

Diagnostic challenge and surgical decision making for a duodenal spindle cell tumor mimicking a gastrointestinal stromal tumor

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Case Report

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Abstract

Rare non-gastrointestinal stromal spindle cell tumors of the duodenum can closely mimic gastrointestinal stromal tumor (GIST), making accurate preoperative diagnosis difficult. A 55-year-old woman presented with abdominal discomfort, nausea, and vomiting. Contrast-enhanced computed tomography revealed an approximately 6.0 × 3.8 cm soft-tissue mass posterior to the pancreatic head and closely related to the duodenum, and duodenal GIST was considered the most likely preoperative diagnosis. Gastroscopic biopsy showed only heterotopic fundic glands with chronic inflammation and failed to explain the deep-seated lesion. Because the patient remained symptomatic and the lesion could not be characterized with confidence preoperatively, she underwent surgical exploration. Intraoperatively, the tumor was firm and densely adherent to the inferior vena cava, and pancreaticoduodenectomy was performed. Postoperative pathology demonstrated a duodenal spindle cell tumor of mesenchymal origin. Immunohistochemistry showed DOG-1 negativity, CD117 negativity, and SMA positivity, findings that argued against typical GIST and favored myogenic differentiation. The postoperative course was uneventful, and follow-up with four abdominal computed tomography examinations and one magnetic resonance imaging examination showed no definite recurrence or metastasis through May 28, 2025. This case underscores the importance of recognizing discordance between imaging and superficial biopsy in deep duodenal lesions and suggests that, in anatomically complex cases, surgical strategy may ultimately be driven more by local resectability than by a presumed preoperative diagnosis.

Introduction

Mesenchymal tumors of the duodenum are uncommon, and non-GIST spindle cell tumors are particularly rare. Their clinical manifestations are nonspecific, and their imaging features frequently overlap with those of GISTs, peripancreatic masses, and retroperitoneal lesions, making accurate preoperative diagnosis difficult [1, 2]. For lesions arising from the deeper layers of the duodenal wall or growing predominantly outside the lumen, routine endoscopic biopsy is often limited by insufficient sampling depth and may fail to obtain representative tissue [2–6]. We report a duodenal spindle cell tumor that was initially considered a GIST but was ultimately classified postoperatively as a spindle cell tumor favoring myogenic differentiation. The case highlights the diagnostic challenge posed by deep duodenal mesenchymal lesions and illustrates how resectability may become the decisive consideration in surgical planning. The manuscript was prepared with reference to the CARE reporting guideline [15].

Case Presentation

A 55-year-old woman developed abdominal discomfort without an identifiable precipitating factor on October 30, 2023. Non-contrast upper abdominal computed tomography performed at an outside hospital demonstrated a mass-like lesion anterior to the right kidney that was indistinct from the pancreatic head and duodenum. She was admitted on October 31, 2023 for further evaluation and treatment. On admission, she reported nausea, vomiting, and abdominal distension, and her abdominal discomfort was partially relieved after vomiting. She had no fever and no recent significant weight loss.

Her medical history was unremarkable for hypertension, diabetes mellitus, hepatitis, tuberculosis, previous surgery, or trauma, and she reported no known food or drug allergies. Physical examination revealed a soft abdomen without tenderness, rebound tenderness, or guarding.

Timeline

The main diagnostic, therapeutic, and follow-up milestones of this case are summarized in Fig. 3.

Diagnostic assessment

Laboratory testing on admission showed a white blood cell count of $15.08 \times 10^9/L$, a neutrophil percentage of 80.2%, and a high-sensitivity C-reactive protein level of 13.77 mg/L, suggesting an inflammatory response. Alanine aminotransferase was mildly elevated at 76 U/L. CEA, CA19-9, CA72-4, and CA125 were all within normal limits.

Contrast-enhanced whole-abdomen computed tomography on November 1, 2023 demonstrated an approximately 6.0×3.8 cm soft-tissue mass posterior to the pancreatic head, with relatively homogeneous density and mild enhancement, closely related to the duodenum. Duodenal GIST was considered the leading preoperative diagnosis (Fig. 1). Cholelithiasis, mild dilatation of the intrahepatic and extrahepatic bile ducts, and an approximately 3.5×2.0 cm sac-like lesion in the ascending portion of the duodenum, considered a diverticulum, were also noted. Chest computed tomography additionally showed dependent pneumonia in the right lower lung and a small pleural effusion.

Gastroscopy performed on November 3, 2023 suggested possible Barrett esophagus, chronic non-atrophic gastritis, and mucosal changes in the duodenal bulb (Fig. 1). Pathological examination of the endoscopic biopsy on November 6, 2023 showed only heterotopic fundic glands with chronic inflammation and papillary epithelial hyperplasia in the posterior wall of the duodenal bulb. These findings were inconsistent with the deep-seated lesion identified on imaging, indicating that routine mucosal biopsy failed to reflect the true nature of the mass.

Therapeutic intervention

Because the patient had persistent gastrointestinal symptoms and imaging showed a pancreaticoduodenal lesion that could not be characterized with confidence before surgery, other deep mesenchymal tumors with potentially malignant behavior could not be excluded, despite the working diagnosis of duodenal GIST. Given the close relationship of the lesion to the pancreatic head and duodenum, and the uncertainty regarding the feasibility of safe local resection, surgical exploration was undertaken.

Laparoscopic pancreaticoduodenectomy was planned on November 7, 2023. Intraoperatively, the tumor was found to be firm and densely adherent to the inferior vena cava. Continued laparoscopic dissection carried a substantial risk of vascular injury, and the procedure was converted to open

pancreaticoduodenectomy with concomitant cholecystectomy. The operation lasted from 08:40 to 14:20, and the patient received 1.5 U of red blood cells and 200 mL of plasma intraoperatively.

Postoperative pathological examination demonstrated a spindle cell tumor of mesenchymal origin arising in the duodenum. Tumor cells showed moderate atypia, focal myxoid change, and a small number of mitotic figures. Immunohistochemistry showed DOG-1 negativity, CD117 negativity, and SMA positivity, arguing against typical GIST and favoring myogenic differentiation (Fig. 2). Given the currently available evidence, a cautious designation of duodenal spindle cell tumor favoring myogenic differentiation was considered most appropriate. No tumor cells were identified at the bilateral resection margins, gastric margin, or pancreatic margin. No lymph node metastasis was detected in the submitted lymph nodes, and chronic cholecystitis was also present.

Follow-up and outcomes

The postoperative course was generally stable. Early after surgery, the patient experienced transient fever, nausea, and fluctuations in drainage volume, which gradually resolved with anti-infective therapy, fluid replacement, nutritional support, and symptomatic management. A postoperative upper gastrointestinal contrast study on November 20, 2023 showed no obvious anastomotic obstruction or contrast leakage, indicating a patent gastrointestinal reconstruction (Fig. 3). The patient was discharged in good general condition on November 23, 2023.

She subsequently underwent regular imaging follow-up. As of May 28, 2025, she had completed four abdominal computed tomography examinations and one abdominal magnetic resonance imaging examination, all of which showed no definite local recurrence or distant metastasis, suggesting a favorable short- to mid-term outcome.

Discussion

This case illustrates the diagnostic difficulty posed by deep duodenal spindle cell tumors in routine practice. Contrast-enhanced computed tomography demonstrated a lesion posterior to the pancreatic head, closely abutting the duodenum, with relatively homogeneous soft-tissue density and mild enhancement. These features closely overlapped with those of duodenal GIST, making GIST a reasonable leading preoperative diagnosis. Postoperative immunohistochemistry, however, showed DOG-1 negativity, CD117 negativity, and SMA positivity, an immunophenotype that argued against typical GIST and favored myogenic differentiation. The clinicopathological features of previously published rare non-GIST duodenal tumors are summarized in Table 1 [9–14].

The case also highlights the limitations of routine gastroscopic biopsy for deep lesions. Endoscopic biopsy yielded only heterotopic fundic glands, chronic inflammation, and superficial epithelial changes, findings that could not explain the approximately 6 cm mass identified on imaging. The most plausible explanation is that the lesion arose predominantly from the deeper layers of the duodenal wall or grew exophytically, with routine mucosal sampling therefore failing to capture representative tumor tissue.

Accordingly, when imaging findings and endoscopic pathology are clearly discordant, clinicians should not dismiss the possibility of a clinically relevant deep tumor solely on the basis of a superficial biopsy result.

Preoperative endoscopic ultrasonography might have improved characterization by clarifying the layer of origin, the relationship to the duodenal wall, and the feasibility of EUS-guided tissue acquisition [3–6]. In this case, however, the tumor was large, located at the pancreaticoduodenal junction, and closely associated with major vascular structures. Even if EUS had improved preoperative tissue characterization, it would not necessarily have altered the need for resection or allowed safe local excision instead of pancreaticoduodenectomy [7, 8]. In this setting, the potential value of EUS would likely have been incremental for lesion characterization rather than decisive for the extent of surgery.

A central message of this case is that the extent of surgery was determined less by a definitive preoperative pathological label than by local resectability and operative safety. Intraoperative findings showed dense adhesion to the inferior vena cava and a complex relationship with the pancreatic head and duodenum. Under these circumstances, local resection was unlikely to provide both oncologic adequacy and operative safety. Pancreaticoduodenectomy was therefore a reasonable and pragmatic choice, and the negative resection margins together with the absence of recurrence during follow-up indirectly support that decision.

Published reports of rare non-GIST duodenal tumors suggest that these lesions usually lack specificity in clinical presentation, imaging appearance, and preoperative assessment, and that definitive diagnosis often relies on postoperative morphology and immunohistochemistry [9–14]. In the absence of expert pathological consultation from a higher-level center or more extensive molecular evaluation, the cautious designation of a duodenal spindle cell tumor favoring myogenic differentiation is more appropriate than assigning an overly definitive subtype. The principal clinical lesson is that persistent discordance between imaging and superficial biopsy, particularly in a large lesion abutting major vascular structures, should raise concern that definitive management may need to be guided more by the feasibility of safe complete resection than by preoperative histological certainty.

Conclusion

Deep duodenal spindle cell tumors may closely mimic GIST on imaging while remaining non-diagnostic on routine mucosal biopsy. In large, deeply situated lesions that are closely related to critical vascular structures, operative strategy may need to be determined primarily by resectability and surgical safety. This case emphasizes the value of integrating imaging, operative findings, immunohistochemistry, and follow-up while maintaining cautious pathological interpretation.

Patient perspective

The patient and her family were informed that the preoperative diagnosis remained uncertain and that definitive resection was recommended because of the lesion's location and its close relationship with

surrounding vital structures. During postoperative recovery and follow-up, the patient remained clinically stable and expressed acceptance of the diagnostic and therapeutic process.

Declarations

Ethics approval and consent to participate

Ethical approval was waived by the Ethics Committee of Yanbian University Hospital for this single patient case report in accordance with institutional policy. This study was conducted in accordance with the Declaration of Helsinki. The patient provided written informed consent for the use of anonymized clinical information in this report.

Consent for publication

Written informed consent for publication of anonymized clinical details and related imaging data was obtained from the patient.

Note

Because definitively classified duodenal smooth muscle-derived spindle cell tumors are exceedingly rare, this table primarily includes published rare non-GIST duodenal tumors that are comparable to the present case in terms of anatomical location, preoperative diagnostic difficulty, and pathological differential considerations.

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Conflict of interest

The authors declare that they have no conflict of interest.

Author Contribution

Jie Li was responsible for case data collection, literature review, and preparation of the first draft. Guangyi Li supervised the clinical management of the case, reviewed the surgical and clinical data, and critically revised the manuscript. Both authors read and approved the final version of the manuscript.

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Data Availability

The original data supporting the conclusions of this article are included within the article. Further inquiries can be directed to the corresponding author. To protect patient privacy, personally identifiable information will not be made publicly available.

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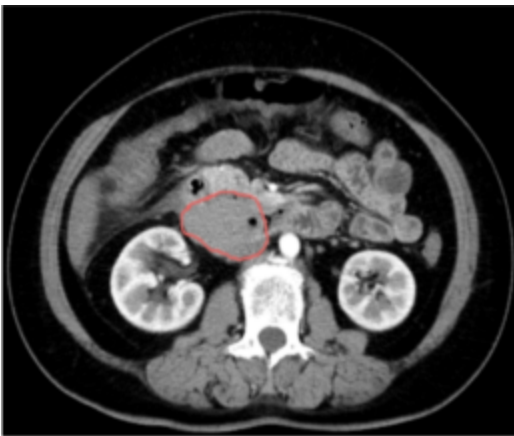
Tables

Table 1. Comparison of published rare non-GIST duodenal tumors similar to the present case.

Case	Clinical Presentation / Detection	Preoperative Impression	Key Diagnostic Challenge	Surgical Management	Basis for Final Diagnosis
Present case	Abdominal discomfort, nausea, and vomiting; imaging detected a lesion near the pancreatic head and duodenum	Duodenal GIST or peripancreatic mass	Routine gastroscopic mucosal biopsy failed to sample the deep lesion; preoperative origin remained uncertain	Pancreaticoduodenectomy	Postoperative morphology, immunohistochemistry, and follow-up
Banerjee et al., 2015	Rare duodenal lesion with vomiting-related symptoms; nonspecific presentation	GIST-like duodenal lesion	Clinical and radiologic findings lacked specificity; distinction from GIST was required	Surgical resection	Postoperative pathology and immunophenotype
Poizat et al., 2012	Rare duodenal tumor case	Duodenal tumor	Difficult radiologic classification and challenging pathologic differential diagnosis	Surgical resection	Postoperative histomorphology
Li et al., 2025	Rare duodenal schwannoma case	Duodenal schwannoma or GIST-like lesion	Nonspecific clinical and imaging findings; accurate preoperative diagnosis was difficult	Surgical resection	Postoperative morphology and immunohistochemistry
Oh et al., 2025	Rare inflammatory myofibroblastic tumor in the second portion of the duodenum	Duodenal tumor or inflammatory lesion	Nonspecific presentation and imaging; difficult preoperative classification	Surgical resection	Postoperative morphology and immunohistochemistry

Note: Because definitively classified duodenal smooth muscle-derived spindle cell tumors are exceedingly rare, this table primarily includes published rare non-GIST duodenal tumors that are comparable to the present case in terms of anatomical location, preoperative diagnostic difficulty, and pathological differential considerations.

Figures



(A)



(B)

Figure 1

Preoperative imaging and endoscopic findings.

(A) Contrast-enhanced computed tomography showed an approximately 6.0 × 3.8 cm soft-tissue mass posterior to the pancreatic head, with relatively homogeneous density and mild enhancement, closely related to the duodenum. Duodenal gastrointestinal stromal tumor was considered the leading preoperative diagnosis.

(B) Gastroscope showed mucosal changes in the duodenal bulb. Routine endoscopic mucosal biopsy revealed only heterotopic fundic glands with chronic inflammation and papillary epithelial hyperplasia, which did not adequately explain the nature of the deep-seated lesion.

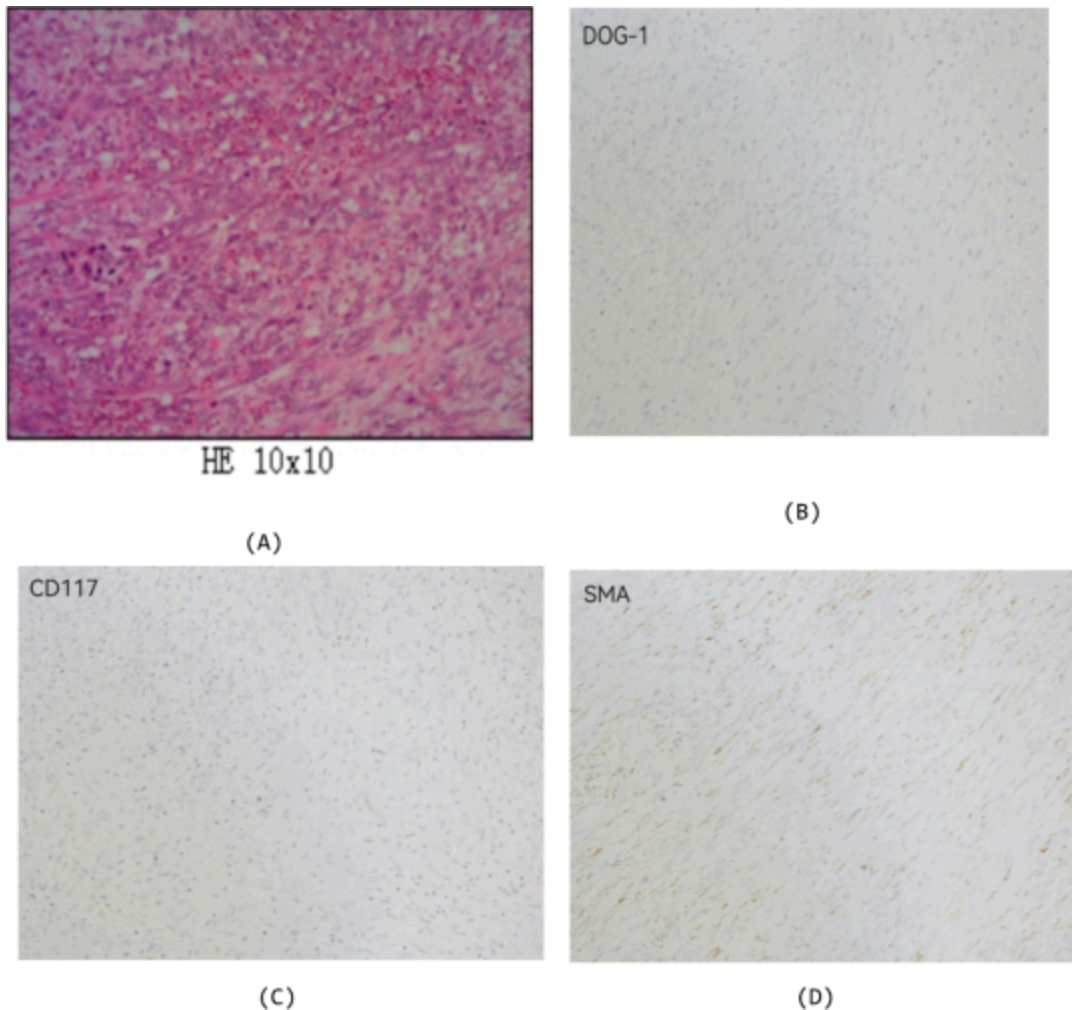


Figure 2

Histopathological and immunohistochemical findings.

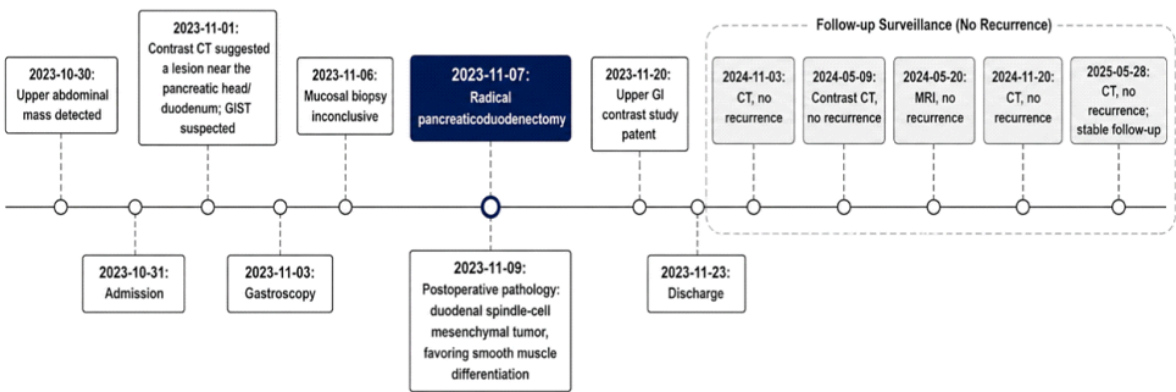
(A) Hematoxylin-eosin staining showed a spindle-cell tumor with focal fascicular or interlacing architecture, moderate atypia, and focal myxoid change.

- (B) DOG-1 staining was negative.
- (C) CD117 staining was negative.
- (D) SMA staining was positive, supporting myogenic differentiation. Taken together, these findings argued against typical gastrointestinal stromal tumor and favored a duodenal spindle cell tumor with myogenic differentiation.



(A)

Clinical Course Timeline



No recurrence during follow-up.

(B)

Figure 3

Postoperative assessment and clinical timeline.

(A) A postoperative upper gastrointestinal contrast study performed on November 20, 2023 showed no obvious anastomotic obstruction or contrast leakage, indicating a patent gastrointestinal reconstruction.

(B) Timeline of diagnosis, treatment, and follow-up. The lesion was first detected on October 30, 2023; pancreaticoduodenectomy was performed on November 7, 2023; and during follow-up, four abdominal computed tomography examinations and one abdominal magnetic resonance imaging examination showed no definite local recurrence or distant metastasis through May 28, 2025.

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