

## Duodenal subepithelial hyperechoic lesions of the third layer: Not always a lipoma

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### Abstract

Endoscopic ultrasonography is the most accurate procedure for the evaluation of subepithelial lesions. The finding of a homogeneous, hyperechoic, well-delimited lesion, originating from the third layer of the gastrointestinal tract (submucosa) suggests a benign tumor, generally lipoma. As other differential diagnoses have not been reported, echoendoscopists might not pursue a definitive pathological diagnosis or follow-up the patient. This case series aims to broaden the spectrum of differential diagnosis for duodenal hyperechoic third layer subepithelial lesions by providing four different and relevant pathologies with this echoendoscopic pattern.

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**Key words:** Endoscopic ultrasonography; Endoscopic ultrasound-guided fine needle aspiration; Duodenum; Subepithelial tumor; Lipoma

**Core tip:** This case series reports four different and relevant pathologies with an echoendoscopic pattern usually suggestive of lipoma.

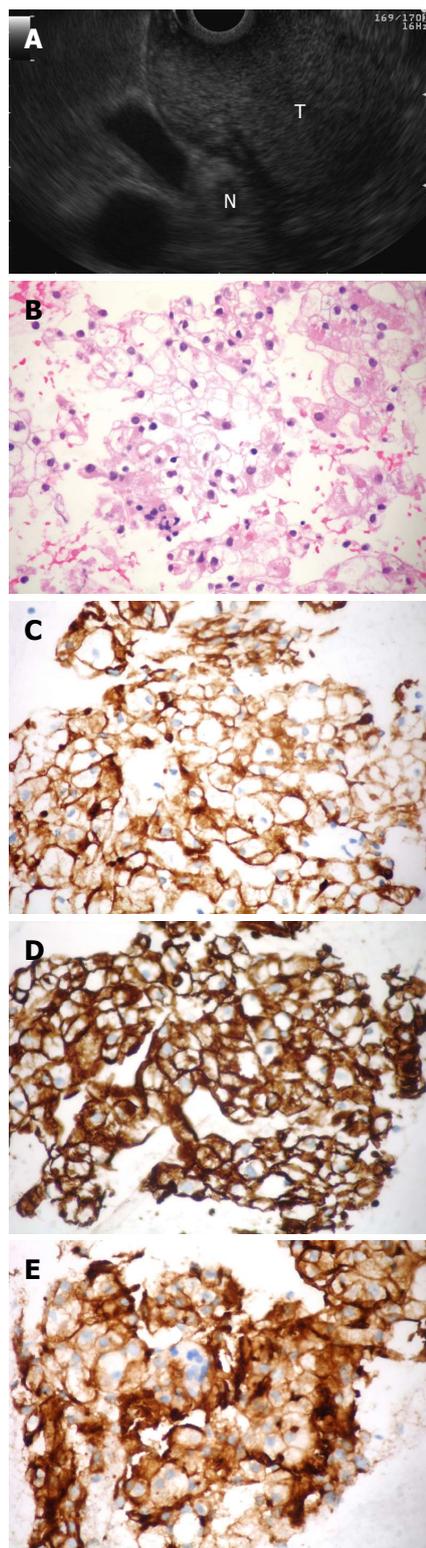
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### INTRODUCTION

Endoscopic ultrasonography (EUS) has long been considered the most accurate procedure for the evaluation of subepithelial lesions<sup>[1-3]</sup>. It provides important information, namely the layer of origin, size, borders and echogenic structure. Using Doppler findings it may also differentiate vascular structures from cysts or assess the tumor blood supply. These findings allow for a presumptive diagnosis in most cases, although histopathology remains the gold standard<sup>[2]</sup>.

Gastrointestinal (GI) lipomas are benign tumors that occur anywhere along the gut, most commonly in the colon<sup>[4]</sup>. The typical EUS finding is a homogeneous, hyperechoic, well-delimited lesion, originating from the third layer of the GI tract (submucosa)<sup>[3,5]</sup>. The only differential diagnosis for this EUS pattern reported in the literature is Brunner's gland hamartoma<sup>[5,6]</sup>.

This case series aims to broaden the spectrum of



**Figure 1** Endoscopic ultrasonography and cytology findings of a renal cell carcinoma metastasis. A: Hyperechoic mass in the duodenal bulb, apparently originating from the third layer. Adjacent, a small lymph node is noted; B-E: Fine-needle aspiration cell blocks, × 400 magnification; Hematoxylin and eosin staining showing clear cell aggregates (B). Positive immunostaining for cytokeratin AE1/AE3 (C), vimentin (D) and CD10 (E): consistent with an epithelial carcinoma of renal origin.

EUS differential diagnosis for duodenal hyperechoic third layer subepithelial lesions.

## CASE REPORT

### Case 1: Renal cell carcinoma metastasis

A 58-year-old woman was admitted for melena and upper GI endoscopy revealed an ulcerated mass in the duodenal bulb. Biopsies using “bite-on-bite” technique were inconclusive. EUS with a linear echoendoscope (Olympus Medical Systems Corp., Tokyo, Japan) showed a well-delimited hyperechoic mass, apparently originating from the third layer at the bulb (Figure 1A). Fine-needle aspiration (FNA) was performed with a 22-gauge EZ Shot needle (Olympus Medical Systems Corp., Tokyo, Japan). FNA smear and cellblock sections showed clear cell aggregates with positive immunostaining for cytokeratin AE1/AE3, vimentin and CD10, which were consistent with an epithelial carcinoma of renal origin (Figure 1B-E). Three years before the patient had a left kidney nephrectomy for a Grawitz tumor and was referred for cephalic pancreatoduodenectomy to treat the disease recurrence.

### Case 2: Ampullary carcinoma

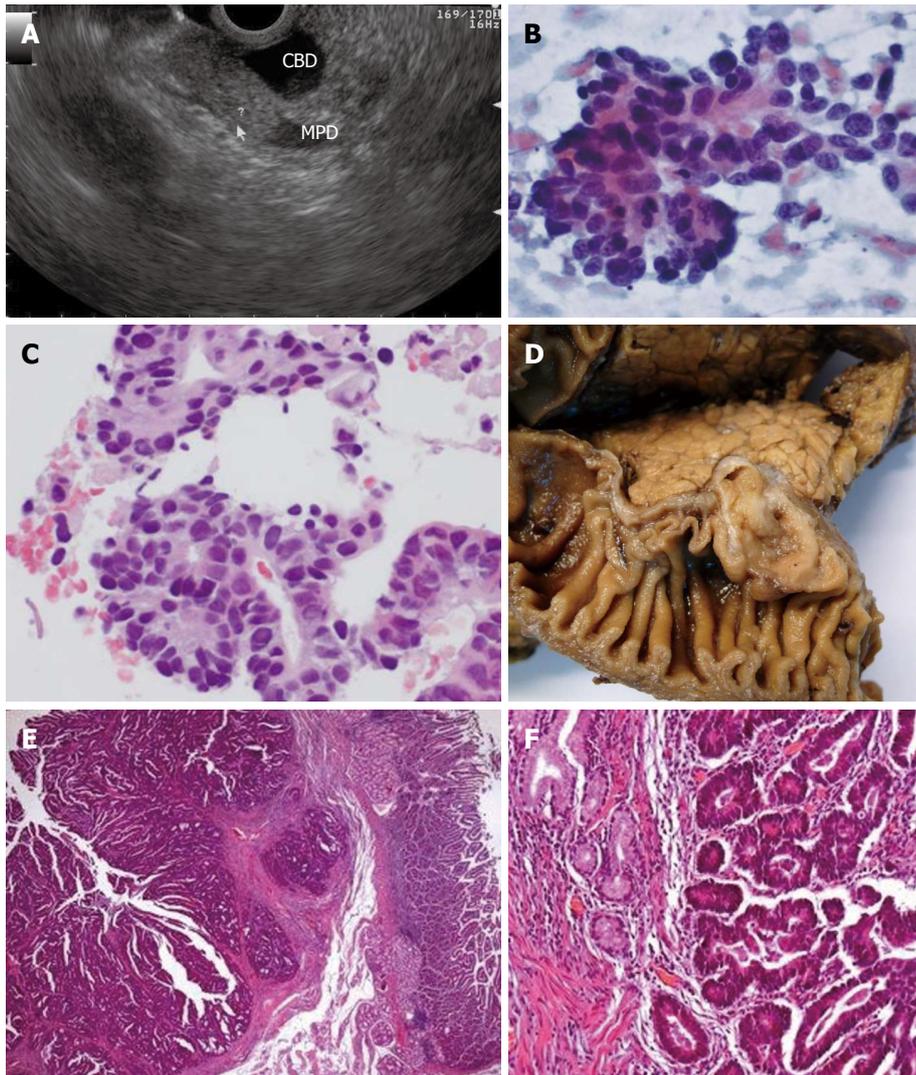
A 64-year-old man presented with jaundice at the emergency department. An abdominal US and CT scan showed dilated bile ducts down to the level of the ampullary region, where a polypoid mass was found. Using a linear echoendoscope a mildly hyperechoic homogeneous lesion was found on the duodenal submucosa, adjacent to the ampulla, compressing the bile duct (Figure 2A). FNA with a 25-gauge EZ Shot needle (Olympus Medical Systems Corp., Tokyo, Japan) retrieved a cytology sample consistent with adenocarcinoma (Figure 2B, C). The patient was submitted to cephalic pancreatoduodenectomy which confirmed the diagnosis of ampullary carcinoma (Figure 2D-F).

### Case 3: Hamartomatous duodenal polyp

A 62-year-old man was admitted for melena and upper GI endoscopy revealed an ulcerated semipedunculated polyp in the second portion of the duodenum (Figure 3A). EUS, performed using a radial echoendoscope, showed a homogeneous hyperechoic polypoid lesion originating from the submucosa (Figure 3B, C). Following polypectomy, histopathological examination unveiled fibroadipose tissue covered by intestinal mucosa, which was consistent with a hamartomatous polyp (Figure 3D).

### Case 4: Gangliocytic paraganglioma

A 51-year-old woman was submitted to an upper GI endoscopy for dyspepsia. A 20 mm subepithelial lesion was found on the posterior wall of the second part of the duodenum. On linear EUS, this was shown to be a well-delimited slightly hyperechoic lesion apparently originating from the submucosa (Figure 4A). A tissue sample was obtained using a 22-gauge ProCore needle (Cook Endoscopy Inc, Limerick, Ireland) (Figure 4B-E). Cytopathological examination suggested a possible gastrointestinal stromal tumor (GIST) which led to the decision to perform endoscopic resection (Figure 4F). Further



**Figure 2** Endoscopic ultrasonography and pathological findings of an ampullary carcinoma. A: Mildly hyperechoic third-layer lesion adjacent to the ampulla, compressing the bile duct; B, C: Fine-needle aspiration,  $\times 400$  magnification; B: Smears with acinar groups, irregularly distributed nuclei, coarse chromatin, conspicuous nucleoli (Papanicolaou); C: Cell-block preparation of aspirated sample [hematoxylin and eosin (HE)]; D: Surgical pathology specimen confirming the full excision of an ampullary carcinoma; E: Ampullary area well-differentiated adenocarcinoma, HE  $\times 25$ ; F: HE  $\times 100$ .

histopathological analysis of the resected tumor brought about another diagnosis-gangliocytic paraganglioma (Figure 4G-I).

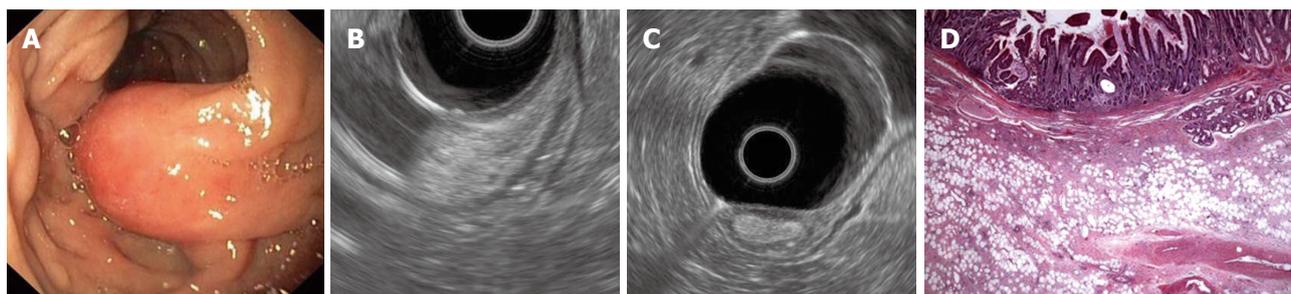
## DISCUSSION

Although EUS does not provide gastroenterologists with a definitive diagnosis for subepithelial lesions, the ultrasonographic findings and knowledge of the epidemiology allow for an educated guess in many situations. This, along with the likelihood of malignancy, guides management decisions regarding biopsy and resection.

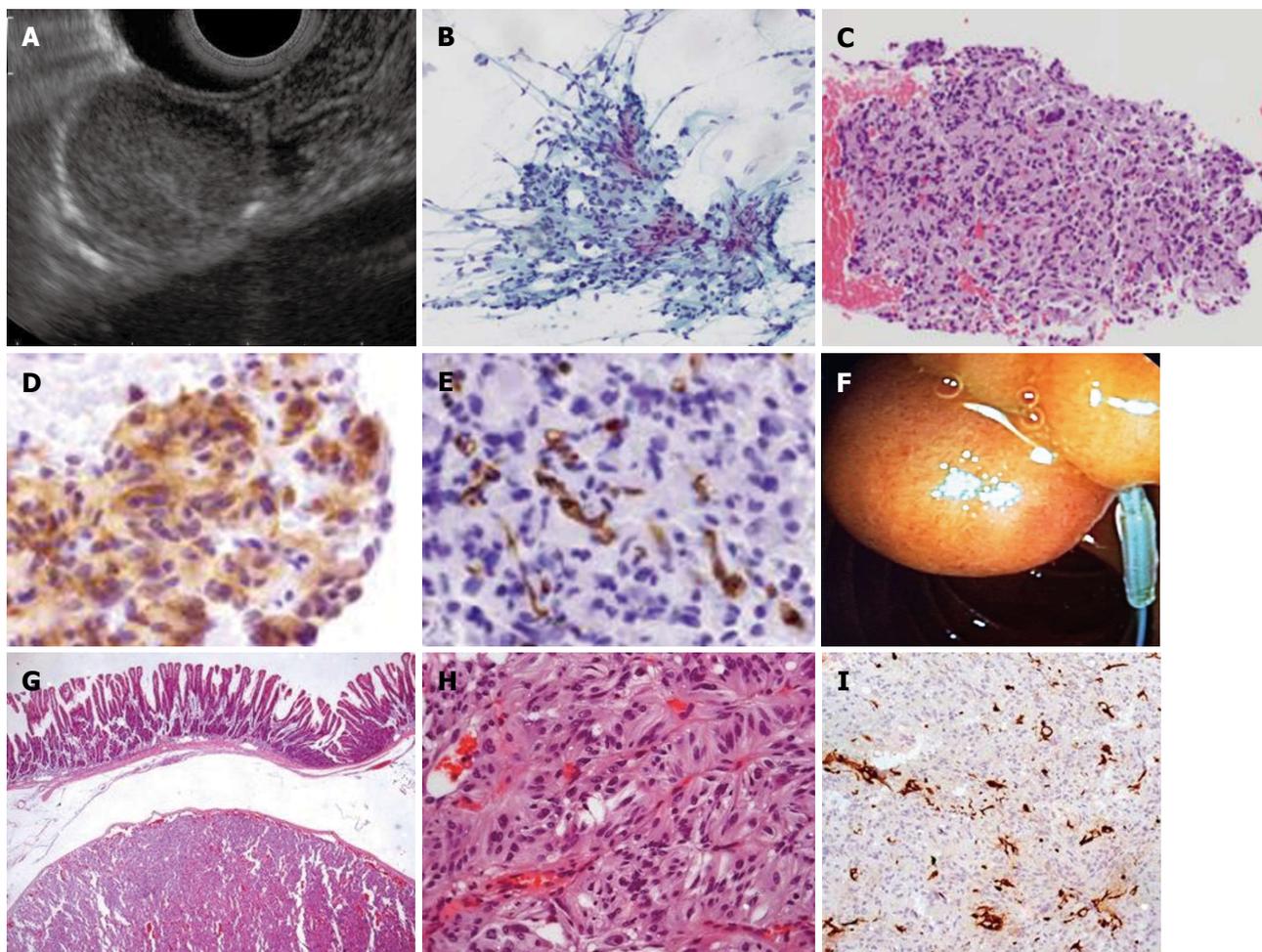
Both lipomas and Brunner's gland hamartomas are regarded as benign tumours, which are usually asymptomatic<sup>[7,8]</sup>. Given their benign nature, treatment is only recommended if they become symptomatic<sup>[9]</sup>. Moreover, in the absence of other differential diagnosis for hyperechoic lesions of the third layer of the GI tract, the ecoendoscopist might be tempted not to obtain a tissue sample or even not follow-up the patient.

In our case series, two subepithelial lesions presented with bleeding and a third one with jaundice. EUS favored the diagnosis of lipoma in all of these lesions and resection was required. In the first two cases, surgery was the preferred approach due to the tumors characteristics-size, ulceration and location. The surgical team required a histopathological evaluation to confirm the diagnosis and establish the therapeutic strategy, therefore EUS with FNA was performed. In the third case, the tumor was pedunculated and endoscopic resection was feasible, thus FNA was not required.

The fourth case was an incidental lesion. EUS features were felt suspicious for lipoma although the pattern was not typical. Based on these findings and our prior experience with the first three cases, a FNA was performed. The diagnosis was GIST, which is a fairly uncommon diagnosis in the third layer<sup>[3]</sup>. Management options were discussed with the patient and the decision for resection was based on the tumor's size (2 cm), location (small bowel confers worse prognosis) as well as the



**Figure 3** Endoscopic, endoscopic ultrasonography and pathological findings of hamartomatous polyp. A: Semipedunculated polyp in the second portion of the duodenum; B: Longitudinal view of the polyp's stalk-originating from the duodenal wall; C: Top of the polypoid lesion-cross-sectional view; D: Hamartomatous polyp, HE  $\times 25$ .



**Figure 4** Endoscopic, endoscopic ultrasonography and pathological findings of gangliocytic paraganglioma. A: Slightly hyperechoic lesion of the third layer of the duodenal wall; B-E: Endoscopic ultrasonography-fine needle aspiration with cytological features suggestive of GIST; B: Few fragments of loose mesenchymal spindle cell tissue fragments (Papanicolaou staining  $\times 100$ ); C: Cell block preparation of aspirated material, discrete nuclear atypia [Hematoxylin and eosin (HE)  $\times 100$ ]; D: Most cells stain positive for CD117 ( $\times 400$ ); E: Rare cells stained with CD34 ( $\times 400$ ); F: Resection of the subepithelial lesion using endoloop; G-I: Histopathological analysis of the resected tumor; G: Duodenal gangliocytic paraganglioma (HE  $\times 25$ ); H: Duodenal gangliocytic paraganglioma (HE  $\times 200$ ); I: Sustentacular S-100 positive cells documented (S100  $\times 100$ ). GIST: Gastrointestinal stromal tumor.

patient's wish<sup>[10]</sup>. The surgical specimen pathology report showed the lesion to be a gangliocytic paraganglioma—an exceedingly rare entity<sup>[11]</sup>. Previous EUS reports described it as a hypoechoic or isoechoic homogeneous lesion, in the proximity of the duodenal papilla<sup>[12,13]</sup>. Its characteristic triphasic microscopic appearance (epitheli-

oid cells, spindle cells, and ganglion cells) histological appearance might account for our inability to differentiate it from a GIST on FNA<sup>[14]</sup>.

In conclusion, this case series presents relevant and previously unreported differential diagnosis for duodenal hyperechoic subepithelial lesions in the third layer.

The EUS operator should always take time to assess the transition zone to assess the layer of origin and, in our opinion, have a low threshold to perform FNA, namely, if the EUS features are felt not typical.

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