor was in 17 patients (30.4%). Malignancy tumors included adenocarcinoma in 6 patients (10.7%), lymphoma (diffuse large B cell lymphoma: 7, mucosa-associated lymphoid tissue: 1) in 8 patients (14.3%), gastrointestinal stromal tumor in 1 patient (1.8%) and sarcoma in 2 patients (3.6%) (Fig.

1). Benign tumors consisted of lipoma in 5 patients (8.9%), lymphangioma in 1 patient (1.8%), inflammatory fibroid polyp in 4 patients (7.1%), hamartomatous polyp in 6 patients (10.7%) and duplication cyst in 1 patient (1.8%). Considering no tumorous lesions, Meckel's diverticulum was discovered in 2 patients (3.6%), enteritis/ischemic colitis in 6 patients (10.7%), postoperative intussusception following gastrojejunostomy in 4 patients (7.1%), intussusception after colonoscopic polypectomy in 2 patients (3.6%) and acute appendicitis in 1 patient (1.8%) (Figs. 2 and 3). Seven (7) patients (12.5%) had unknown causes of adult intussusception.

Surgical management was performed in 45 patients (80.4%) and conservative management (spontaneous reduction) in 11 patients (19.6%). Surgical resection was performed in 40 patients (71.4%) and manual reduction was performed in 5 patients (8.9%). Patients who underwent manual reduction included 3 patients with postoperative intussusception following gastric surgery, 1 patient with enteritis, and 1 patient with an unknown cause of intussusception. Patients who underwent spontaneous reduction consisted of 6 patients with an unknown cause of intussusception, 2 patients with enteritis, 2 patients with intussusception after colonoscopic polypectomy and 1 patient with duplication cyst. Laparoscopic surgery was performed in 12 patients (21.4%) and open surgery was performed in 32 patients (57.1%) (Table 3).

## Discussion

Intussusception is defined as the prolapse of a proximal bowel segment into a distal segment in the gastrointestinal tract. The mechanism of intussusception is still unknown and it is mostly common in children. 90% of intussusception cases are idiopathic and most lesions can safely be reduced. In contrast, adult intussusception is very rare and is found in only 1–5% of adult patients with bowel obstruction or ileus, accounting for 5–10% of all adult intussusceptions [7]. The most common clinical symptom is abdominal pain with acute symptoms, often requiring emergency surgery [8–9]. Other symptoms include nausea, vomiting, palpable mass, bowel obstruction, changes in bowel habits, constipation, and diarrhea [10]. In the present study, the most common symptom was abdominal pain and the duration of the symptom was relatively short (4.8 days). In addition, the rate of emergency surgery was also high at 53.6%, and 78.6% of the cases were hospitalized by visiting an emergency center. Abdomen CT appears to be the most important and sensitive diagnostic tool for making the preoperative diagnosis of intussusception in adults. Abdomen CT can also define the location, presence and characteristics of the tumor, its relationship to surrounding tissues, and its malignant stage [11]. All the patients in the present study were diagnosed with adult intussusception with abdomen CT that confirmed the location of the cause or lesion, condition, degree of lesion, type of intussusception, and need for surgery. In the present study, the most common type of intussusception was entero-enteric (53.6%), followed by ileocolic (23.2%) and colo-colic (21.4%). Most existing researches report entero-enteric type as the most common intussusception type, ileocolic or ileocecal as the second most common type, and colocolic as the least common type [12–14].

A verifiable cause has been found in 64–90% of cases of adult intussusception. The malignancy in small bowel intussusception accounted for 12.5%–38.0% whereas most lesions (62.0–88.0%) in the small bowel were benign diseases, including benign neoplasms, Meckel's diverticulum, adhesion, and inflammatory lesions [15–17]. A malignant tumor was the etiology in 48% of patients with colo-colonic intussusception [18]. In the present study, unknown causes of adult intussusception accounted for 12.5%, malignancy tumor 30.4%, and benign tumor 30.4%.

Among the causes of adult intussusception, there are often rare cases that are not tumorous lesion. In the present study, postoperative intussusception following gastric surgery was found in 4 patients (7.1%). Three (3) cases were jejunojejunal intussusception (treatment: segmental resection) and 1 case was jejunogastric intussusception (treatment: manual reduction). Postoperative intussusception is a very rare complication after gastric surgery, with an incidence of less than 0.1% reported [19]. Bozzi reported the first case of jejunogastric intussusception after gastrojejunostomy in 1914 [20], and the types include retrograde jejunogastric, jejunojejunal, jejunoduodenal and duodenogastric intussusception with no functional or mechanical leading cause [21]. In the present study, 1 case developed into intussusception due to appendicitis. Appendiceal intussusception is a very rare condition with an incidence rate of 0.01% [22]. Anatomical features such as redundant cecum, a wide appendiceal lumen and a thin or short mesoappendix have been associated with appendiceal intussusception [23–24]. In the present study, intussusception after colonoscopic polypectomy was found in 1 patient. Intussusception after colonoscopy is an extremely rare complication [25–26]. The mechanism is unknown, but the bowel edema secondary to a transmucosal burn may cause submucosal lifting. The post polypectomy electrocoagulation syndrome is caused by an injury to the colonic mucosa and muscularis layer after colonoscopic polypectomy, resulting in peritoneal inflammation with intussusception signs spotted by CT scans. Intussusception characteristics are presented within 12h of colonoscopy accompanied with abdominal pain at the site of the polypectomy, and is commonly resolved with conservative management [27–29]. The patient in the present study recovered after receiving conservative management. The present study found enteritis and ischemic colitis (10.7%) to be one of the causes of intussusception which is very rare. However, a previous case report has stated the cause of intussusception to be enteritis or ischemic colitis [30–32]. Most surgeons agree that adult intussusception requires standard surgical intervention due to high incidence of malignancy [33–34].

In conclusion, the present study reviewed the diagnosis and treatment of 56 adult intussusception patients. As shown in the study, adult intussusception is caused by various causes, thus the choice of treatment (surgical or conservative, resection or reduction, laparoscopy or open, and so on) must be determined through an accurate diagnosis before treatment.

## Declarations

## Acknowledgements

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## Author Contributions Statement

C.J.K. and J.C.K. conceived and designed the study, N.P., D.R.L. and E.J.S. collected the data, performed analyses, and drafted the manuscript. D.R.L. supervised the study. All authors reviewed the final manuscript text.

## Competing Interest Statement

The authors declare no conflict of interest in this work.

## Availability of materials and data

The datasets analyzed during the current study are not publicly available due their containing information that could compromise the privacy of research participants, but are available from the corresponding author on reasonable request.

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## Tables

**Table 1.** Patients characteristics (n=56) and clinical symptoms of adult intussusception

	Patients (n = 56)
<i>Patients characteristics</i>	
Age(mean ) (year)	49.9±18.3 (18-86)
Sex, n (%)	
Male	30(53.6%)
Female	26(46.4%)
Weight(mean ) (kg)	63.7±12.6(38.1-88.3)
Height(mean ) (cm)	161.9±8.7(144.8-175.7)
BMI(mean ) (kg/m <sup>2</sup> )	22.3±3.5(15.4-34.5)
Previous abdomen surgical history	
Yes	15(26.8%)
No	41(73.2%)
<i>Clinical symptoms</i>	
Abdominal pain	56(100.0%)
Nausea	4(7.1%)
Vomiting	4(7.1%)
Diarrhea	3(5.4%)
Fever	2(3.6%)
Hematochezia/melena	3(5.4%)
Palpable mass	2(3.6%)
Obstruction	4(7.1%)
Duration of symptom	4.8±9.9(0.0-60.0)
Admission type for treatment	
Visiting of emergency center	44(78.6%)
Visiting of outpatient clinic	12(21.4%)
Emergency surgery	30(53.6%)

BMI: Body mass index

**Table 2.** Type and leading point of adult intussusception

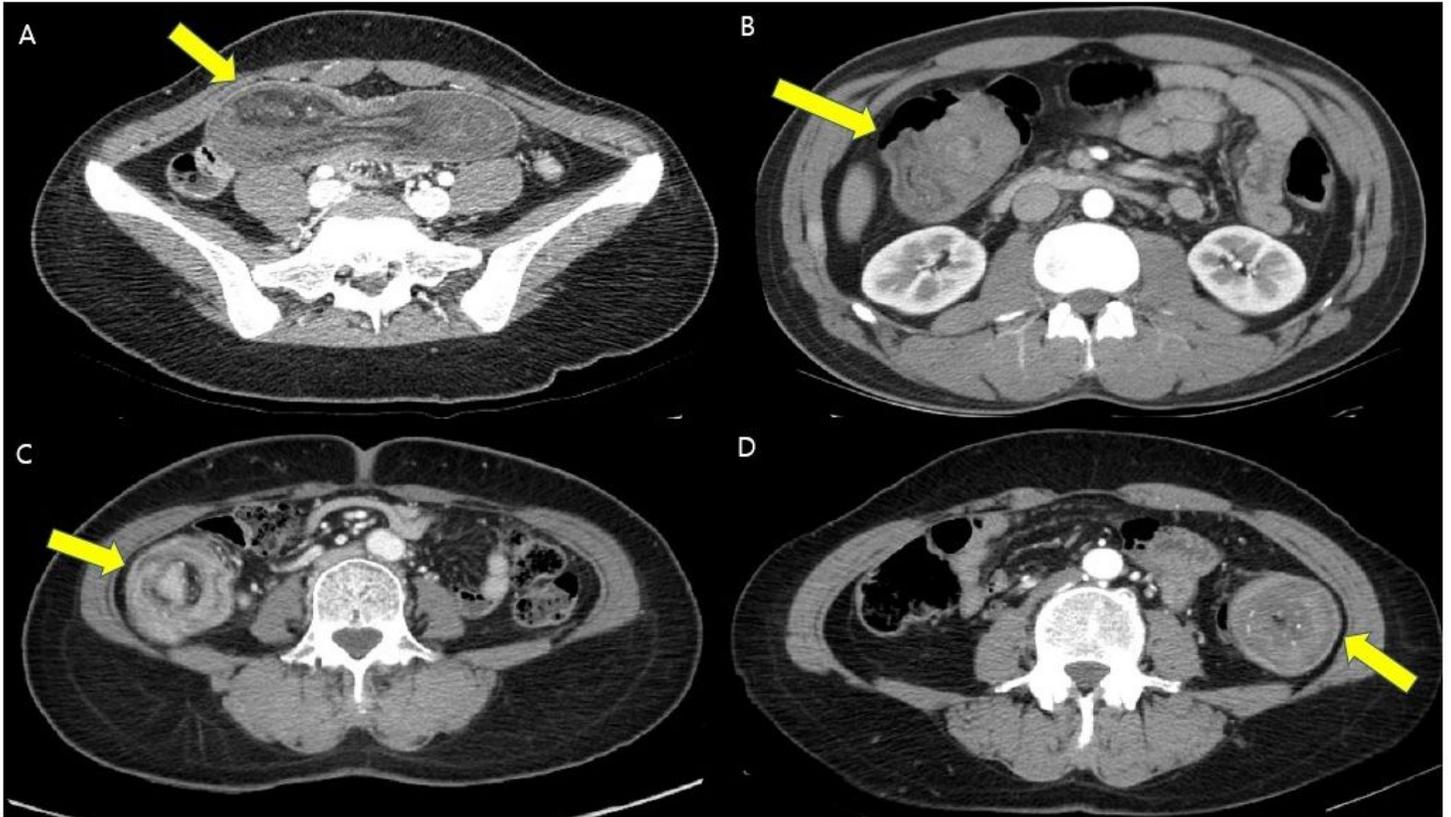
	Patients (n = 56)
<i>Intussusception type</i>	
Entero-enteric	30(53.6%)
Ileo-cecal	1(1.8%)
Ileo-colic	13(23.2%)
Colo-colic	12(21.4%)
<i>Intussusception leading point</i>	
<b><i>Small bowel</i></b>	<b>40(71.4%)</b>
Jejunum	22(39.3%)
Ileum	16(28.5%)
Ileocecal valve	2(3.6%)
<b><i>Large bowel</i></b>	<b>16(28.6%)</b>
Cecum	7(12.5%)
Ascending colon	6(10.7%)
Transverse colon	1(1.8%)
Descending colon	2(3.6%)

**Table 3.** Cause and treatment of adult intussusception

Cause of Adult Intussusception	Patients (n = 56)
<b><i>Tumorous lesion</i></b>	<b>34(60.7%)</b>
Malignancy tumor	17(30.4%)
Adenocarcinoma	6(10.7%)
Lymphoma (DLBL=7, MALT=1)	8(14.3%)
Gastrointestinal stromal tumor	1(1.8%)
Sarcoma	2(3.6%)
Benign tumor	17(30.4%)
Lipoma	5(8.9%)
Lymphangioma	1(1.8%)
Inflammatory fibroid polyp	4(7.1%)
Hamartomatous polyp	6(10.7%)
Duplication cyst	1(1.8%)
<b><i>No tumorous lesion</i></b>	<b>22(39.3%)</b>
Meckel's diverticulum	2(3.6%)
Enteritis/ischemic colitis	6(10.7%)
Postoperative intussusception following gastric surgery	4(7.1%)
Intussusception after colonoscopic polypectomy	2(3.6%)
Acute appendicitis	1(1.8%)
Unknown	7(12.5%)
Treatment of Adult intussusception	
<b><i>Surgical management</i></b>	<b>45(80.4%)</b>
Resection	40(71.4%)
Manual reduction	5(8.9%)
(Postoperative intussusception following gastric surgery: 3, enteritis: 1, unknown: 1)	
<b><i>Conservative management</i></b>	<b>11(19.6%)</b>
(Unknown: 6, enteritis: 2, post polypectomy: 2, duplication cyst: 1)	
Laparoscopic surgery	12(21.4%)

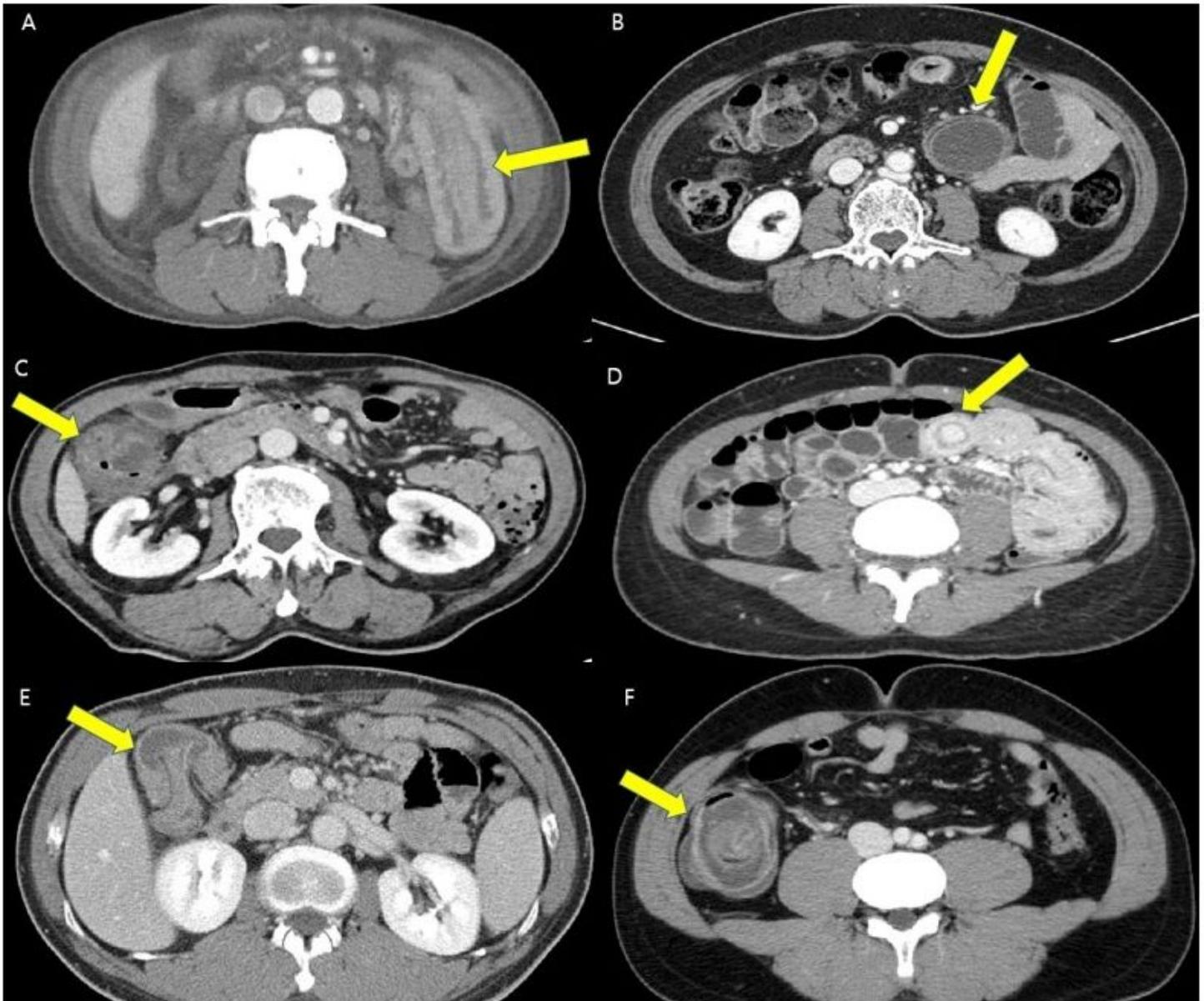
DLBL: diffuse large B cell lymphoma, MALT: mucosa-associated lymphoid tissue

## Figures



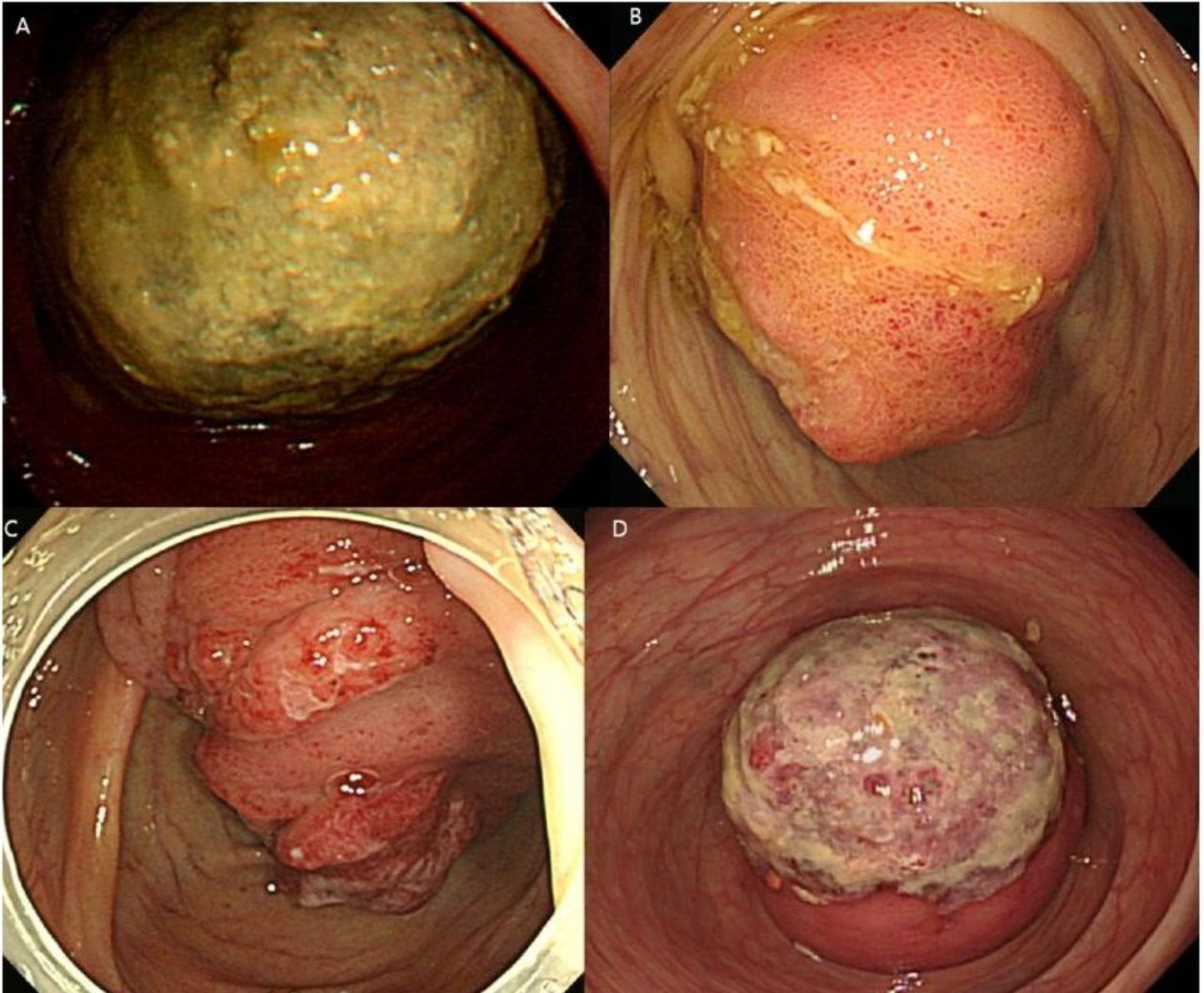
**Figure 1**

Type of adult intussusception: A) Entero-enteric type (hamartomatous polyp), B) Ileo-cecal type (diffuse large B cell lymphoma), C) Ileo-colic type (diffuse large B cell lymphoma), D) Colo-colic type (adenocarcinoma).



**Figure 2**

Adult intussusception caused by no tumorous condition: A) postoperative intussusception following gastric surgery (entero-enteric type), B) Meckel's diverticulum (entero-enteric type), C) ischemic colitis (colo-colic type), D) enteritis (entero-enteric type), E) post intussusception after colonoscopic polypectomy, F) acute appendicitis (colo-colic type).



**Figure 3**

Colonoscopic finding of adult intussusception: A) Inflammatory fibroid polyp (ileo-colic type), B) Adenocarcinoma (ileo-colic type), C) diffuse large B cell lymphoma (ileo-colic type), D) lipoma (ileo-colic type).