Case Report

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Gastric glomus tumor with a rare presentation: a case report and review of the literature

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Introduction and importance: Gastric glomus tumors (GGT) are rare soft tissue tumors of the gastrointestinal tracts (GIT). It is somewhat challenging to establish the diagnosis of GGT and differentiate it from the more common submucosal neoplasms.
Case presentation: A 34-year-old female patient presented with upper gastrointestinal bleeding. Extensive workup including endoscopic ultrasonography (EUS) revealed a well-circumscribed isoechoic mass arising from the muscularis propria. Based on fine needle biopsy (FNB) findings, with H&E stains performed only initially, the mass was considered a neuroendocrine tumor (NET). Antrectomy with Billroth II anastomosis was performed. A microscopic and immunohistochemical studies of the resected specimen showed the cells to be positive for smooth muscle actin (SMA) making GGT the final diagnosis.
Clinical discussion: Of the 116 patients included in our analysis, 56.9% ($n = 66$) were females and age group was between 41 and 64 years old in 63.8% ($n = 74$) of the patients. About 55 cases (47.4%) had abdominal or epigastric pain or discomfort, which was the most frequent clinical symptom. In immunohistochemistry, SMA staining is present in 68.1% of the cases, underscoring its diagnostic significance. Laparotomy with wedge or partial gastrectomy was employed in 46.1% of the recorded cases. Due to malignant potential, long-term follow-up and monitoring are usually recommended.
Conclusion: Despite the rarity of GGT, they should be included in the differential diagnosis of gastric submucosal tumors, with immunohistochemistry studies playing a major role in the diagnosis. Furthermore, a comprehensive evaluation of the literature in the past 8 years was presented in a table.

Keywords: case report, epigastric pain, gastric neoplasm, glomus, submucosal mass

Introduction

Glomus tumors are rare mesenchymal tissue neoplasms that arise from modified smooth muscle cells of the glomus bodies, a neuro-arterial structure, and account for nearly 2% of all soft tissue tumors[1,2]. These tumors can be found anywhere in the human body; however, their most frequent site is within peripheral tissue and distal extremities[3]. Glomus tumor formation within the gastrointestinal tract (GIT) is extremely rare. They are found mainly in the stomach and particularly in the antrum[2,4]. Other rare locations include mediastinum, head and neck, and geni tourinary tract[3,4].

Since 1951, when Key and his colleagues reported the first occasion of gastric glomus tumor (GGT), a few more cases have been reported[5]. Patients with GGT may experience non-specific symptoms such as epigastric pain and upper GIT bleeding, while asymptomatic GGT has also been reported[2–4]. Due to the lack of distinct clinical and radiological features, GGT is often challenging to diagnose and difficult to distinguish from other gastric lesions such as gastrointestinal stromal tumor (GIST), neuroendocrine tumors (NET) (e.g. carci noid), and even gastric lymphoma. Therefore, immunohisto chemical staining is needed to definitively diagnose a glomus tumor[2,4].

HIGHLIGHTS

- Patients with gastric glomus tumor are commonly present with epigastric discomfort.
- This case highlights the importance of including gastric glomus tumors in a gastric mass diagnosis.
- The diagnosis of gastric glomus tumor is challenging, due to the lack of distinct clinical and radiological findings.
- Immunohistochemical staining is crucial to definitely diagnose glomus tumor.

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Herein, we report a rare case of a 34-year-old female patient who presented with a highly suspected NET and was diagnosed later with GGT after complete surgical excision. A literature review is provided, and significant diagnostic pitfalls are pointed out to avoid misdiagnosis. This case report has been reported in line with the SCARE, Supplemental Digital Content 1, http://links.lww.com/MS9/A629 criteria[6].

Case presentation

A 34-year-old Arab female with upper GIT bleeding was referred to our hospital for further evaluation after an endoscopy performed at Al-Shifa Hospital in Gaza Strip three months prior to referral revealed a gastric antral submucosal mass. An enhanced abdominal computed tomography (CT) with IV contrast was done at Al-Shifa Hospital showing a soft tissue mass measuring 2.5×3.5×3 cm arising from the gastric antrum. The mass showed heterogeneous enhancement in the arterial phase and almost homogeneous intense enhancement with small central necrosis in the venous phase (Fig. 1A). There was no radiological evidence of lymphadenopathy or metastasis.

Over the past 4 months before referral, the patient has complained of epigastric pain that radiates to the back, associated with constipation and multiple episodes of black stool. Additionally, she specified an inability to keep up with her daily activities due to headaches, fatigue, and dizziness. She denies any significant weight loss. The patient's medical history includes hypothalamic hypogonadism, for which she doesn't take any medications. The patient's past surgical and family history were unremarkable with no history of cancer or genetics in the family. The patient was not taking any chronic medications. The patient finished high school. She is married

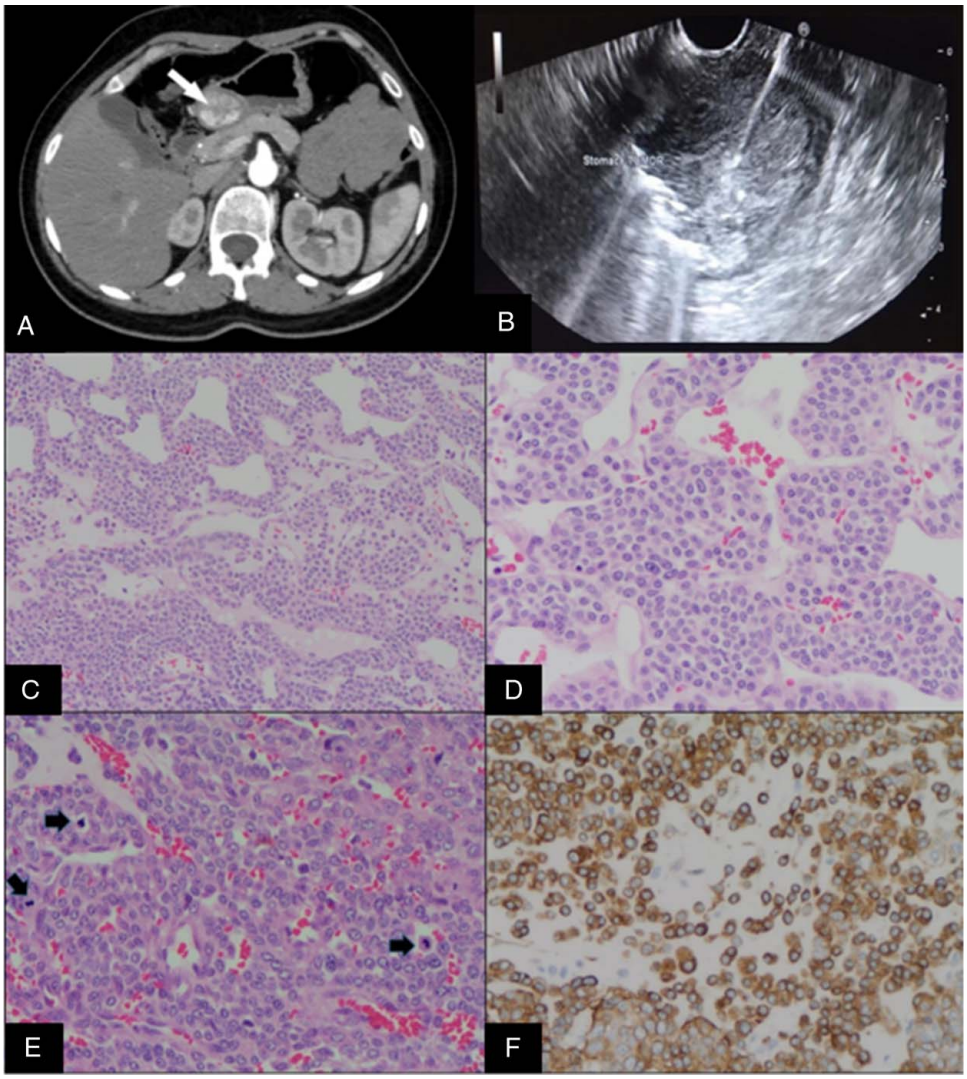

Figure 1. (A) Computed tomography-abdomen: Soft tissue mass (white arrow) arising from the gastric antrum with heterogeneous enhancement in the arterial phase; (B) Endoscopic ultrasonography: a well-defined rounded isoechoic mass in the gastric antrum; (C) Cellular tumor composed of round monotonous cells with slightly dilated vascular spaces in the background [hematoxylin and eosin (H&E), ×10]; (D) The tumor cells show indistinct borders with amphophilic to eosinophilic cytoplasm, rounded nuclei, and inconspicuous nucleoli (H&E, ×20); (E) Certain areas show increased mitotic activity (black arrows) (H&E, ×20); (F) The tumor cells are positive for smooth muscle actin by immunohistochemistry (×20).

Table 1

Patient information and details of investigations done.

Demographics	
Age	34 years old
Sex	Female
Place of residence	Gaza, Palestine
Ethnicity	Arab
Medical history	
Chief complaint	Upper GI bleeding
Past medical history	Hypothalamic hypogonadism
Past surgical history	Unremarkable
Family history	Unremarkable
Allergies and medications	None
Physical examination	Unremarkable except for looking pale
Vital signs	Stable
Investigations	Result
Complete blood count	
RBC	3.14×10^6/μl
HGB	7.4 g/dl
HCT	23.24%
MCV	72 fl
MCH	27 pg
MCHC	32.2 g/dl
RDW	18.5%
WBC	9.3×10^9/l
PLT	299 000 /mm^3
Coagulation profile	
PTT	32.3 s
PT	12.2 s
INR	0.9
Electrolyte panel	
Na, K, Ca	Within normal range
Albumen	Within normal range
Liver enzymes	
AST, ALT	Within normal range
Amylase	82 U/l
Total bilirubin	Within normal range
Renal function tests	
BUN	15 mg/dl
Cr	0.6 mg/dl
Random blood glucose	83 mg/dl
Thyroid function tests	
T3, T4, TSH	Within normal range
Urinalysis	Nothing significant
Metabolic panel	
Ammonia	Within normal range
Lactic acid	Within normal range
CT scan with IV contrast	2.5×3.5×3 cm mass arising from the gastric antrum
Esophagogastroduodenoscopy	Ulcerated antral submucosal mass with a bleeding vessels
Endoscopic ultrasonography	Isoechoic mass was identified measuring about 34×32 mm with a well-defined border originating from the gastric muscularis propria layer
FNB pathological examination	A cluster of monomorphic cells with plasmacytoid features and bland nuclei with salt and pepper chromatin
Immunohistochemistry	Positive for SMA
Treatment plan and follow-up	Normal
Treatment provided	Billroth II
Follow-up results	No recurrence at 2 years

ALT, alanine aminotrasferase; AST, aspartate aminotrasferase; BUN, blood urea nitrogen; CT, computed tomography; FNB, fine needle biopsy; GI, gastrointestinal; HGB, hemoglobin, HCT, hematocrit; INR, international normalized ratio; MCH, mean corpuscular hemoglobin; MCHC, mean corpuscular hemoglobin concentration; MCV, mean corpuscular volume; PLT, platelet; PT, prothrombin time; RBC, red blood cell; RDW, red cell distribution width; SMA, smooth muscle actin; TSH, thyroid-stimulating hormone; WBC, white blood cell.

and is a housewife. She has two children, does not smoke or drink alcohol, and does not take illicit drugs.

On physical examination, the patient looked pale. Her abdomen was soft without palpable masses or organomegaly. Apart from microcytic hypochromic anemia (hemoglobin 7.4 g/dl and hematocrit 23.24%), further laboratory tests were within normal limits (Table 1). Upon admission, two units of blood were transfused to the patient to correct her anemia.

On the fourth day of admission, the patient underwent esophagogastroduodenoscopy (EGD) performed by our endoscopy and gastroenterology team, which showed an ulcerated antral submucosal mass with a bleeding vessel to which one clip was applied. Upon subsequent endoscopic ultrasound (EUS), an isoechoic mass was identified measuring about 34×32 mm with a well-defined border originating from the gastric muscularis propria layer (Fig. 1B). Fine needle biopsy (FNB) pathological examination showed a cluster of monomorphic cells with plasmacytoid features and bland nuclei with salt and pepper chromatin that are mostly consistent with a well-differentiated NET.

After a discussion of different treatment measures with the patient, she underwent open laparotomy with antrectomy and Billroth II anastomosis. The procedure was done by the surgical team of Al-Ahli Hospital. A gross examination of the excised specimen described a 3×2×2 cm well-defined mass with associated ulceration of the overlying mucosa. Microscopic sections showed a cellular tumor composed of monotonous round cells with a moderate amount of cytoplasm. By immunohistochemistry, the tumor cells were positive for SMA while negative for CD34, DOG1, chromogranin, and synaptophysin; hence a diagnosis of GGT was confirmed (Fig. 1C-F). A repeat expanded immunohistochemical analysis of FNB specimens further validated the presence of a glomus tumor. The patient's postoperative period was uneventful, and a 2-year follow-up revealed no evidence of recurrence.

Before being diagnosed, the patient experienced significant anxiety and distress, primarily due to her doctor referring her for further evaluation outside Gaza where comprehensive care and specialized treatments are not universally accessible, and due to the fear of potentially having cancer. Upon referral to our hospital, the patient expressed gratitude for the thorough and compassionate care she received, particularly appreciating the skill and professionalism of the physicians. Two years following her surgery, the patient reflected positively on her experience. The successful removal of the tumor and the lack of recurrence brought her significant comfort and satisfaction. The patient's experience underscores the importance of not only providing expert medical care but also addressing the emotional and psychological needs of patients facing rare and challenging diagnoses.

Discussion

Glomus tumors are rare soft tissue tumors arising from the glomus bodies and frequently found within peripheral tissues, distal extremities, and rarely in visceral organs[4,7,8]. GGT specifically is extremely rare, contributing to only 2.2% of all gastric tumors and 1% of gastric mesenchymal tumors[4,8]. This makes GGT diagnosis somehow challenging, as they are frequently mis diagnosed with other more common tumors, especially GIST and NET[9–11].

The data reported in the literature showed that Key and his colleagues reported this entity for the first time in 1951, and about 206 cases were reported after the year 2000[2,4,10,12–80]. A thorough literature review was done by our team including cases published since 2016. Most of the cases reported before 2016 were either only abstract or were adequately reported with no data, so we chose to only include reported cases after 2016. Only case reports published regarding GGT were included in our search. We searched PubMed and Embase with the following keywords used: gastric glomus tumor, glomus, glomus tumor, and case report. Further information regarding our represented tables are available in a supplementary data set (Supplementary file), Supplemental Digital Content 2, http://links.lww.com/MS9/A630.

Of the 116 patients included in our analysis, the majority of the cases, 56.9% ($n=66$), were females and the age of presentation was between 41 and 64 years old in 63.8% ($n=74$) of the patients. The distribution of younger patients (≤ 41 years) and older patients (≥ 65 years) was relatively fairly equal, with 17.2% ($n=20$) and 18.1% ($n=21$), respectively. GGT was located in the gastric antrum in 60.4% of the cases and the lesser curvature in 12.1%. Other affected sites included the body of the stomach, greater curvature, and corpus.

Regarding the presentation, 47.4% of the cases had abdominal or epigastric pain or discomfort, which was the most frequent clinical symptom. Remarkably, a stomach-occupying lesion that was discovered accidentally during a physical examination was present in 15.5% of GGT patients. These findings may be related to the spread of endoscopic examination and the rise in public health awareness[21]. In addition to the rarity of GGT itself, it also rarely presents with upper GIT bleeding. This is evident in the analyzed data, where only 5.2% of the cases ($n=6$) exhibited upper GI bleeding. Other clinical manifestations included lower GIT bleeding, abdominal bulge or mass, and melena and/or anemia (Table 2). Melena and/or anemia was reported independently because some cases reported the presentation as "melena and/or anemia" and there was no way to know which cases presented with melena alone.

The tumor size, as documented on CT scan, ranged from 1.3 cm to 10.0 cm with a mean diameter of 3.32 cm. In contrast, EUS measurements revealed a mean size of 2.48 cm and a range from 0.7 to 4.6 cm. Gross examination revealed sizes ranging from 0.8 cm to 10 cm, with a mean of 2.41 cm. Regarding size, the largest diameter was considered for measurement.

GGT typically shows a mucosal protrusion on endoscopic examination and a hypoechoic submucosal or muscular mass on EUS. Furthermore, it frequently appears as a single, well-circumscribed submucosal mass with peripheral or homogeneous nodular enhancement during the arterial and portal phases on CT scan[21,23]. Given its rarity and overlapping features, we consider clinical symptoms and preoperative imaging insufficient to confirm the diagnosis of GGT. Therefore, there is a need for histopathological and immunohistochemical evaluation. GGT must be differentiated from NET, giant cell tumors, gangliomas, and clear cell leiomyomas based on their respective pathology patterns[21–24].

It's difficult to differentiate between GGT and other submucosal gastric tumors such as GIST and well-differentiated NET. Since they share similar clinical and imaging features as previously mentioned. Therefore, immunohistochemistry is vital in distinguishing these entities. Based on the WHO classification system for digestive tracts tumors[25], GGT typically appears as round glomoid cells with strong positivity for SMA. While GIST appears as spindle cells, epithelioid or mixed morphology with kit and/or DOG1 positivity in 85% of the cases. On the other hand, NET appears as a uniform population of cells with round nuclei and finely stippled chromatin; architectural patterns such as trabeculae, acini, nests, and ribbons; with the expression of synaptophysin and chromogranin A[25]. Immunohistochemistry is therefore necessary to direct accurate diagnosis and treatment of these tumors.

Tumor cells typically express SMA with abundant pericellular type IV collagen production[2,4,14]. To diagnose GGT, SMA must be positive. However, the literature shows that a number of GGTs were found to be positive for vimentin, calponin, collagen type IV, and H-caldesmon[2,4,14,15]. These markers have been also associated with NET and there has been no diag nostic criteria requiring these markers to diagnose GGT. Our patient was negative for these markers. Other markers such as desmin, CD34, cytokeratin, and S100 are usually negative in GGT[12,16]. In our case, the tumor cells were positive for SMA, a finding that is present in 68.1% of the cases, underscoring its diagnostic significance. On the other hand, the tumor cells were negative for chromogranin, CD56, DOG1, or cytokeratin AE1/AE3, which is consistent with the more widespread patterns found in the observed data. The analysis revealed that chromo granin was performed in only 30 patients and all of them expressed negative results. In contrast, DOG1 was performed in 43 cases, of which 5 were positive and 38 were negative. A total of 57 cases underwent synaptophysin testing, 37 of those cases yielded positive results, while 20 cases yielded negative results (20) (Table 2)

Regarding treatment, our patient underwent open antrectomy with Billroth II anastomosis. Comparative data from Table 2 indicates that laparotomy with wedge or partial gastrectomy was employed in 46.1% of the recorded cases. Additionally, 23.2% of patients underwent endoscopic submucosal dissection, while 15.5% had laparoscopic resection, highlighting the variety of surgical approaches used in managing this rare entity. Wide local excision is the treatment of choice for GGT. Furthermore, the type of surgical intervention whether, open, or laparoscopic, should be tailored to the tumor's location and size[4,24,26]. EUS-guided resection of GGT tumors has been reported in the literature. However, there is a significant risk of intraoperative bleeding due to the abundance of blood vessels in GGT, and also many hospitals are not aware of this endoscopic technique. Therefore, the Surgical method is preferable[26]. Due to the disease's rarity, there are currently no recognized guidelines for staging, ideal therapy, or clinical fol low-up for these tumors. However, long-term follow-up and monitoring are usually recommended as malignant potential is possible[10,24,27].

Regarding our reported case, the immunohistochemical profile of our patient's tumor, particularly being positive for SMA and negative for chromogranin and DOG1, is in line with what has been described in the literature. This supports the characterization of the tumor as a GGT, consistent with findings that emphasize SMA positivity as a key diagnostic feature. As we mentioned before, synaptophysin showed variability between cases, and in our case it was negative. This does not mean that it contradicts literature but rather confirms

the aforementioned variability. The treatment approach of open antrectomy with Billroth II anastomosis is in line with the literature, where surgical resection is the common treatment method. The lack of recurrence in the follow-up period also aligns with the general expectation of a good prognosis following adequate surgical intervention for GGT. Our case also has differences from the literature. Our presented case involves a younger patient (34 years old), which is somewhat atypical given the literature's age distribution (41–64 years old). Furthermore, upper GIT bleeding is a rare presentation of GGT and mirrors the importance of considering GGT in the differential for upper GIT bleeding, highlighting a more acute presentation compared to the more common symptomatology described in the literature.

Conclusion

Gastric glomus tumor is a rare submucosal neoplasm that mostly arises in the antral region. Abdominal CT scan and endoscopic ultrasonography are useful modalities for initial investigations. Immunohistochemical staining is essential for the definitive diagnosis because it is difficult to distinguish glomus tumors from other submucosal gastric tumors. Complete resection of the mass with negative margins or total gastrectomy is the preferred treatment option.

Ethical approval

The study is exempt from ethical approval in our institution.

Consent

Written informed consent was obtained from the patient for all procedures performed and for publication of this report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

M.T., Y.A., and H.K. performed the literature search and data collection. M.T., Y.A., H.K., and M.M. wrote the original draft of the manuscript. Y.A. performed the statistical analysis of the extracted data. S.B. contributed to immunohistochemical testing and description. All authors were involved in the critical revision of the work and approved the final version of the manuscript. Y.A. is responsible for the overall content as the guarantor.

Conflicts of interest disclosure

The authors declare no conflicts of interest.

Research registration unique identifying number (UIN)

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Guarantor

Yousef A. Alnajjar.

Data availability statement

Data are available upon reasonable request.

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