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Radiologic Review of Small Bowel Malignancies and Their Mimicking Lesions

소장의 악성 종양과 악성 종양으로 오인할 수 있는 소장 병변에 대한 영상의학적 검토

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Because of their small size, small bowel malignancies are often easily missed when radiologists read CT images, which can lead to errors in the normal small bowel due to their similar enhancement to the small bowel or non-specific enhancement. In addition, small bowel malignancies are sometimes mistaken for masses of other origins, such as the uterus, rectum, or omentum. In this article, we describe various small-bowel malignancies, their mimicking lesions and the typical and atypical features on CT imaging along with their clinical manifestations.

Index terms Duodenum; Jejunum; Ileum; Malignancy; Computed Tomography, X-Ray

INTRODUCTION

Small bowel malignancy is extremely rare, accounting for 0.4% of all malignancies in South Korea (1), and 0.5% of all malignancies in the United States (2). In addition to rarity, small bowel malignancy is easy to miss owing to its small size, nonspecific enhancement pattern, and location at the surface area of abdominal organs, which is misconstrued as the normal bowel. Sometimes, small bowel malignancy is mistaken for tumor from other origins. Therefore, the diagnosis of small bowel malignancy using CT is often challenging (3).

Most small bowel malignancies except for metastasis are asymptomatic for a long period of time and the symptom-to-diagnosis interval is approximately a few years (4), which means delays in accurate diagnosis. Small bowel malignancies can accompany nonspecific clinical manifestations, including vomiting, vague abdominal pain, anemia, weight loss, and gastrointestinal bleeding. However, misinterpretation of imaging examinations and inappropriate

diagnostic tools are the main reasons for the delayed diagnosis of small bowel malignancies.

In this article, we present a review of various primary small bowel malignancies and small bowel lesions mimicking small bowel malignancies on CT to help radiologists diagnose small bowel malignancies.

SMALL BOWEL GIST

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal tumors of the small bowel, and they originate from the interstitial cells of Cajal. Small bowel GISTs account for approximately 40% of all GISTs (3), the jejunum being the most common site, followed by the duodenum and ileum (5). On contrast-enhanced CT, GISTs manifest as well-defined soft tissue masses with variable enhancement. GISTs can often grow exophytically from the bowel lumen, and rarely contain calcifications. Although large GISTs usually show central necrosis, hemorrhage, or cavitation with heterogeneous enhancement, small GISTs ($\leq$ 3 cm) tend to show well-defined, homogeneous enhancement on CT that easily mimics normal small bowel enhancement (Figs. 1, 2) (5). These features of small GISTs can delay the diagnosis of GISTs in small bowels. The radiologists often miss recurred GISTs on CT scans when the le-

Fig. 1. A 3-cm recurrent GIST at the distal ileal loop in a 77-year-old female who had rectal GIST 20 years ago.
A-D. Axial (A) and coronal (B) contrast-enhanced CT images show a 3 cm sized, mildly enhancing mass abutting the distal ileum (arrows). The mass shows a similar enhancement of the adjacent small bowel on the portal venous phase, and the lesion was missed. After 6 months, CT images show increases of the lesion (C, D) (arrows), compared with a prior CT examination (A, B). Recurrent GIST was diagnosed.
GIST = gastrointestinal stromal tumor

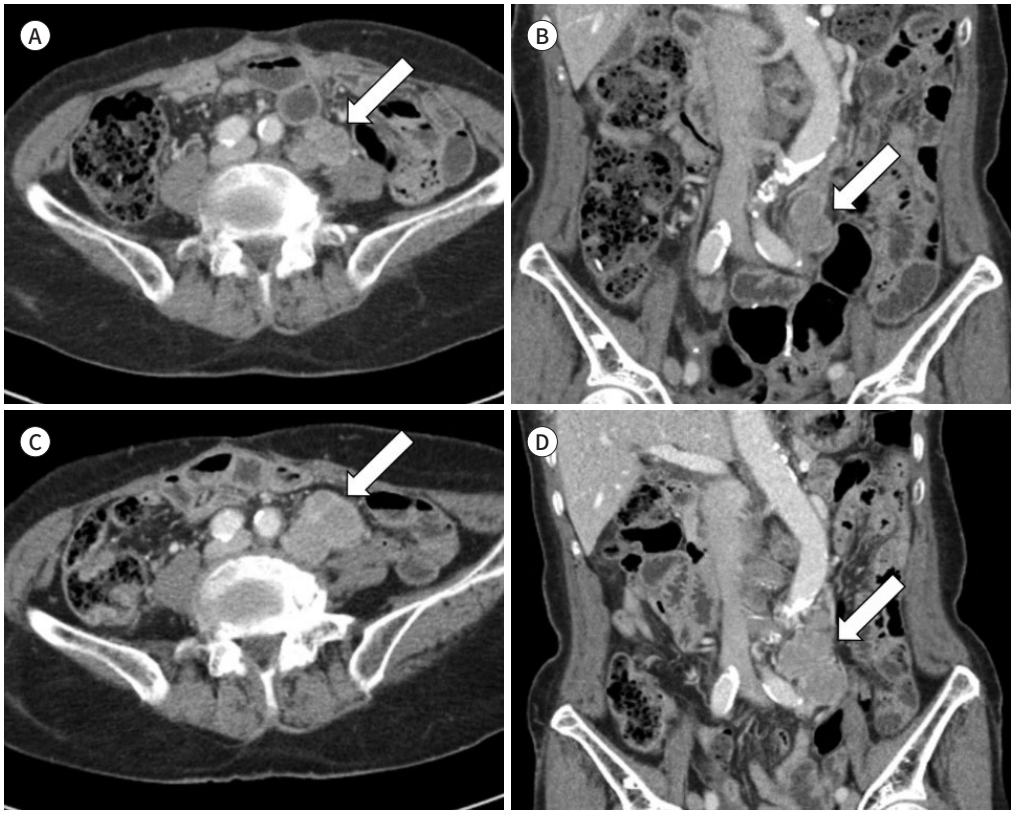

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Fig. 2. Two surgically proven gastrointestinal stromal tumor in the duodenum and pelvic ileum in a 55-year-old female with hematochezia and neurofibromatosis type I.
A-C. Axial contrast-enhanced CT images reveal 2.5 cm sized, well-enhancing hypervascular mass in the duodenum, 2nd portion (arrow, A), and a 4 cm sized, well-enhancing hypervascular mass in the pelvic ileum (asterisk, B). Multiple skin nodules in the abdominal wall (arrowheads, C) are noted, related with neurofibromatosis type I.

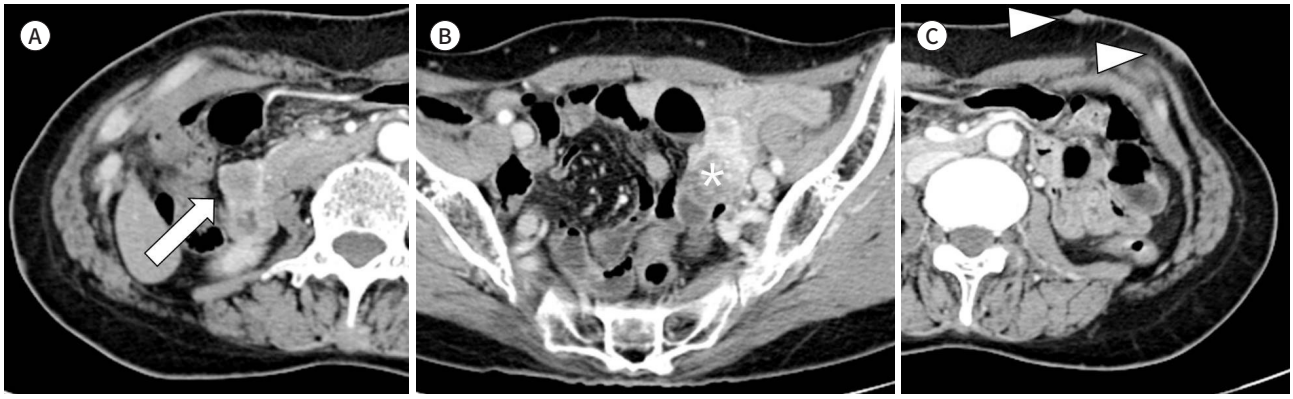
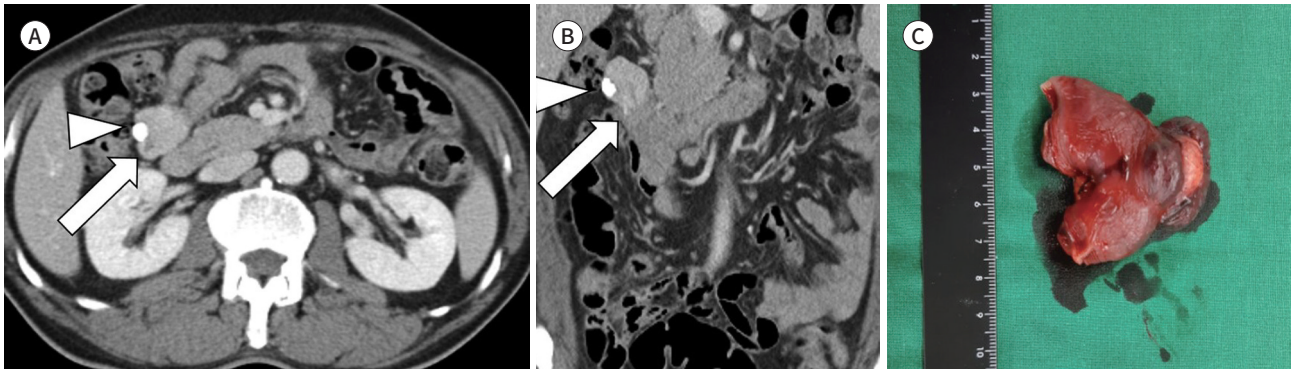


Fig. 3. A surgically proven GIST in the proximal jejunum in a 61-year-old male with long-standing iron deficiency anemia.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show a 3 cm sized, well-enhancing hypervascular mass (arrows) in the proximal jejunum, with focal calcification (arrowheads). The mass showed a similar enhancement of the adjacent small bowel on the portal venous phase; therefore, the small bowel lesion was missed on a prior CT examination.
C. Gross specimen of GIST. After small bowel segmental resection and removal of GIST, the patient's anemia had improved.
GIST = gastrointestinal stromal tumor



sions are small or show similar enhancement to that of adjacent normal small bowel. These missed tumors are detected with larger size after several follow-up CT scans. When we reviewed CT scans of these cases again, we were able to detect small recurred GISTs which had not been initially noticed.

Small bowel GISTs frequently cause GI bleeding and manifest with anemia (Fig. 3), melena, or hematochezia. However, in many patients, small bowel GISTs are often detected with non-specific symptoms, such as abdominal discomfort or ulcer-like symptoms. In our cases, small bowel GISTs were detected incidentally on abdominopelvic CT (APCT) while evaluating nonspecific abdominal pain (Figs. 4, 5). Some patients with small bowel GISTs even presented with abdominal pain after minor trauma with tumor rupture and hemoperitoneum (Fig. 6) or bowel perforation (Fig. 7). GISTs can also be found in familial or idiopathic multitumor syndromes such as neurofibromatosis 1 (Fig. 2), accounting for less than 5% of all GISTs (6). In neurofibromatosis 1, GISTs account for 7% of neurofibromatosis 1 and multiple lesions

Fig. 4. Surgically confirmed large GIST abutting the duodeno-jejunal junction and ileum in a 58-year-old male while evaluating nonspecific abdominal pain.
A, B. Axial contrast-enhanced CT images reveal a large, heterogeneous enhancing masses abutting the duodeno-jejunal junction (arrow, A) and ileum, with central necrosis (arrowhead, B).
GIST = gastrointestinal stromal tumor

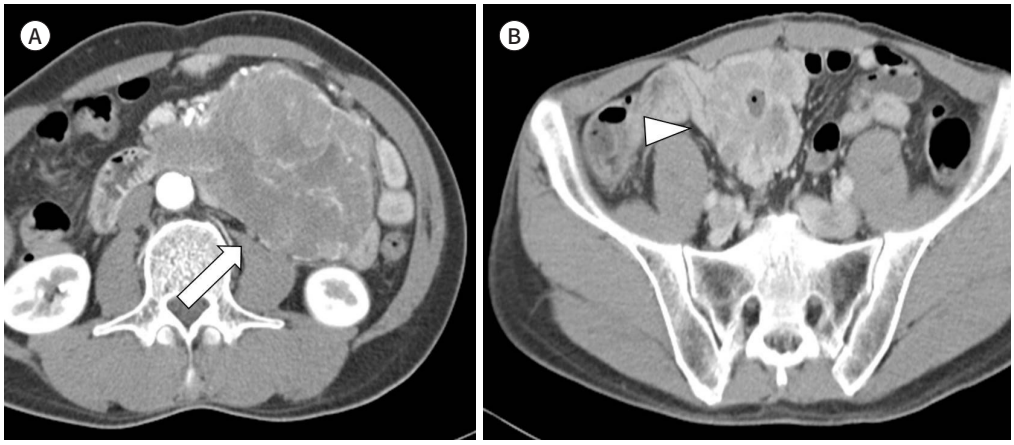
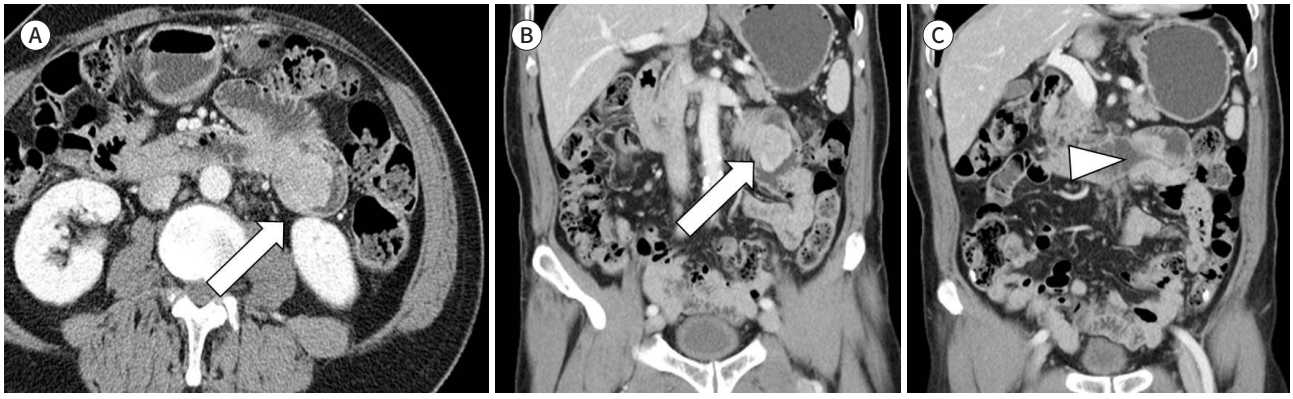
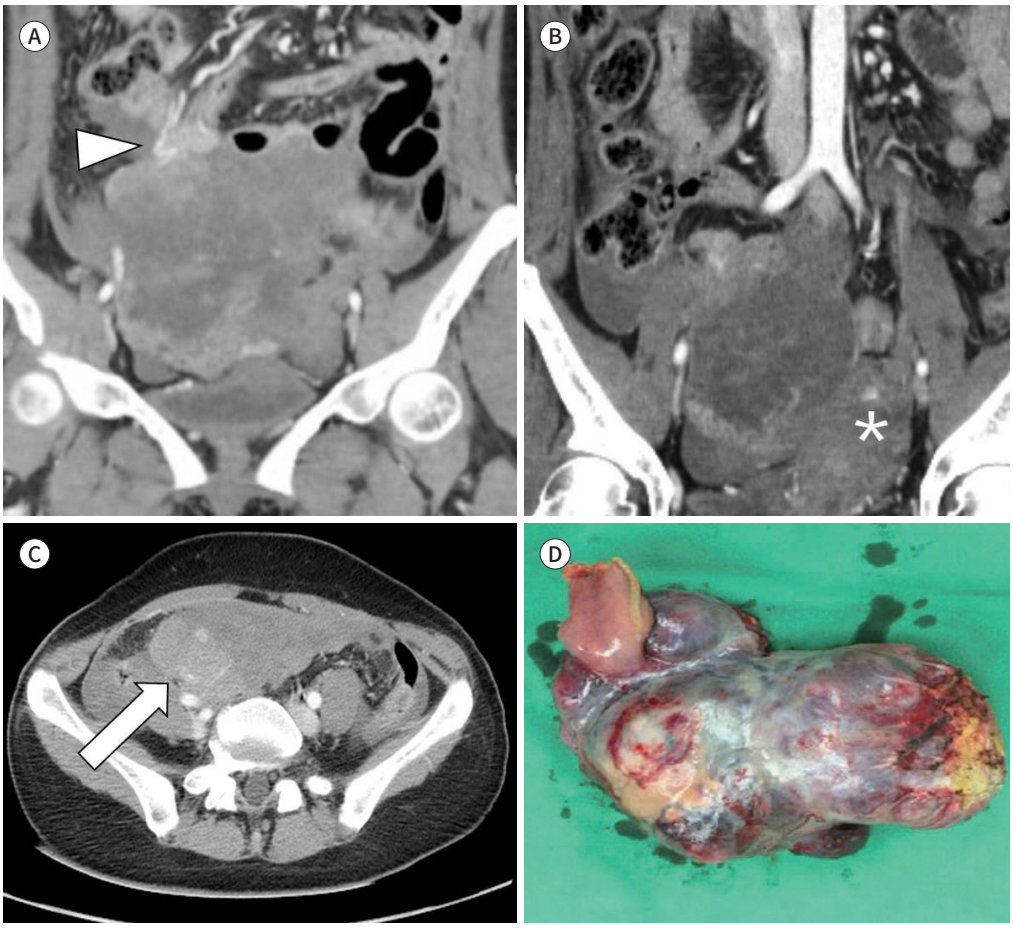


Fig. 5. Surgically confirmed GIST in the proximal jejunum in a 71-year-old male while evaluating nonspecific abdominal pain.
A-C. Axial (A) and coronal (B, C) contrast-enhanced CT images show a 2 cm sized, well-enhancing, hypervascular mass (arrows) in the proximal jejunum, with jejuno-jejunal intussusception (arrowhead).
GIST = gastrointestinal stromal tumor



may occur, mainly in the small bowel (7, 8). When we encounter small bowel tumors that are suspected to be GISTs on CT, differential diagnoses include adenocarcinoma, lymphoma, sclerosing mesenteritis, and metastasis. High-risk GISTs (> 5 cm, non-gastric from the modified National Institutes of Health [NIH] criteria) tend to be bulkier with heterogeneous enhancement, and are associated with a high recurrence rate and metastases to the peritoneum (9, 10). Unlike small bowel GISTs, small bowel adenocarcinomas show vascular invasion, circumferential or irregular luminal narrowing, and often develop bowel obstruction. Furthermore, lymph node enlargement is not commonly accompanied in GISTs, compared with adenocarcinomas and lymphomas. Sclerosing mesenteritis shows heterogeneous pseudomass attenuation surrounding the mesentery with preserved normal fat attenuation. Metastatic disease generally shows multiple polypoid intraluminal lesions or focal wall thickening, and other evidence of metastatic disease. However, small GISTs in small bowels are difficult to differentiate from other rare mesenchymal tumors, such as leiomyomas, on CT.

Fig. 6. A ruptured GIST with tumor bleeding and hemoperitoneum in a 45-year-old female with abdominal pain after a minor trauma.
A-C. Coronal (A, B) and axial (C) contrast-enhanced CT images show an approximately 11-cm well-defined mass (arrow) containing cystic and solid portions in the pelvic cavity abutting to the pelvic ileal loop (arrowhead) and uterus, with active tumor bleeding (asterisk) and hemoperitoneum. Initially the origin of the mass was considered to be the ovary. However, the mass originated from small bowel on surgery, adhrered to the left adnexa, bladder, and small bowel.
D. Gross specimen of the mass. After removal of the ruptured mass, the case was finally confirmed as ruptured small bowel GISTs, secondary to a minor trauma.
GIST = gastrointestinal stromal tumor



Curative surgical resection is the gold standard treatment for localized GISTs (11).

SMALL BOWEL ADENOCARCINOMA

Adenocarcinomas of the small bowel account for 31%–40% of all small bowel malignancies (12). They originate from the glandular epithelium that are most common in the proximal or distal jejunum, whereas primary small bowel adenocarcinomas arise most commonly in the duodenum (60%), followed by the jejunum (25%–29%) and ileum (10%–13%) (13-15). Clinically, small bowel adenocarcinomas show nonspecific symptoms, such as abdominal pain, abdominal discomfort, vomiting, and weight loss. Patients can present with anemia due to gastrointestinal bleeding, or cramping abdominal pain due to mechanical bowel obstruc-

Fig. 7. A 6.2-cm surgically confirmed GIST in an 84-year-old male with abdominal pain and bowel perforation.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show a 6.2 cm sized, heterogeneously enhancing mass (arrows) in the left upper abdomen with focal wall defect (arrowheads), and a large amount of pneumoperitoneum is seen. This case was confirmed as GIST with bowel perforation of the descending colon.
GIST = gastrointestinal stromal tumor

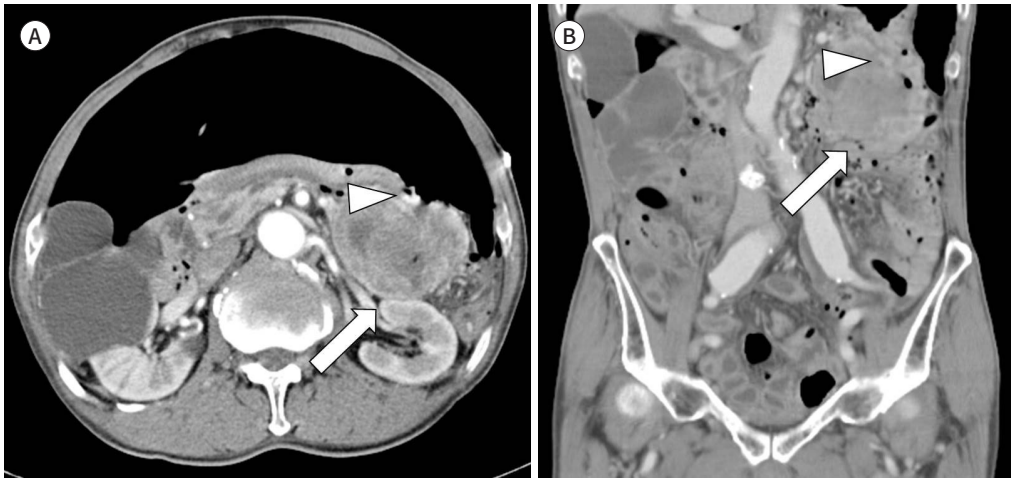
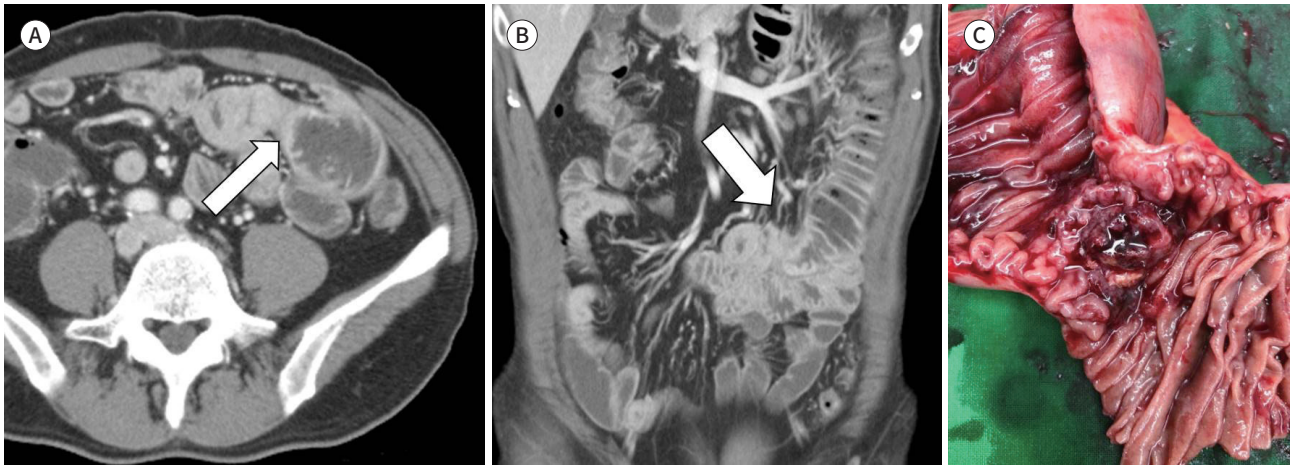


Fig. 8. Surgically confirmed small bowel adenocarcinoma in a 56-year-old male with vomiting.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show small bowel dilatation with abrupt luminal narrowing at the proximal jejunum (arrows) without definite mass. Inflammatory stricture or malignant stricture of the small bowel was suspected with obstructive enteritis.
C. The gross specimen shows stricture site in the jejunum: adenocarcinoma. After small bowel resection, the lesion was confirmed as small bowel adenocarcinoma.



tion. On contrast-enhanced CT, small bowel adenocarcinoma frequently manifests as a focal or annular, ulcerated soft tissue mass or wall thickening, with abrupt luminal narrowing (apple-core lesion). Although the most common cause of small bowel obstruction is adhesion, adenocarcinoma can cause malignant stricture of the small bowel (Figs. 8-10) with upstream obstructive bowel dilatation. Advanced small bowel adenocarcinoma is accompanied by metastatic lymphadenopathy (Figs. 10, 11), adjacent mesenteric tumor infiltration, vascular invasion, or distant metastasis to the peritoneum or liver (16). A large, ulcerated mass of small bowel adenocarcinoma can be mistaken for GIST or lymphoma on CT. However, unlike GIST,

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Fig. 9. Surgically confirmed jejunal mucinous adenocarcinoma in a 68-year-old male with abdominal discomfort and indigestion.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images reveal an approximately 2.5 cm sized, focal, hypdense, circumferential narrowing in the mid jejunum (arrows), with upstream jejunal dilatation (arrowhead). After small bowel resection, the lesion was confirmed as jejunal mucinous adenocarcinoma and focal hypodense wall thickening was due to mucin pool.

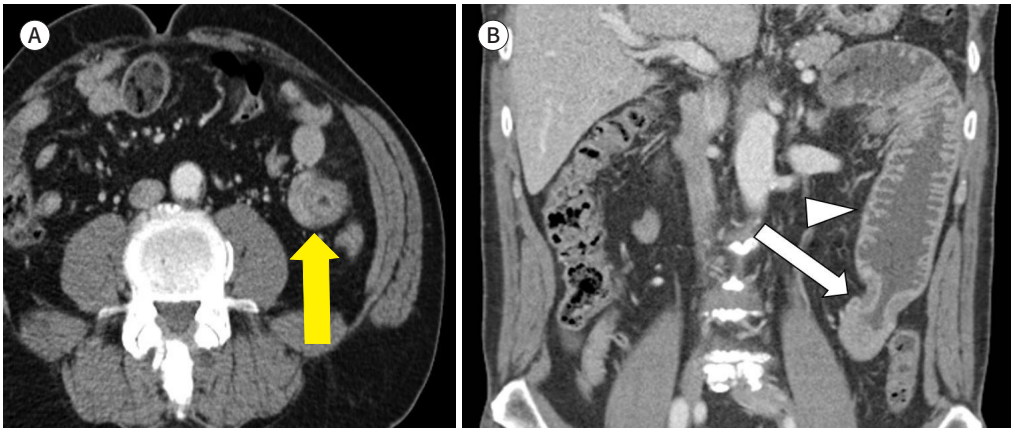


Fig. 10. Surgically confirmed recurrent small bowel adenocarcinoma in a 76-year-old male with abdominal pain.
A, B. Initial axial contrast-enhanced CT image (A) shows multiple enlarged lymph nodes in the retroperitoneal (arrows) and retrocrural area, and focal abnormal wall thickening with perilesional infiltration at the proximal jejunum (yellow arrow, B). The patient was diagnosed with small bowel adenocarcinoma.
C. After resection and chemotherapy (FOLFIRI), interval improvement in the multiple lymph nodes metastases (asterisk) is observed in the follow-up CT obtained after 1 month.
D, E. After 6 months, follow-up axial (D) and coronal (E) contrast-enhanced CT show duodenal obstruction with segmental wall thickening (arrowheads). The lesion was confirmed as a recurrent small bowel adenocarcinoma.
FOLFIRI = folinic acid, fluorouracil and irinotecan

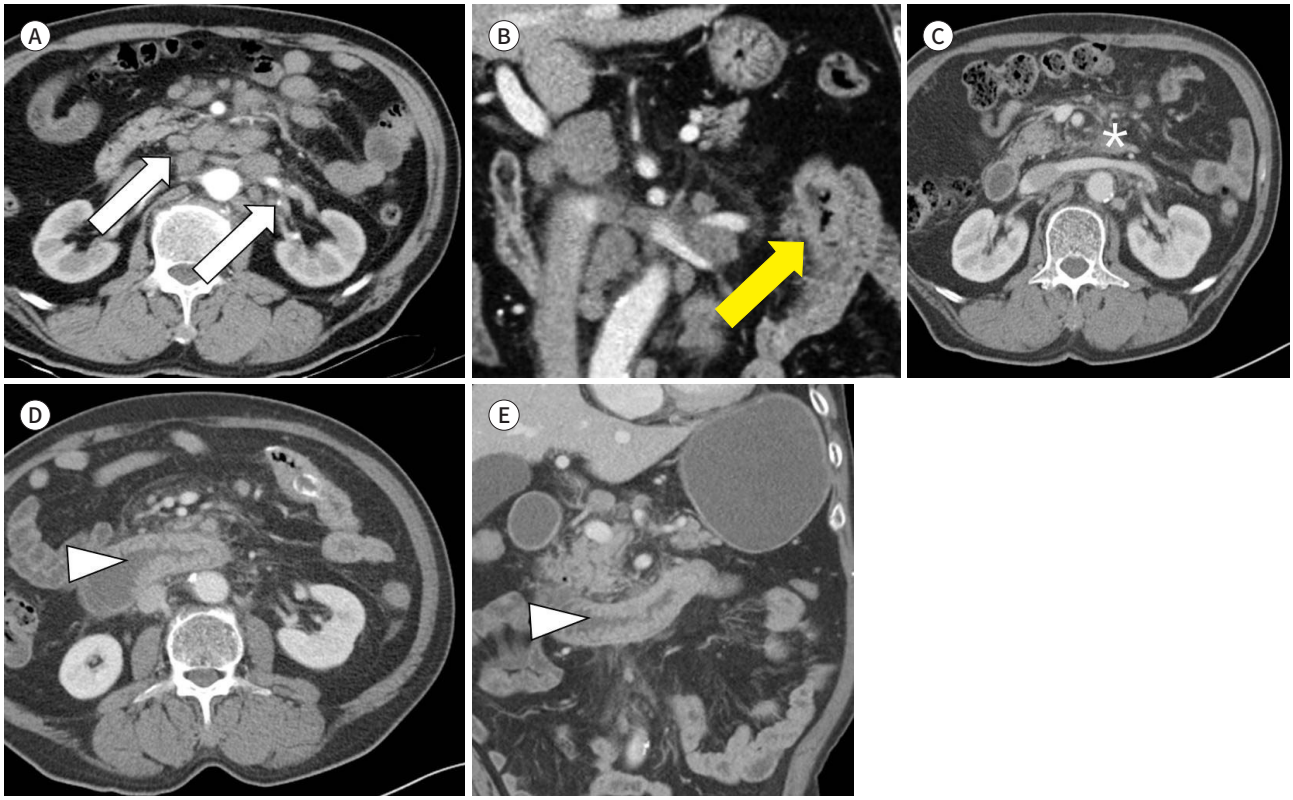
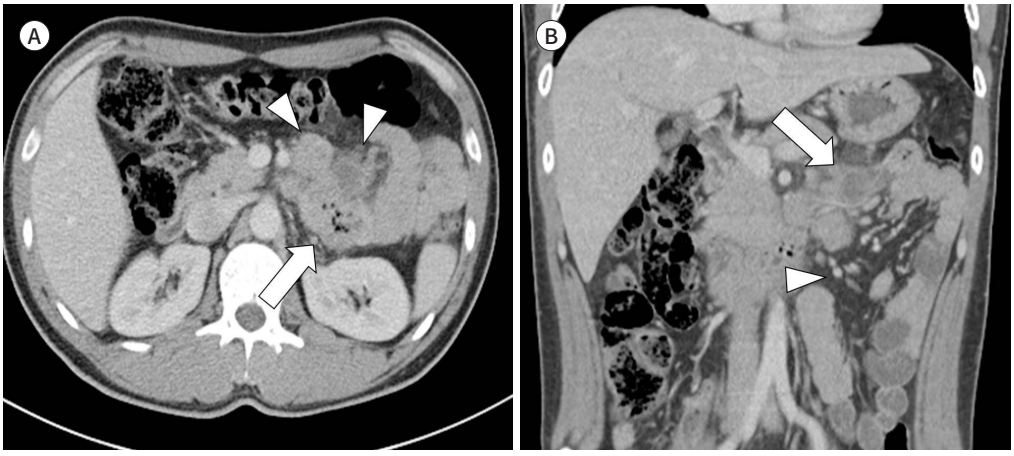


Fig. 11. Incidentally detected small bowel adenocarcinoma in a 37-year-old male.
A, B. Focal abnormal wall thickening in the proximal jejunum (arrows) is shown on axial (A) and coronal (B) contrast-enhanced CT images. Multiple enlarged lymph nodes with necrotic portions (arrowheads) are located at the mesentery. Small bowel lymphoma or adenocarcinoma was suspected in the radiologic report, and the lesion was confirmed as jejunal adenocarcinoma.



lymphadenopathy and variable forms of metastases are common in small bowel adenocarcinoma. Unlike lymphoma, small bowel adenocarcinoma commonly shows irregular luminal narrowing and obstruction.

SMALL BOWEL LYMPHOMA

Lymphomas of the small bowel originate from lymphoid tissue in the bowel wall. Primary small bowel lymphoma is sometimes difficult to diagnose because of the absence of peripheral lymphadenopathy, involvement of other organs, or abnormal blood tests. Clinically, small bowel lymphoma shows nonspecific symptoms similar to those in other small bowel malignancies, such as abdominal pain, nausea, vomiting, and weight loss. The ileum is the most common site of small bowel lymphoma, followed by the jejunum (17, 18). The radiologic features of small bowel lymphoma include polypoid masses, homogeneous bulky wall thickening with pseudoaneurysmal dilatation (Figs. 12, 13), and adjacent mesenteric lymphadenopathy (Fig. 13). Extremely rarely, bowel stenosis can be seen in small bowel lymphoma (19, 20). The differential diagnosis of small bowel lymphoma includes Crohn's disease, adenocarcinoma, GIST, and metastasis. Compared with small bowel adenocarcinoma, small bowel lymphoma tends to show homogenous wall thickening with eccentric luminal narrowing adjacent to multiple enlarged lymph nodes without necrosis. However, lymphoma is less likely to develop bowel obstruction due to the absence of a desmoplastic response (21). Moreover, distal and multifocal involvement of the small bowel may be more common in lymphoma than in adenocarcinoma (3). Small bowel lymphoma manifests as focal wall thickening with pseudoansurysmal dilatation mimicking GIST with luminal fistula and inner necrosis (Fig 13). Compared with Crohn's disease, lymphoma tends to involve fewer segments and show thicker wall (22). Bowel metastases show multifocal wall thickening or polypoid lesions. Other evidence of metastasis can be found in the abdomen.

Fig. 12. Surgically confirmed malignant small bowel lymphoma in a 46-year-old male with abdominal pain and distension.
A, B. On axial (A) and coronal (B) contrast-enhanced CT images, an approximately 15 cm sized, homogeneously enhancing mass with pseudo-aneurysmal change (arrows) involving the proximal jejunum and left side of the colon. Multiple extraluminal air bubbles are shown (arrowheads). Small bowel perforation was strongly suspected. The lesion was finally confirmed as malignant T-cell lymphoma with bowel perforation at the jejunum.

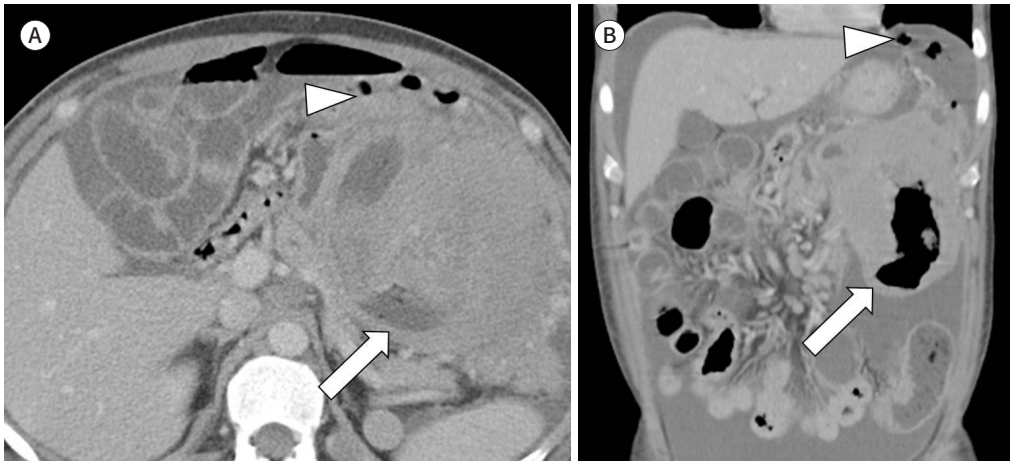
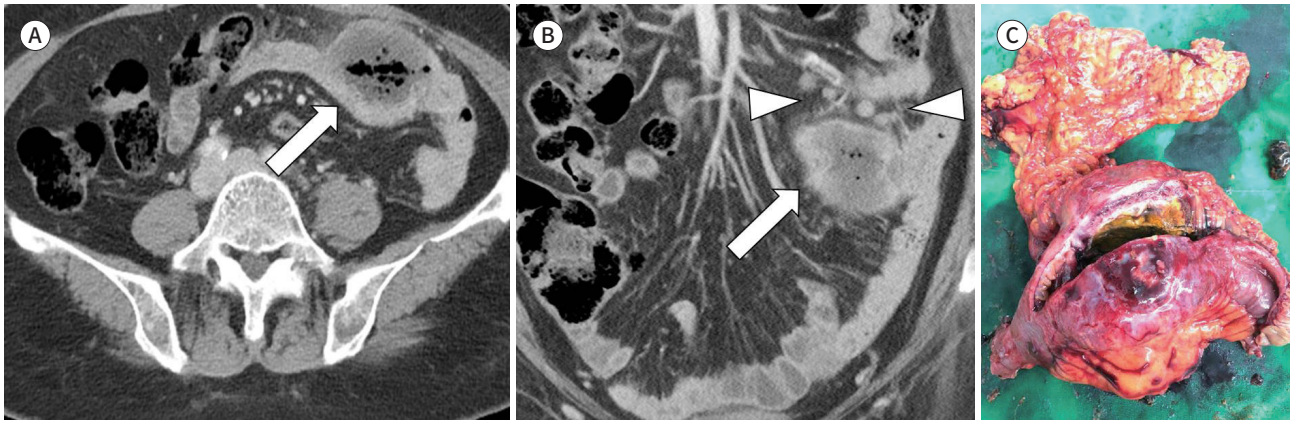


Fig. 13. Surgically confirmed small bowel lymphoma in a 67-year-old female with abdominal pain.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show an approximately 6.6 cm sized, rim-enhancing mass with internal air density (arrows) abutted the distal jejunum and transverse colon. There are multiple enlarged regional round lymph nodes (arrowheads) in the mesentery. The lesion was suspected as lymphoma or gastrointestinal stromal tumor with luminal fistula and inner necrosis.
C. Gross specimen of the mass. After bowel resection, the lesion was confirmed as T-cell lymphoma.



SMALL BOWEL SARCOMA

Sarcoma of the small bowel accounts for approximately 10% of all small bowel malignancies. The most common sarcoma of the small bowel is leiomyosarcoma, which arises in the muscle tissue of the bowel wall. The various radiologic features of small bowel sarcoma include large size mass, heterogeneous enhancement, central necrosis, and focal wall thickening (Fig. 14) (3, 23). Due to these features, mass forming small bowel sarcomas are difficult to distinguish from GISTs. On pathologic examination, the expression of KIT (CD117) distinguishes GISTs from other malignant mesenchymal tumors, including leiomyosarcoma (3, 24).

SMALL BOWEL PLASMACYTOMA (EXTRAMEDULLARY PLASMACYTOMA)

Extramedullary plasmacytoma is a malignant tumor of plasma cells that generally arises in

Fig. 14. Surgically confirmed small bowel sarcoma in a 50-year-old female with abdominal pain.
A-C. Axial (A) and coronal (B, C) contrast-enhanced CT images show focal abnormal wall thickening (asterisks) in the distal ileum with diffuse proximal dilatation (arrowhead) of the ileum. There is no definite calcification around the thickened wall, and small bowel malignancy was suspected. After bowel resection, the lesion was confirmed as a clear cell sarcoma in the distal ileum.

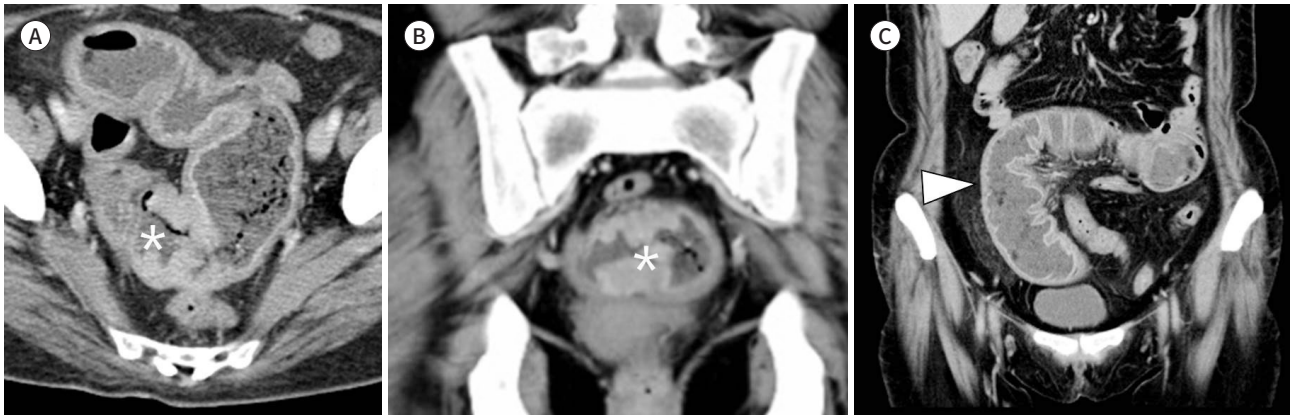
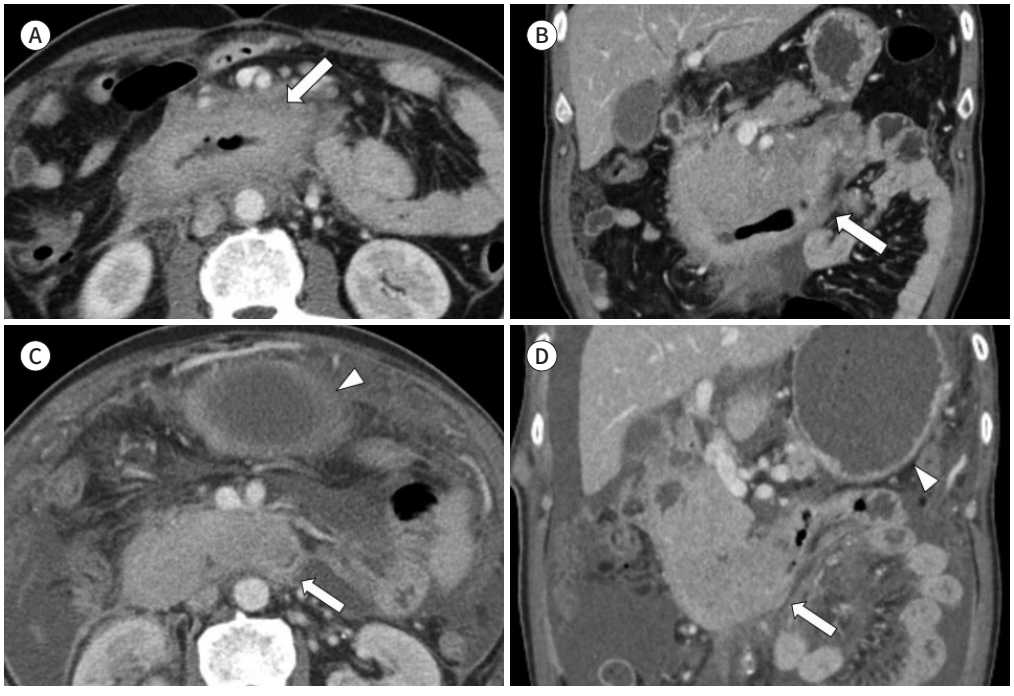


Fig. 15. About 7 cm sized bowel plasmacytoma from the 2nd portion of the duodenum to the proximal jejunum in a 62-year-old male patient with dyspepsia.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show an approximately 7 cm sized, wall thickening from the 2nd portion of the duodenum to the proximal jejunum, involving the pancreatic head and adjacent vascular structures without definite luminal obstruction (arrows).
C, D. Axial (C) and coronal (D) contrast-enhanced CT images performed after 6 weeks reveal an upstream gastric distention with gastric outlet obstruction (arrowheads) due to the duodenal mass (arrows). After endoscopic biopsy, the patient was diagnosed with primary small-bowel plasmacytoma.



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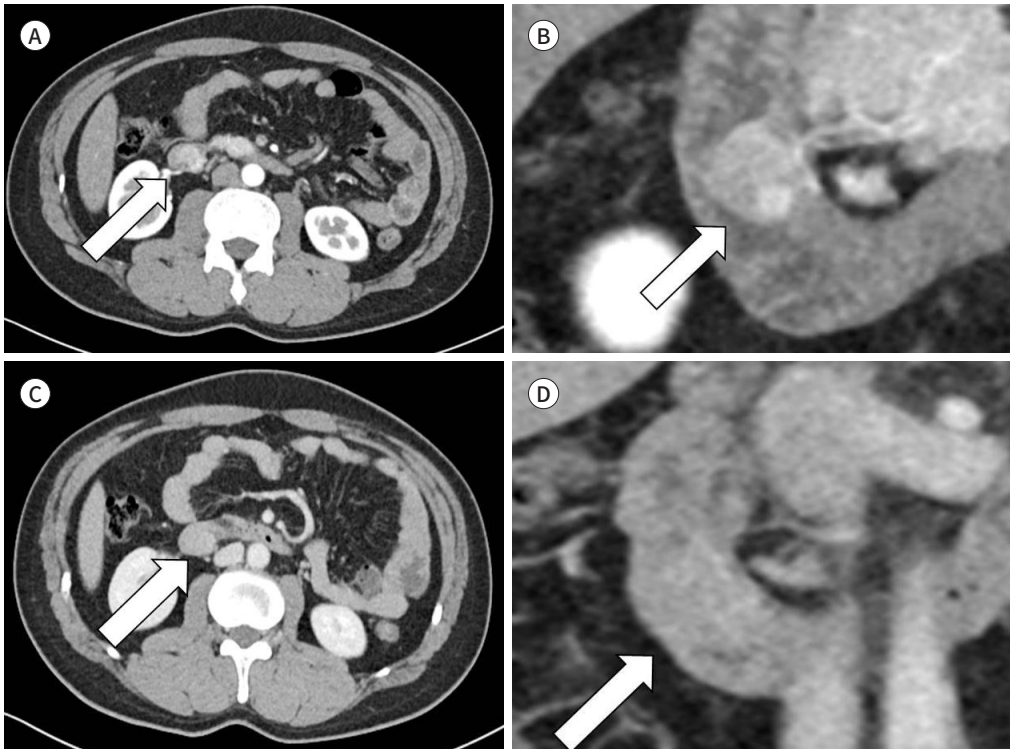
the upper respiratory tract, but can arise in any soft tissue (25). Most extramedullary plasmacytomas can be seen as secondary forms of multiple myeloma; however, small bowel plasmacytomas are mostly seen in primary form. The jejunum is the most common site of small bowel plasmacytoma, followed by the duodenum and ileum (25). On contrast-enhanced CT, small bowel plasmacytoma frequently manifests as a well-demarcated homogenous enhancing mass or focal wall thickening, with luminal narrowing or obstruction with lymphadenopathy in the small bowel (Fig. 15). Generally, small bowel plasmacytomas can be mistaken for adenocarcinoma or lymphoma. Small bowel plasmacytoma tends to show a finer margin than adenocarcinoma, and more obstructive lesions than lymphoma. However, small bowel plasmacytoma is difficult to differentiate into adenocarcinoma or lymphoma on CT.

SMALL BOWEL NET

Neuroendocrine tumors (NETs) originate from ectodermal hormone-producing cells of the neural crest. The ileum is the most common site of small bowel neuroendocrine tumors, followed by the duodenum and jejunum (26). At this time, there is no single imaging tool that fulfills all diagnostic evaluations of small bowel NETs (27). Contrast-enhanced CT and MRI are currently widely used for initial morphologic imaging evaluation and staging of NETs, whereas functional imaging examinations, such as gallium-68 (68Ga)-labeled somatostatin analogs, in-

Fig. 16. Incidentally detected, surgically confirmed small bowel neuroendocrine tumor in a 43-year-old male. A-D. Axial (A) and coronal (B) contrast-enhanced CT images at the late arterial phase show a 2.5 cm sized, well-enhancing hypervascular mass (arrows) in the 2nd portion of duodenum. They are poorly visible at portal venous phase (C, D). Small bowel tumor was suspected. After small bowel resection, the lesion was confirmed as a duodenal neuroendocrine tumor.



cluding 68Ga-DOTATOC, -DOTANOC, and DOTATATE, are useful for detection and can determine the treatment planning (27). They are useful for evaluating multiple NET involvement, such as the multiple endocrine neoplasia type 1 (MEN a), which is a rare inherited syndrome consisting of two or more endocrine tumors such as the pituitary, parathyroid, pancreas, and small bowel (28). Although small-sized small bowel NETs manifest as well-defined enhancing mucosal or submucosal masses on CT scans (Fig. 16), large size (> 2 cm) NETs show hypervascularity, calcification, necrosis, and infiltrative growth to the mesentery (29-32).

MASS-LIKE SMALL BOWEL LESIONS MIMICKING SMALL BOWEL MALIGNANCIES

Some mass-like lesions from inflammation or trauma, benign tumors, or ectopic pancreas in the small bowel can mimic small bowel malignancies. These include Meckel's diverticulum (Fig. 17), diverticulitis (Fig. 18), inflammatory fibroid polyps (Fig. 19), intramural hematoma, other benign tumors, and heterotopic pancreas. Small bowel diverticulitis manifests as a focal inflammatory lesion mimicking perforated or advanced small bowel malignancy or foreign body-related changes on CT (33). Meckel's diverticulum and diverticulitis can present with wall thickening or mass-like lesions containing fecal materials, blood, or debris in-

Fig. 17. Perforated Meckel's diverticulum in a 43-year-old male.
A, B. Coronal contrast-enhanced CT images show a blind-ending tubular structure (arrows) at the anti-mesenteric border of the distal ileum, with fluid collection in the pelvic cavity (arrowhead).
C, D. Axial contrast-enhanced CT images show the perforation site (arrowheads) at Meckel's diverticulum. The lesion presents a continuous small bowel layer, suggesting Meckel's diverticulum.

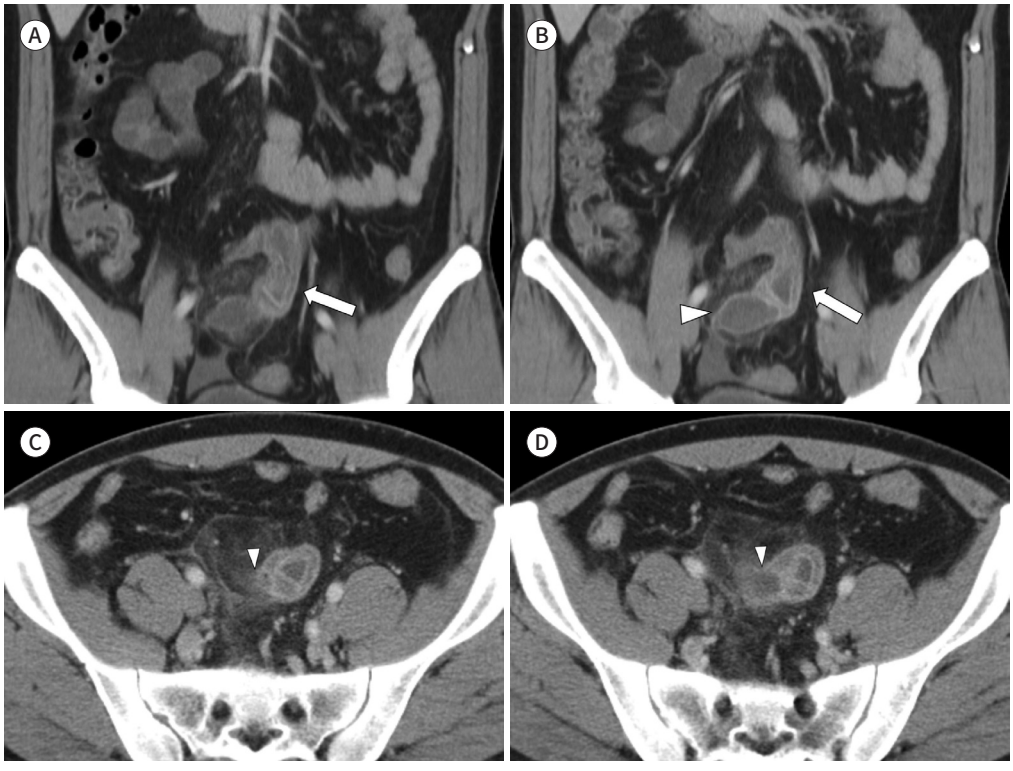


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Fig. 18. Jejunal diverticulitis in a 71-year-old female.
A-D. Several small, rim-enhancing lesions at the mesenteric side of the jejunum are seen (arrows) on coronal contrast-enhanced CT images (A, B). Although these findings (A, B) cannot exclude advanced small bowel malignancy, the patients were treated for jejunal diverticulitis (arrowheads, C, D). The lesions (A, B) were considered to more likely be remnant localized peritonitis around the jejunum due to jejunal diverticulitis, than small bowel malignant lesions.

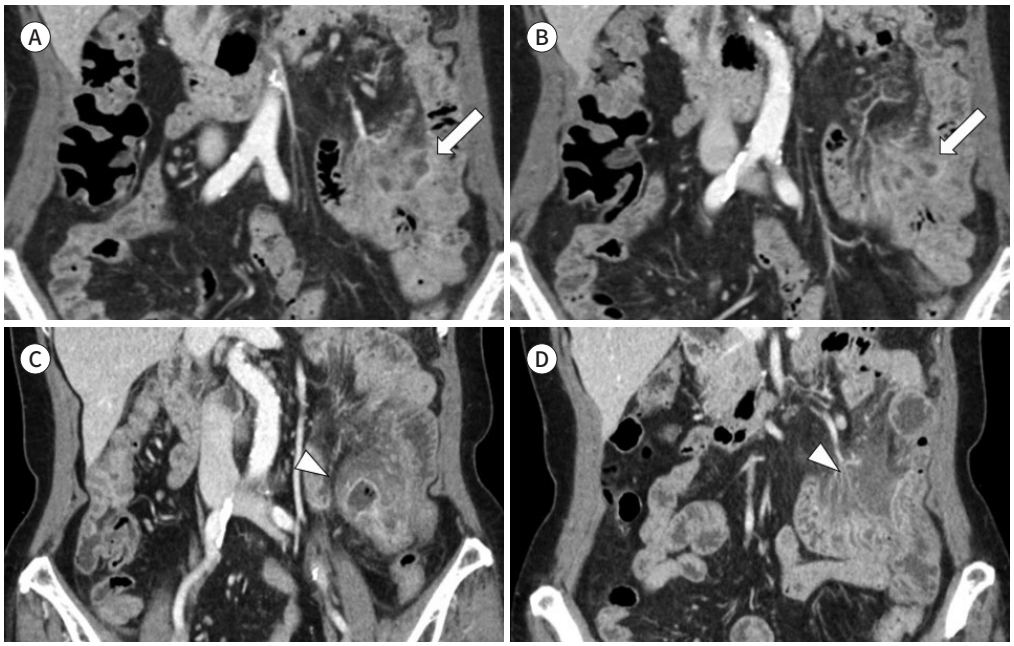
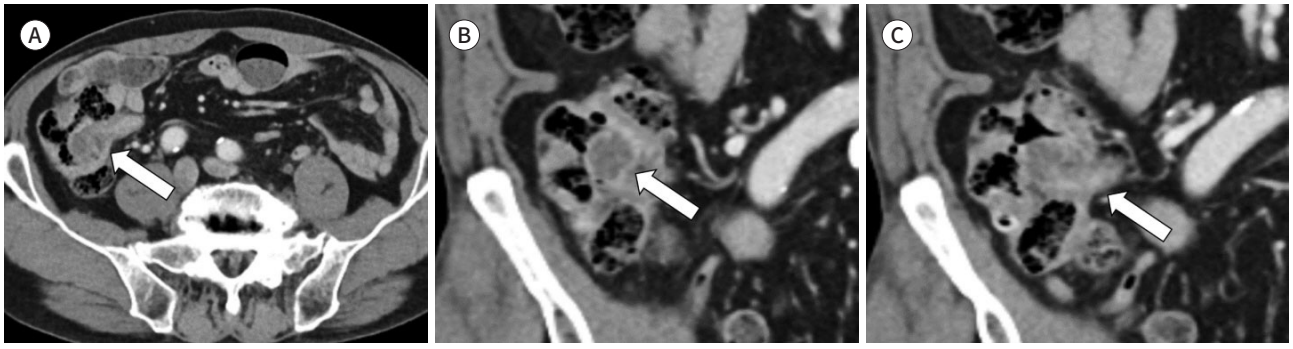


Fig. 19. Inflammatory fibroid polyp in a 79-year-old male incidentally detected during ileocolonoscopy and CT, and surgically confirmed.
A-C. Axial (A) and coronal (B, C) contrast-enhanced CT images show a 2.5 cm polypoid nodule at the ileocecal valve (arrows), initially suggesting GIST or leiomyoma. The patient underwent ileocecectomy, and the lesion was finally diagnosed as an inflammatory fibroid polyp. After second image review, our case showed a poorly enhancing mass with overlying mucosal hyperenhancement, which is a common feature of inflammatory fibroid polyps.



volving the jejunum and distal ileum, respectively, to differentiate from malignancies. Meckel's diverticulum has all layers of the small bowel, and is mostly located at the antimesenteric border of the ileum (34). Inflammatory fibroid polyps present as well-defined, ovoid, round, or slightly lobulated, contoured endoluminal mass in the small bowel (35). Overlying mucosal hyperenhancement and ulceration points to mucosal involvement are often observed on imaging modalities (35). Intramural hematoma shows distinctly high attenuation and luminal narrowing, which is often associated with anticoagulation treatment or previous injuries

such as endoscopy with biopsy or trauma (36-38). The patient's specific history is useful for the diagnosis of intramural hematoma to exclude small bowel malignancy. Small bowel leiomyoma, a rare benign tumor, can be seen as a well-demarcated soft tissue mass with homogenous enhancement (Fig. 20) (39). Large leiomyomas can show inner ulceration or calcification, but small leiomyomas can be difficult to distinguish from GISTs. Large leiomyomas are sometimes needed to differentiate malignant tumors, such as leiomyosarcoma with lymphadenopathy or irregular margins. Some leiomyomas may require surgical intervention if they present with hemorrhage, anemia, or pain. Heterotopic pancreas refers to aberrant pancreatic tissue without ductal or vascular continuity to the original gland with most of the cases occurring at stomach, duodenum or jejunum. On CT images, heterotopic pancreas can show similar enhancement to the normal pancreas (Fig. 21). However, it is difficult to distinguish it from other subepithelial small bowel tumors based on this enhancement feature (40). Ductal structure can be seen in this lesion and pancreatitis or pancreatic cancer can occur in heterotopic pancreas.

Fig. 20. Surgically confirmed leiomyoma in a 61-year-old male with abdominal colicky pain.
A-D. Coronal (A-C) and axial (D) contrast-enhanced CT images reveal an approximately 3.5 cm sized, homogeneously enhancing mass (arrows) with small bowel intussusception (arrowheads) involving the distal jejunum. Gastrointestinal stromal tumor or inflammatory polyp was suspected.
E. Gross specimen of the mass in the jejunum. Finally, the lesion was confirmed as leiomyoma at the leading point mass with small bowel intussusception.

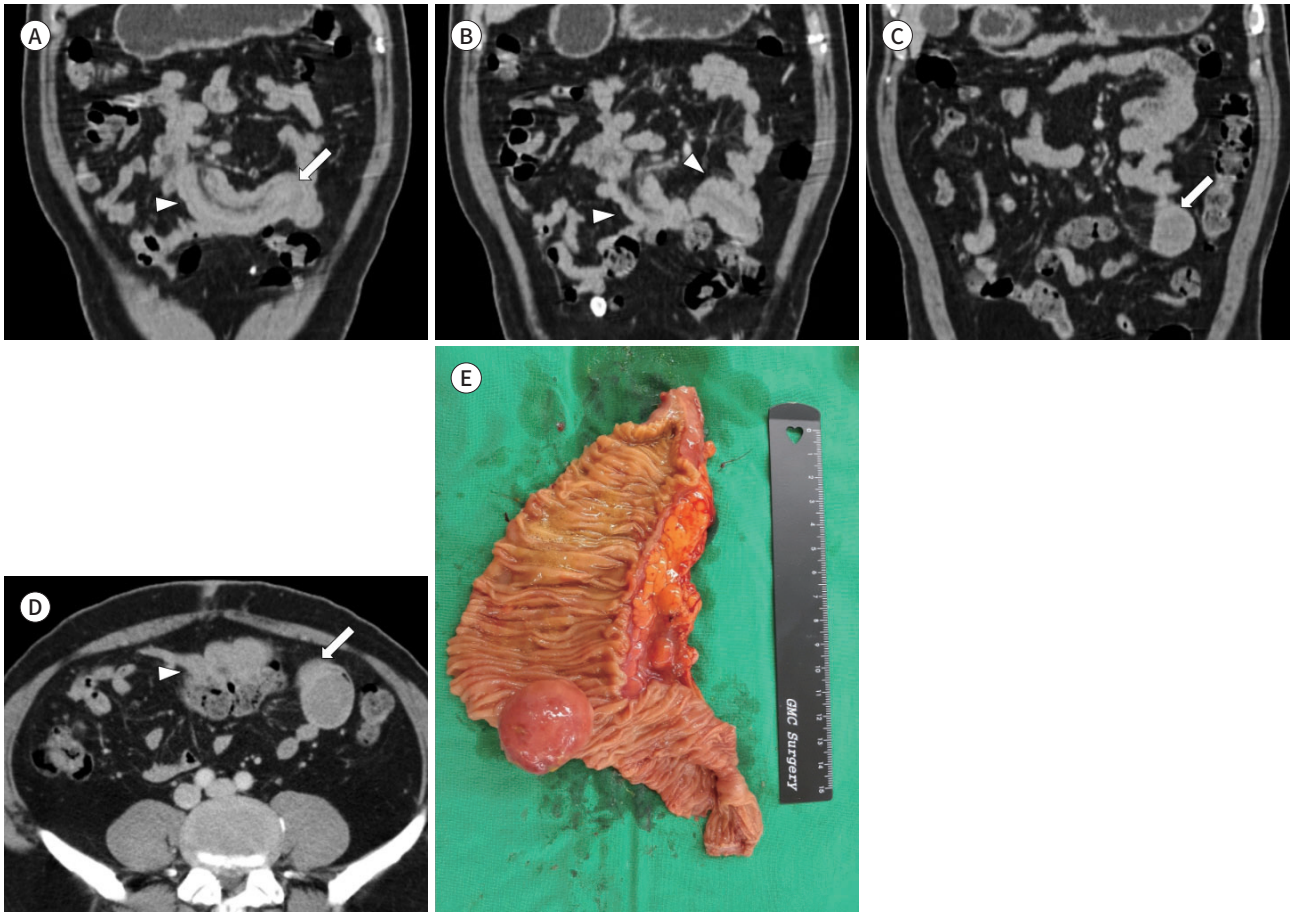


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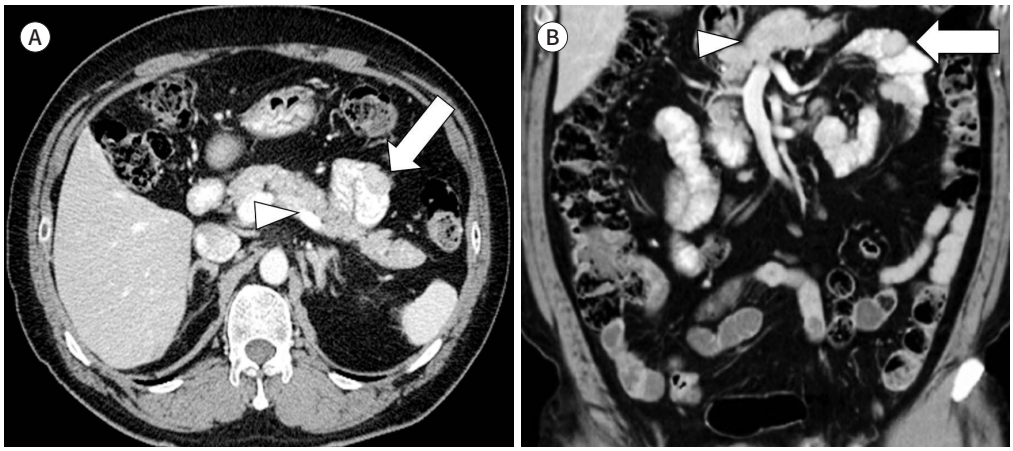
Fig. 21. Incidentally detected, heterotopic pancreas mimicking small bowel malignancy in a 54-year-old male.
A, B. Axial (A) and coronal (B) contrast-enhanced CT images show an ovoid, well-defined mass (arrows), with homogenous enhancement in the proximal jejunum. This lesion shows similar enhancement with the adjacent pancreas (arrowheads). Initially, a subepithelial tumor of the small bowel was suspected; however, the lesion was pathologically confirmed as a heterotopic pancreas.



CONCLUSIONS

Small bowel malignancies can be easily missed or misdiagnosed by radiologists because of their rarity, nonspecific symptoms, and overlapping imaging features, especially when manifesting with small sizes. However, if radiologists know some characteristic imaging features of small bowel malignancies and their mimicking lesions, and perform a careful inspection of the entire small bowel loops, especially when patients present with gastrointestinal bleeding symptoms, optimal detection and diagnosis of small bowel malignancies can be achieved.

Author Contributions

Conceptualization, P.S.H.; data curation, all authors; investigation, L.J.S.; project administration, P.S.H.; supervision, P.S.H.; visualization, L.J.S.; writing—original draft, L.J.S.; and writing—review & editing, P.S.H., C.S.J.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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소장의 악성 종양과 악성 종양으로 오인할 수 있는 소장 병변에 대한 영상의학적 검토

이종수 · 박소현* · 최승준

영상의학과 의사가 컴퓨터단층촬영 영상을 볼 때, 소장에 생긴 악성 병변은 그 크기가 작아 정상 소장과 유사한 조영증강을 보이거나 비특이적인 조영증강으로 인해 정상 소장으로 오인될 수 있기 때문에 놓치기 쉽다. 또한, 소장의 악성 병변은 자궁, 직장, 대망과 같은 다른 장기에서 발생한 종괴로 오인될 수 있다. 이 임상화보에서, 저자들은 소장에 생긴 다양한 악성 종양과 악성 종양으로 오인할 수 있는 소장 병변의 전형적, 비전형적 CT 소견을 임상 양상과 함께 보여주고자 한다.

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