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Case Report

Distinct cases of gangliocytic paraganglioma in the duodenum: Two case reports ☆,☆☆

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ABSTRACT

Gangliocytic paraganglioma (GP) is a rare, benign neuroendocrine tumor that commonly arises in the second portion of the duodenum. Despite its favorable prognosis, there have been instances of lymph node and liver metastasis as well as 1 reported fatal case. The immunohistochemical and morphological resemblance between GP and neuroendocrine tumor G1 makes it critical to properly recognize and differentiate between the 2. In this article, we present 2 distinct cases of GP: a 70-year-old male with a GP tumor in the ampulla, and a 46-year-old male with a GP near the ampulla whose tumor was excised using a robotic Whipple procedure. We focus on optimizing diagnosis and management through the application of radiological modalities and pathological analysis.

Introduction

Gangliocytic paraganglioma (GP) is a rare neuroendocrine tumor (NET) that commonly arises in the periampullary portion of the duodenum [1]. The GP tumor is distinguished by its triphasic cellular distinctiveness: spindle cells, endocrine cells, and ganglion cells [2]. Despite its favorable prognosis [3], there have been several instances of lymph node and liver metastasis, 10% and 1% [4], respectively, as well as 1 reported fatal case [5]. Given the increase in the worldwide incidence of NETs [6], and their lack of mitotic activity and Ki-67 immunoreactivity [7], the immunohistochemical and morphological resemblance between GP and NET G1 [7], the latter of which has a less favorable prognosis, makes it critical to properly diagnose and differentiate between the 2. However, a conclusive GP diagnosis is challenging due to the tumor's inaccessibility and its similarities with NET G1. One useful differentiation was found to be GP's positive reactivity for progesterone receptors and pancreatic polypeptide [8], compared to NET G1's negative reactivity for both markers. In this article we discuss 2 cases of GP: 1 positioned in the ampulla, and another situated near the ampulla.

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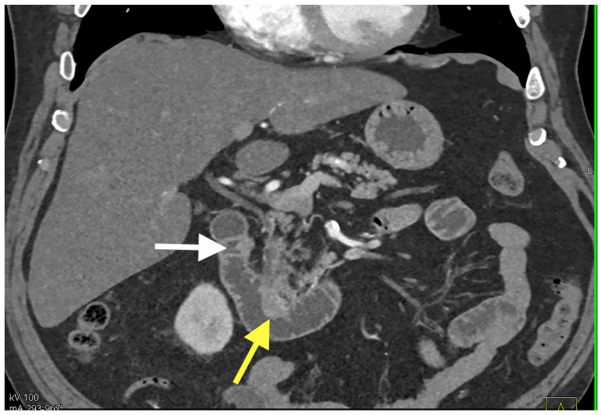
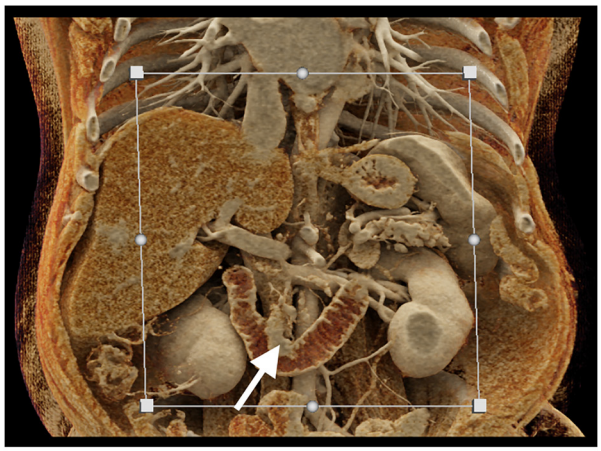


(a)



(b)

Fig. 1 – (A, B) 70 y old male presented with abdominal pain and diarrhea. Via biopsy, he was subsequently found to have a gangliocytic paraganglioma of the ampulla and duodenum. (A) Coronal image demonstrates the 1 cm nodule in the first portion of the duodenum (white arrow) and the 2.3 cm polypoid mass (yellow arrow) involving the duodenum at the level of the ampulla. (B) Cinematic rendering shows the 2.3 cm polypoid mass involving the ampulla and 2nd portion of the duodenum (arrow).

Case report 1

A 70-year-old male presented to his local hospital with diarrhea and abdominal pain. A computed tomography (CT) scan of the chest, abdomen, and pelvis revealed a 2.3 cm polyploid mass in the second portion of the duodenum at the ampulla, as well as a smaller, 1.2 cm, subtle nodule adjacent to the first portion of the duodenum. Furthermore, several arterially enhancing masses within the hepatic parenchyma of the liver were observed, most notably a 3.9 cm mass and a 3.7 cm mass on the right and left haptic lobe, respectively; no lesions were reported in the lymph nodes (Fig. 1A and B). Ultimately, following a biopsy and subsequent examination in the pathology department, the patient was diagnosed with GP. Immunostains in the final pathology report showed that neoplastic cells were positive for synaptophysin and CD56, while negative for TTF1, CDX2, CK7, CK20, c-kit, and DOG1. Ki67 is less than 5% in neoplastic cells.

A subsequent PET/CT Ga-68 Dotatate scan performed for further evaluation of liver masses was negative for any suspicious lesions. In fact, the duodenal soft tissue lesions showed no significant avidity above background bowel activity. Approximately 3 months later, a follow-up MRI showed the liver lesions to be consistent with hepatic hemangiomas; it also showed stability of the masses in the duodenum. Given the patient's clinical improvement and stable imaging, his local surgeon recommended against Whipple surgery. The patient also had untreated cardiac comorbidities at baseline making him an unfavorable candidate for surgery.

Case report 2

A 46-year-old male presented to his local hospital with severe abdominal pain and diarrhea. A preliminary CT showed wall thickening in the distal stomach and pylorus, as well as an intraluminal duodenal lobulated mass. An ensuing esophagogastroduodenoscopy showed gastritis and a benign-appearing mass in the third portion of the duodenum. Four months later, a biopsy showed a 5 cm longitudinal bulging lesion with mild central depression and normal overlaying mucosa in the third portion of the duodenum. As a result of the tumor proximity to the major papilla (Fig. 2A–C), the individual was recommended for a Whipple procedure. Following surgery, pathology identified the tumor as a GP with 2 foci, 3.7 and 1.1 cm, involving the ampulla and duodenal submucosa, as well as the muscularis propria; there was no evidence of lymph node metastasis. Furthermore, a polyploid lesion comprised of packeted epithelioid cells, a spindled stroma, and ganglion cells was noted. Immunostains for synaptophysin, chromogranin, and cytokeratin AE1/AE3 highlighted epithelial cells, confirming neuroendocrine differentiation. Additionally, S100 and SOX-10 highlighted spindled stroma, confirming Schwannian differentiation. The patient had a complicated postoperative course, but is currently doing well following treatment.

Discussion

This article reviews 2 cases of gangliocytic paraganglioma, a rare, benign NET characterized by 3 cell types: spindle, epithelioid, and ganglion-like cells. GP commonly appears in the second and third portions of the duodenum, near the major papilla of Vater [1]. The mean age of individuals affected by GP is 53.5 years with an average tumor size of 2.6 cm, and it is slightly more prevalent in males. Common symptoms include gastrointestinal bleeding and abdominal pain (47.9% and 44.7%, respectively) [8]. Despite its favorable prognosis, there have been instances of lymph node metastasis, distant metastases, and even death, in cases involving these tumors [4,5,9,10]. (Please see references 4, 5, 9, and 10 for further reading on PG tumors in the duodenum and metastases to other organs.) Given the metastatic potential of GP tumors, as well

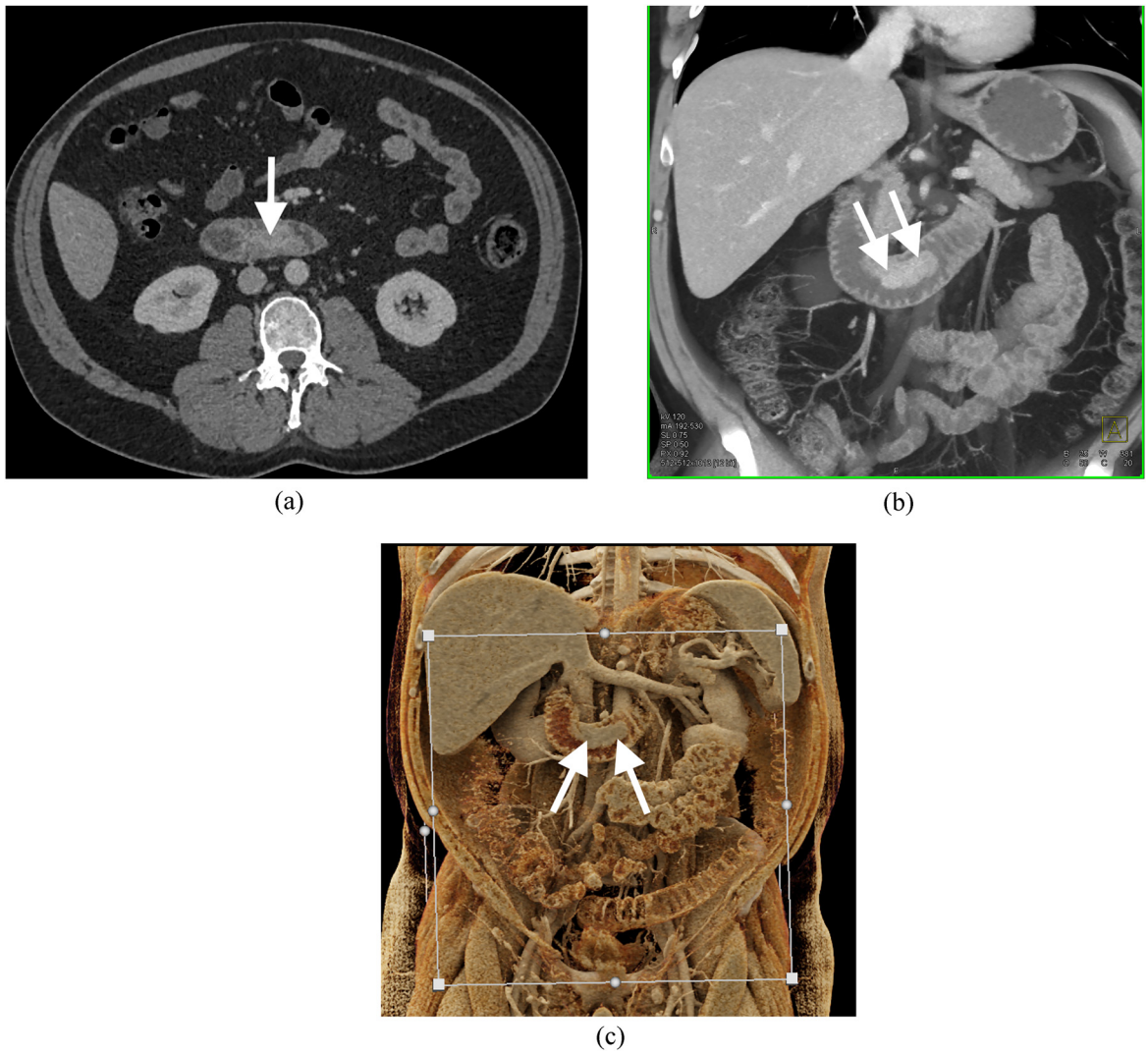


Fig. 2 – (A–C) 46 y old male presented with severe abdominal pain and diarrhea. CT imaging and endoscopy demonstrated a lobular mass of the duodenum best defined as having a polypoid-type appearance. A Whipple procedure and a subsequent pathology were performed and the patient is currently doing fine on observation. (A) Axial CT demonstrates a mass in the 3rd portion of the duodenum (arrow). (B) Coronal volume rendering of the duodenum defines the enhancing polypoid lesion off the duodenal wall (arrows). (C) 3D imaging with cinematic rendering nicely defines the intraluminal mass and its relationship to normal duodenal folds (arrows).

as the morphological and immunohistochemical similarities between GP and NET G1 [7], it is critical to properly diagnose GP tumors.

We report a 70-year-old male who presented with complaints of abdominal pain and diarrhea, which are common symptoms associated with GP. The patient underwent an endoscopic ultrasound biopsy, which showed a NET; however, upon analysis of the immunohistochemical findings, the tumor was identified as a GP tumor in the small intestine, with arterially enhancing masses within the liver. This finding is consistent with 1% of GP cases displaying liver metastasis [4].

Preoperative diagnosis of GP is complicated due to its rareness, as well as similarity to other numerous submucosal tumors. Moreover, the diagnostic rate by biopsy prior to surgical intervention is only 11.4%; therefore, it is evident that preoperative endoscopic ultrasound findings are crucial for proper differential diagnosis as well as treatment [7,9]. Fortunately, follow-up PET/CT Ga-68 Dotatate and MRI studies identified liver lesions as hepatic hemangiomas. Given that the masses in the first and second portions of the duodenum were unchanged due to the nature of GPs, and the surgeon's recommendation against a Whipple procedure due to cardiac issues, it was determined that as long as there was no obstruction of the bile duct or pancreatic duct resulting in pancreatitis, jaundice, or diabetes, surgery could be delayed.

On the other hand, our second case is an example of a postoperative definitive diagnosis of GP. We also present a 46-year-old male who underwent a Whipple procedure followed by a pathological diagnosis of GP. The patient was experiencing extreme abdominal pain and diarrhea, and a subsequent biopsy and CT suggested the presence of a NET in the second and third portions of the duodenum. Despite GP's low

incidence of metastasis and pancreaticoduodenectomies being a more common option in the presence of possible malignancy, the individual was recommended for the more radical approach of a Whipple procedure due to the tumor's proximity to the major papilla and the low recurrence of disease following complete surgical resection. Following surgery, sections showed a polyploid lesion comprised of packeted epithelioid cells, a spindled stroma, and ganglion cells, all of which are commonly associated with GP. Despite a notable postoperative course due to slow return of bowel function, intra-abdominal fluid collection, and thrombosis of the superior mesenteric vein, the patients have been in remission for 2 years.

The CT appearance of the duodenal masses in these 2 cases were interesting and could be confused with adenocarcinoma or potentially carcinoid or a GIST tumor. The MPR and 3D maps outlined the tumors and helped with preoperative planning of tumor extent.

Patient consent

The patients reported in the manuscript signed the informed consent/authorization for participation in research which includes the permission to use data collected in future research projects including presented case details and images used in this manuscript.

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