

# Intussusception of the initial jejunum secondary to adenoma in the third and fourth portions of the duodenum: A case report

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**Abstract.** Adult intussusception is a rare condition and is typically asymptomatic, although it can manifest as bowel obstruction, posing diagnostic challenges. Gastrointestinal tumors are a significant etiology for adult intussusception, predominantly affecting the ileocecal segment and ileum. To the best of our knowledge, the occurrence of intussusception in the initial jejunum vicinity near the Treitz ligament is exceedingly rare. The current study presents a case of initial jejunum intussusception, characterized by persistent epigastric pain but no palpable masses and normal bowel sounds. Abdominal computed tomography and magnetic resonance imaging revealed evidence of left upper abdominal intestinal obstruction, prompting surgical intervention for symptom alleviation and diagnostic confirmation. The current report aims to raise awareness of this unusual anatomical location of intussusception and to emphasize the importance of timely imaging and surgical intervention in achieving accurate diagnosis and effective management.

## Introduction

Intussusception refers to the invagination of a segment of the bowel into the lumen of an adjacent segment, which can occur in all age groups. Intussusception is more common in the pediatric population, with the ratio of child to adult cases being ~20:1 (1). Adult intussusception is often secondary to pathological conditions such as polyps, lipomas, malignancies and Meckel's diverticulum (2,3). Jejunum-jejunal intussusception in adults is a rare clinical entity that often results from a pathological lead point, such as benign or malignant neoplasms, and its diagnosis requires high clinical suspicion (4-6). Due

to the non-specific nature of symptoms associated with jejunum-jejunal intussusception and its low incidence rate, the preoperative diagnosis remains challenging despite advancements in imaging techniques. Previous reports have shown that tumors arising in the horizontal (D3) and ascending (D4) portions of the duodenum may lead to duodeno-duodenal intussusception (7-9). However, the simultaneous occurrence of two tumors in these segments, resulting in initial jejunum intussusception near the Treitz ligament, is exceedingly rare. The current study presents the case of a patient who underwent successful surgical intervention for intussusception in the proximal jejunum near the Treitz ligament. This report adheres to the Surgical Case Report criteria (10).

## Case report

In January 2023, a 54-year-old female presented to Changzhi People's Hospital (Changzhi, China) with acute upper abdominal pain that had persisted for 6 h, accompanied by referred lumbar pain, nausea and vomiting. There were no indications of fever, chills or jaundice. The abdominal pain presented as persistent epigastric pain. A physical examination revealed tenderness in the epigastric region but no palpable masses and normal bowel sounds. Hematological analysis revealed a white blood cell count of  $8.16 \times 10^9/l$  (reference range,  $3.5-9.5 \times 10^9/l$ ), a red blood cell count of  $4.19 \times 10^{12}/l$  (reference range,  $3.8-5.1 \times 10^{12}/l$ ) and a neutrophil proportion of 75.6% (reference range, 40-75%). Computed tomography (CT) scans revealed signs of intestinal obstruction in the left upper quadrant, suggesting Meckel's diverticulum. Additionally, there was an enlarged gallbladder and dilated bile ducts (common bile duct, gallbladder duct and intrahepatic bile ducts) (Fig. 1A). To enhance diagnostic precision, an upper abdominal enhanced magnetic resonance imaging (MRI) scan was performed, revealing leftward displacement of the descending and horizontal segments of the duodenum, deformation and dilation of the common bile duct, and indications of intussusception at the proximal jejunum (Fig. 1B). Magnetic resonance cholangiopancreatography (MRCP) was conducted to evaluate the biliary system, revealing an enlarged gallbladder, dilation of the common bile duct and leftward displacement of its distal segment (Fig. 1C).

At 2 days post-admission, the patient underwent a laparotomy due to the persistent epigastric pain and radiological

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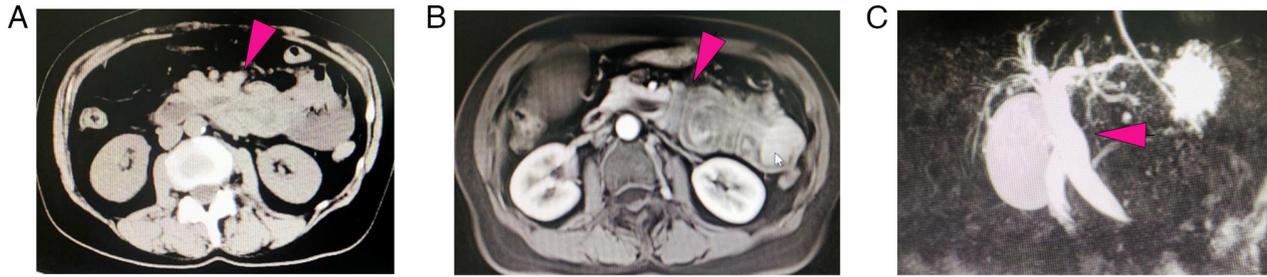


Figure 1. Intussusception of the initial jejunum according to CT and MRI. (A) Intussusception of the initial jejunum (arrow) observed by CT. (B) Intussusception of the initial jejunum (arrow) observed by MRI. (C) Magnetic resonance cholangiopancreatography revealing an enlarged and displaced common bile duct (arrow). CT, computed tomography; MRI, magnetic resonance imaging.

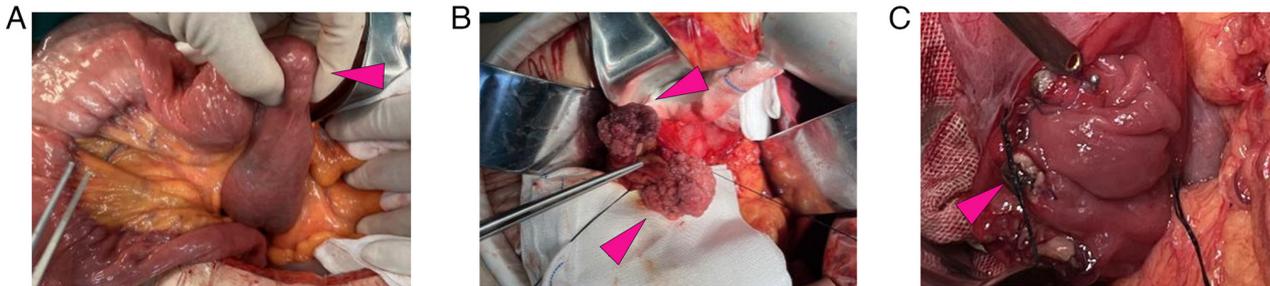


Figure 2. Surgical observations. (A and B) The location of the tumors in the duodenum (arrows). (C) Following the excision of the tumors, the intestinal tract was meticulously sutured (arrow).

evidence of intestinal obstruction in the left upper abdomen, in order to prevent progression to intestinal ischemia, perforation or necrosis (Fig. 2). During the operation, two large cauliflower-shaped tumors measuring 3.5x3x2.5 and 3x2.5x1.5 cm were observed in the D3 and D4 segments of the duodenum, respectively, positioned at 3 and 9 o'clock. The lesions were located ~7 cm distal to the duodenal papilla, without involvement of the papillary region, and no direct invasion of the pancreatic head or uncinata process was observed. A longitudinal incision was made on the side wall of the duodenum to remove both tumors along with ~1 cm of adjacent intestinal wall tissue (Fig. 3). The displaced and entrapped intestinal tract was successfully repositioned before closing the duodenal incision and placing a drainage tube around it. The intact sample was sent for pathological analysis.

Tissues were fixed in 10% neutral buffered formalin at room temperature for 24 h, sectioned at 4  $\mu$ m, and stained with hematoxylin and eosin at room temperature for 10 min each. Images were captured using a Nikon Eclipse E100 light microscope (Nikon Corporation) at x200 magnification. Histopathology results reported a papillary tubular adenoma, localized high-grade epithelial intraepithelial neoplasia and localized carcinoma *in situ* of the mucosa (Fig. 3). Following successful recovery, the patient was discharged from the hospital.

Abdominal CT and gastroscopic examinations are being performed at each follow-up visit, which have been planned at 3 months post-surgery, then every 6 months during the first year, and annually thereafter. To date, the postoperative course has remained uneventful, and the patient continues to be symptom-free, with no evidence of recurrence on follow-up imaging.

## Discussion

The present case is notable for two main reasons. First, it underscores that an initial jejunum intussusception near the Treitz ligament can be triggered by benign tumors in the D3 and D4 segments of the duodenum, a finding not documented in previous research, to the best of our knowledge. Second, while CT is the primary imaging modality for adult intussusception, MRI may offer complementary value in lesion characterization and in patients where the avoidance of radiation is (11-13).

Primary intussusception occurs in the absence of a point of invagination and is more common in children, with the small intestine being most frequently affected. By contrast, secondary intussusception arises from a lesion that acts as the point of invagination. Although the underlying mechanism in adults is not entirely clear, secondary intestinal intussusception is believed to be triggered by a pathological lesion of the intestinal wall that alters normal peristaltic activity, thus becoming a lead point of invagination (2,14). In previously reported cases, duodeno-jejunal intussusception typically involved the D2 segment of the duodenum (15), whereas duodeno-duodenal intussusception was observed in the D3 and D4 segments (8,9). However, synchronous tumors in the D3 and D4 segments are exceptionally rare but may disrupt duodenal motility and precipitate jejunal intussusception near the ligament of Treitz, highlighting the need for careful evaluation of unexplained proximal small-bowel obstruction.

With the widespread adoption of CT, it has become the most valuable imaging modality for diagnosing intussusception. On CT images, a well-defined, smoothly contoured,

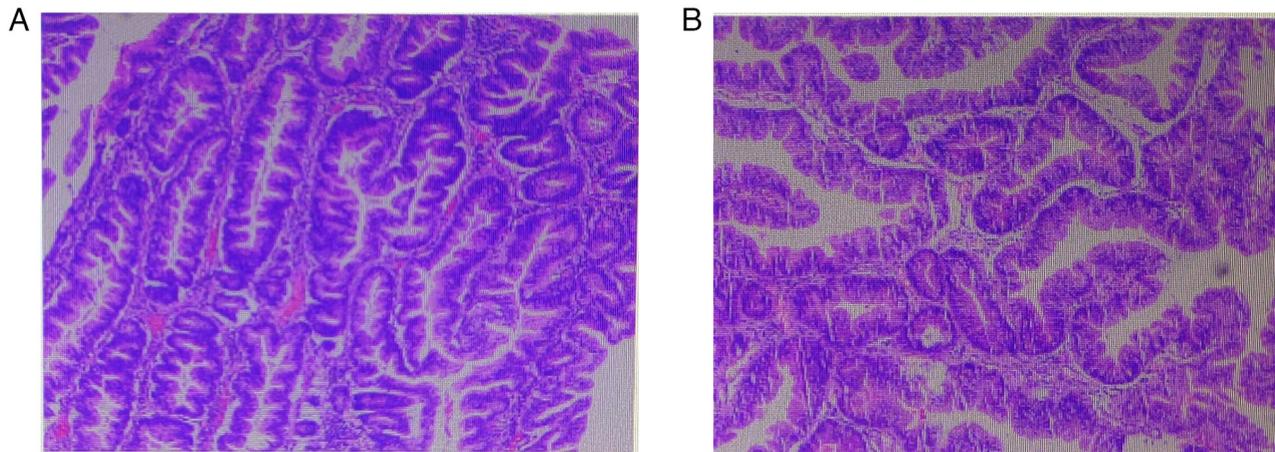


Figure 3. Histopathology images. (A) Tumor cells arranged in a glandular pattern (H&E; x200 magnification). (B) Tumor cells arranged in a papillary pattern (H&E; x200 magnification). H&E, hematoxylin and eosin.

sausage-shaped mass is typically observed, consisting of two components, namely, an inner intussusceptum and an outer intussusciens, with eccentric areas of fat density representing the invaginated mesenteric fat (16,17). Although previous studies have confirmed the diagnostic superiority of CT for intestinal intussusception (12,13), the present study findings indicate that MRI, despite its greater cost and longer examination time, may offer meaningful complementary value, especially in the differential evaluation of soft-tissue pathology. Additionally, since the distal portion (D3 and D4) of the duodenum is not within the routine examination scope of gastroscopy, it is easily misdiagnosed. The patient in the current case presented with a series of clinical symptoms attributed to entrapment of the jejunal loops at their proximal end, resulting in duodenal displacement and subsequent biliary system displacement. This can lead to obstruction of the distal bile duct, dilatation and obstruction of the extrahepatic bile ducts, jaundice and mechanical obstruction of the jejunum. Previous reports have indicated that involvement of the junction of the pancreaticobiliary duct may cause obstructive jaundice or acute pancreatitis (18,19). Surgical treatment may be considered for patients with an unclear diagnosis or severe symptoms (20,21). The choice of the surgical plan depends mainly on the size of the lesion and its relationship with the duodenal papilla (22). The duodenal papilla is closely associated with the dilation of the common bile duct, making it extremely important to predict the condition of the duodenal papilla and develop a preoperative plan based on the degree of biliary dilatation. MRCP imaging is of utmost importance in diagnosing displacement and dilatation of the common bile duct (23,24). Therefore, MRI is an extremely important and effective diagnostic method for patients in which there is difficulty in diagnosing intussusception.

The prognosis of intussusception depends mainly on the causative factor of the lesion, and mortality from intussusception in adults increases from 8.7% in benign causes to 52.4% in malignant causes (14). Specifically, we highlight that this diagnosis warrants heightened vigilance during postoperative surveillance, as it may indicate an increased risk of recurrence or progression. Accordingly,

we emphasize the importance of individualized follow-up strategies, including closer endoscopic and radiological monitoring.

In summary, this case underscores that synchronous benign tumors originating in the D3 and D4 segments of the duodenum may precipitate jejunal intussusception near the ligament of Treitz, thereby emphasizing the complementary diagnostic utility of MRI in such rare clinical scenarios. Intussusception involving the proximal jejunum adjacent to the ligament of Treitz represents an uncommon entity that should be considered in the differential diagnosis when unexplained biliary displacement or dilatation is encountered. MRI serves as a valuable modality for diagnostic confirmation, and in patients with pronounced symptoms, surgical intervention should be contemplated, with the operative strategy tailored to the individual clinical context.

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#### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### Authors' contributions

LH performed the operation and wrote the manuscript. LM participated in the study design and data interpretation. LM and LH confirm the authenticity of all the raw data. All authors agree to be accountable for all aspects of the research in ensuring that the accuracy or integrity of any part of the work (including the provided data) are appropriately investigated and resolved. Both authors have read and approved the final version of the manuscript.

### Ethics approval and consent to participate

This study has been approved by the Ethics Committees of Changzhi People's Hospital (Changzhi, China; approval no. 2024K051).

### Patient consent for publication

Informed written consent was obtained from the patients for the publication of this report and any accompanying images.

### Competing interests

The authors declare that they have no competing interests.

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