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Case Report

Gastric ectopic pancreas in magnetic resonance imaging: A review of 2 cases ☆

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ABSTRACT

Gastric ectopic pancreas (EP) is an uncommon congenital anomaly in which pancreatic tissue with no anatomic connection to the main pancreas is found in the stomach. Gastric EP is often discovered incidentally when a nonspecific submucosal tumor is found in endoscopic studies or other imaging examinations. Tissue characterization by biopsy or fine-needle aspiration is required as endoscopic findings alone cannot exclude malignancy. The authors present 2 cases of gastric EP incidentally detected on endoscopy, which underwent further characterization by magnetic resonance imaging (MRI). In both cases, MRI showed submucosal gastric lesions, isointense to the orthotopic pancreas in all sequences, including hyperintensity on T1-weighted images. Furthermore, the lesions showed bright arterial phase enhancement, paralleling the native pancreas. MRI may provide the best non-invasive imaging method for evaluating gastric submucosal lesions. This report intends to show that EP shows a characteristic MR appearance that allows differentiation from other submucosal lesions.

Introduction

Ectopic pancreas (EP) is an infrequent congenital anomaly defined as pancreatic tissue located outside its usual location, with no anatomic, neural, or vascular continuity with the main pancreas. The incidence is 0.25%-13.7% in autopsy studies. The most common site is the gastrointestinal tract (90%), specifically the stomach (24%-38%), duodenum (9%-36%), and jejunum (0.5%-27%) [1,2]. Gastric EPs are most frequently in the antrum (85%-95%), in the submucosal layer (73%), or, less commonly, in the muscular (17%) or subserosal (10%) layers [2].

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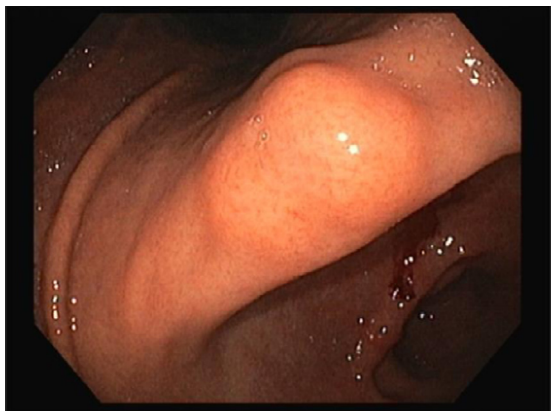

Fig. 1 – Gastric ectopic pancreas on endoscopy (patient A). Endoscopic image displaying an ill-defined subepithelial lesion in the angular notch.

EP is often diagnosed incidentally and less frequently after complications, such as inflammation, bleeding, obstruction, or malignant transformation. Differentiating EP from other submucosal lesions can be tricky in endoscopic studies [3]. Invasive approaches, such as endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA), are generally safe but not exempt from complications [2].

The histologic classification was first described by Heinrich in 1909 and revised in 1973 by Fuentes [4]. Type 1-EP refers to tissue consisting of all normal pancreas components; type 2-EP refers to tissue with ducts only; type 3-EP with acini only; and type 4-EP with islet cells only [5].

We present 2 patients with histologic proof of gastric EP and review the value of magnetic resonance imaging (MRI) in these gastric masses' characterization.

Case reports

Patient A is a 64-year-old man with a past medical history of gastric ulcer and grade A esophagitis. An upper endoscopic examination found a 15 mm gastric subepithelial lesion (Fig. 1). Biopsies revealed a fragment of exocrine pancreatic tissue with small ductal units suggesting EP. Imaging correlation was recommended to establish a definite diagnosis. EUS confirmed the tumor's subepithelial localization. MRI showed a subepithelial gastric lesion with lobular contour localized in the incisura angularis, with high signal intensity (SI) on T1-weighted images (WI) and arterial hyper-enhancement, resembling the native pancreas (Fig. 2).

Patient B is a 44-year-old woman admitted to the hospital for recurrent abdominal pain, nausea, and vomiting. Physical examination and routine blood tests were unremarkable. Gastroduodenal endoscopy revealed an oval-shaped submucosal mass along the lesser curvature of the stomach. The patient underwent MRI that showed a submucosal lesion with high SI on T1-WI and arterial hyper-enhancement, paralleling the native pancreas (Fig. 3). Gastric EP was suggested as the most likely diagnosis. Histologic specimen confirmed ectopic pancreatic tissue.

Discussion

EP usually presents as a nonspecific subepithelial lesion, occasionally with a central dimpling caused by a duct's opening [4]. EUS is helpful in the diagnosis of EP, allowing the delineation of individual layers of the GI wall and, thus, the most likely tumor origin site and tissue characterization. Contrast-enhanced computed tomography (CT) aids in diagnosing EP, relying on a combination of findings of flat ovoid morphology, ill-defined border, endoluminal growth, and prominent arterial enhancement, surface dimpling, and low intralesional attenuation [6]. MRI allows superior morphologic characterization due to its high soft-tissue contrast resolution.

On MRI, EP generally appears isointense to the orthotopic pancreas in all sequences. This feature is critical. In contrast to other submucosal gastric lesions, EP shows a characteristic precontrast high SI on T1-WI [7], typically seen in the native pancreas, due to the T1 shortening effect of acinar protein within the normal exocrine pancreatic gland. Arterial hyperenhancement is characteristic. Previous studies showed that the grade of enhancement might correlate with the histologic type [8]. Type 1-EP shows similar enhancement to the native pancreas, while type 2-EP may show less arterial enhancement, and type 3-EP show increased portal-venous enhancement [8]. Diffusion-weighted imaging (DWI) measures the random Brownian motion of water molecules within a voxel of tissue. In basic terms, highly cellular tissues, as seen in tumor masses, exhibit water molecules' restriction (perceived as a high signal on higher b values and consequently with lower diffusion coefficients). EP shows DWI signal similar to the native pancreas, while other submucosal tumors commonly appear as hyperintense lesions on high b values [9], that is, show DWI restriction. MR cholangiopancreatography may show a duct-like structure inside the lesion ("ectopic duct" sign), perhaps best depicted in secretin-enhanced MR cholangiopancreatography [10].

Differential diagnoses encompass a wide range of mesenchymal tumors, including gastrointestinal stromal tumors (GIST), leiomyoma, lipoma, schwannoma, paraganglioma, glomus tumor, and carcinoid tumors. Additional differential diagnoses include submucosal gastric carcinoma and metastasis, mainly from melanoma, breast, lung, lymphoma, and Kaposi sarcoma [11].

GIST is the most common sub-epithelial gastrointestinal neoplasm, most often (60%-70%) in the stomach [12]. Submucosal GISTs may appear as small lesions of homogeneous low SI on T1-WI and moderately hypervascular, but not as much as EP [12]. Nearly 50% of lesions larger than 2 cm develop focal ulceration of the overlying mucosa because of pressure necrosis, a radiologic feature referred to as the bull's-eye sign.

Leiomyomas originate from either the muscularis mucosa or muscularis propria. They are rare in the stomach, almost always in the cardia. Imaging findings overlap with GIST, although leiomyomas tend to show iso-vascular enhancement [13].

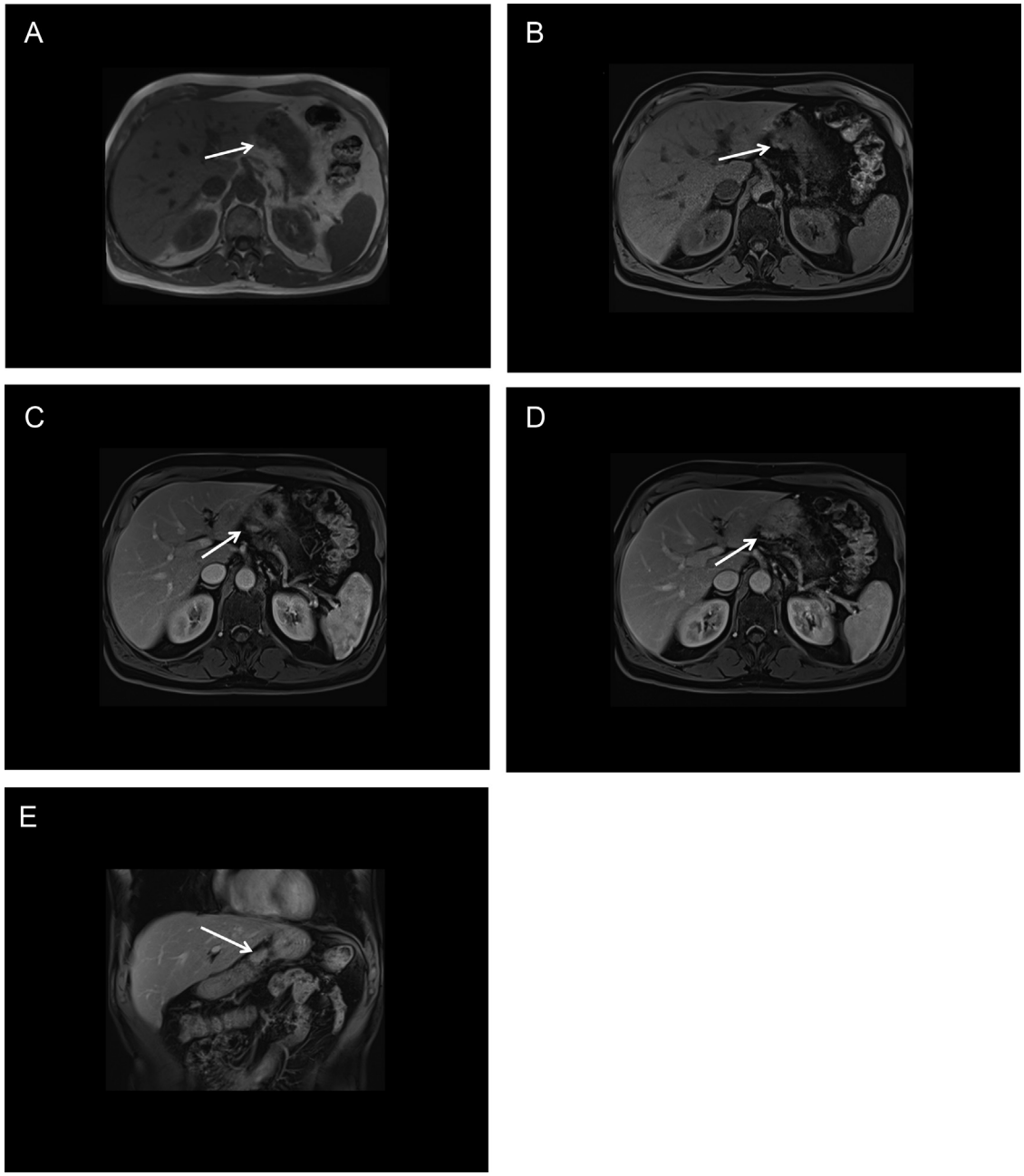

Fig. 2 – Gastric ectopic pancreas on magnetic resonance imaging (patient A). Magnetic resonance images: Axial T1-weighted in-phase (A), fat-suppressed T1-weighted precontrast (B), fat-suppressed T1-weighted postcontrast (arterial, C and venous, D) sequences and fat-suppressed T1-weighted postcontrast in the coronal plane (E) showing a subepithelial lesion (arrow) with precontrast high T1 signal intensity and a hypervascular enhancement.

Lipomas are composed of mature fat with a surrounding fibrous capsule [14]. Lipomas are easily diagnosed due to their SI, which parallels fat on all sequences. Fat suppression is especially useful in verifying the presence of macroscopic fat while rendering the characteristic high SI on T1-WI of pancreatic parenchyma in EP more conspicuous, as seen in the presented cases.

Schwannoma is a nerve sheath tumor that accounts for 2%-7% of gastrointestinal mesenchymal tumors, allegedly arising from the myenteric plexus within the muscularis propria. The stomach is the most common site (60%-70%) [15], demonstrating an exophytic or intramural growth pattern. They are characteristically homogeneous with high SI on T2-WI- and low SI on T1-WI and show minimal arterial enhancement and increased delayed enhancement [9].

Gastric paragangliomas are rare and, like paragangliomas in other locations, show high SI on T2-WI, sometimes called "light bulb." Their vascularity is variable [16].

Glomus tumors originate from modified smooth-muscle cells of peri-vascular glomus bodies. Gastric involvement is

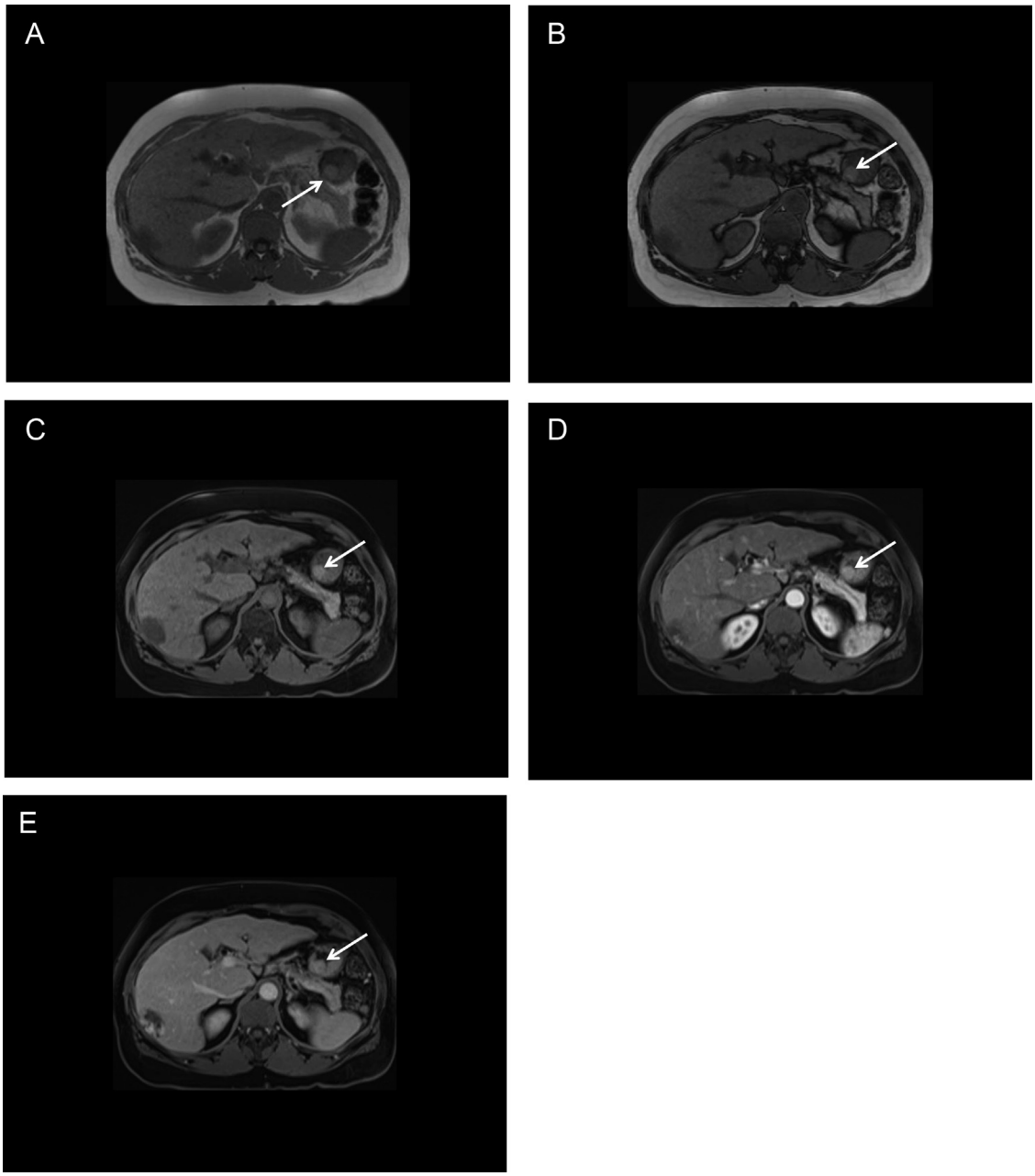

Fig. 3 – Gastric ectopic pancreas on magnetic resonance imaging (patient B). Magnetic resonance images: T1-weighted in-phase (A), T1-weighted out-of-phase (B), fat-suppressed T1-weighted precontrast (C) fat-suppressed T1-weighted postcontrast (arterial, D and venous, E) sequences in the axial plane showing a subepithelial nodule (arrow) which remains isointense to the normal pancreatic tissue in the precontrast sequences and enhances similarly after contrast administration. A liver hemangioma is depicted in segment VI.

extremely rare. Classically, they show high SI on T2-WI and hemangioma-like enhancement [17].

Carcinoid tumors are well-differentiated neuroendocrine tumors that belong to the category of amine-precursor uptake decarboxylase tumors, or "APUDomas." These tumors occur most frequently in the gastrointestinal tract; however, gastric carcinoid tumors are rare, accounting for 1.8% of all gastric malignancies [18]. Often the bulk of the tumor is submucosal. When nodular, they typically appear with low SI on T1-WI and arterial hyper-enhancement.

Metastatic lesions should be suspected based on patient history, and imaging appearance varies according to the primary malignancy. Melanoma metastasis deserves particular note as they may show high SI on T1-WI due to the melanocytic content [19], with a distinct enhancement pattern and increased restriction on DWI compared to EP.

Gastric adenocarcinoma showing submucosal tumor features is exceptionally uncommon, and its prevalence is between 0.2% and 0.62% [20]. These tumors characteristically show low SI on T1-WI and intermediate SI on T2-WI, as well as hypovascular enhancement.

In conclusion, MRI is an invaluable tool for the differential diagnosis of submucosal gastric lesions. It is particularly helpful in recognizing EP, which typically shows high SI on T1-WI, not seen in other lesions, without restriction diffusion, and a hypervascular behavior that parallels the native pancreas. To date, histologic confirmation is still required.

Patient consent

The authors declare that the patients gave their explicit written and fully informed consent.

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