

The role of endoscopic ultrasound and endoscopic resection for gastric glomus: A case series and literature review

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ABSTRACT

Background and Objectives: Preoperative diagnosis of gastric glomus tumor is very difficult, and there are few reports regarding the endoscopic treatment of glomus tumor of the stomach. Our aim is to provide a retrospective assessment of the imaging features of endoscopic ultrasound (EUS) and treatment of choice of gastric glomus tumor. **Methods:** A database of all patients with gastric glomus tumor who was treated at Shengjing Hospital of China Medical University between March 2011 and March 2017 was retrospectively analyzed. The EUS characteristics and patients' clinical data as well as their treatment were reviewed. At the same time, we compared EUS characteristics of gastric glomus tumor with that of gastrointestinal stromal tumor (GISTs), leiomyomas, schwannomas, and ectopic pancreas. **Results:** Eleven patients (3 male and 8 female patients) were included in the present study. The patients' age ranged from 37 to 62 years (mean age, 50.1 years). Ten patients received EUS examination. Eight lesions were presented with mild-hyperechoic round or oval mass; one lesion was mild-hyperechoic oval mass with hypoechoic spots; one lesion was hypoechoic oval mass. One patient received endoscopic full-thickness resection; 3 patients were treated by endoscopic submucosal dissection; and laparoscopic resection was performed for 7 patients. **Conclusions:** Gastric glomus has typical EUS features to differentiate from other submucosal tumors. Compared with surgery, endoscopic resection is also a safe and effective treatment of choice for gastric glomus tumor.

Key words: endoscopic ultrasound, glomus tumor, endoscopic full-thickness resection, endoscopic submucosal dissection

INTRODUCTION

Glomus tumor is a rare vascular tumor originating from glomus bodies. Although most of glomus tumors occur in the distal extremities, this can also occur in any part of body.^[1] In the gastrointestinal tract, glomus tumors are most commonly located in the stomach and present as submucosal tumors.^[2] Although glomus tumors are generally benign in nature, several malignant cases have been reported.^[3-5] Most of the gastric glomus tumors are asymptomatic and are incidentally discovered; sometimes it may present with gastrointestinal hemorrhage and abdominal pain.^[6] Many glomus tumors of the stomach, however, are misdiagnosed as other mesenchymal

tumors, such as gastrointestinal stromal tumors (GISTs) and leiomyomas. Therefore, it is of paramount importance to accurately preoperative diagnose gastric glomus tumors. Endoscopic ultrasound (EUS) is a useful imaging technique for diagnosing the gastric submucosal tumors,^[7-9] but only a few case reports have been published regarding the characteristics of gastric glomus tumors.^[10]

Surgical resection is a curable treatment for gastric glomus tumor. With the development of endoscopic equipment, endoscopic methods, such as endoscopic submucosal dissection (ESD) and endoscopic full-thickness resection (EFTR), have been widely used for gastric submucosal tumors. However, there were few articles regarding

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endoscopic resection of gastric glomus tumors, which might be due to its vascular nature. Thus, our aim is to describe the typical EUS features and endoscopic resection of gastric glomus tumors.

PATIENTS AND METHODS

Patients

A database of all patients with gastric glomus tumor who were treated at Shengjing Hospital of China Medical University between March 2011 and March 2017 was retrospectively analyzed.

At the same time, we reviewed the EUS characteristics of GISTs, leiomyomas, ectopic pancreas, and schwannomas in patients. The EUS characteristics and patients' clinical data as well as their treatment were reviewed. The study was approved by the Ethics Committee of China Medical University and all the patients signed written informed consent.

Methods

Endoscopic ultrasound

All EUS procedures were performed with a linear scanning ultrasound endoscope. A single experienced endosonographer reviewed all the EUS images. The following features were recorded: location, the presence of mucosal ulceration, shape, original layer, echogenicity, the presence of marginal halos, cystic change, and calcification. At the same time, we compared EUS characteristics with that of GISTs, leiomyomas, schwannomas, and ectopic pancreas.

Treatment

ESD

All ESD procedures were performed with propofol sedation and continuous cardiorespiratory monitoring. ESD was performed as follows: the circumferential of the tumor was marked by argon plasma coagulation (APC), and then, a cushion was made by injection of a mixed solution consisting of 100-mL saline and 1-mL indigo carmine. After the mucosa incision was made, dissection of the tumor was made. The hemostasis was performed by electric cautery or APC.

EFTR

The peritumor gastric tissues were incised, and then, the tumor and peritumor gastric tissues were gradually resected in full thickness and electric cautery was used for hemostasis. Then, the tumor was completely removed. Metallic clips or over-the-scope clip was used to close the iatrogenic perforation.

Laparoscopic resection and surgical resection

Laparoscopic resection and surgical resection were performed as previously reported.

Postoperative follow-up

Patients were suggested for the follow-up at 1, 3, 6, and 12 months after resection and annually thereafter to observe the wound healing and any residual tumor or recurrence.

RESULTS

Clinical data of patients

The clinical data for 11 patients (3 male and 8 female patients) were included in the present study and were summarized in table 1. The patients' age ranged from 37 to 62 years (mean age, 50.1 years). Seven patients had epigastric discomfort, two patients had abdominal pain, one patient had abdominal distension, and one patient presented as upper gastrointestinal bleeding.

The characteristics of the lesion and EUS findings

Ten patients received EUS. The EUS characteristics of 10 patients with gastric glomus tumors was presented in Table 1. Nine lesions were located in antrum and two tumors were found in the gastric body. All the lesions presented as a submucosal tumor and one lesion had an ulcer on its surface (Figure 1), leading to hemorrhage. The maximum size of tumors ranged from 10 to 35 mm with mean size being 19 mm. Nine lesions were from fourth layer, and one lesion was from third and fourth layers. Eight lesions were presented with mild-hyperechoic round or oval mass (Figure 2); one lesion was mild-hyperechoic oval mass with hypoechoic spots; one lesion was hypoechoic oval mass with a clear border. Ten patients with gastric GISTs located in gastric antrum, 10 patients with gastric leiomyoma located in gastric antrum, 10 patients with gastric schwannoma located in gastric antrum, and 10 patients with gastric ectopic pancreas located in gastric antrum were randomly selected. The EUS features of gastric glomus tumors were compared with that of gastric GISTs, leiomyoma, schwannoma, and ectopic pancreas, as shown in Table 2. The typical EUS feature of gastric glomus tumor is a triad: antrum; round or oval; mild-hyperechoic lesion from fourth layer.

Treatment

One patient received EFTR; three patients were treated by ESD, and laparoscopic resection was performed for seven patients. Complete resection was performed in all the patients. No complications, such as delayed perforation and hemorrhage, occurred in any patients. Nine patients had the pathology of glomus tumor; two patients had pathology of glomus tumor with uncertain malignant potential, as shown in Table 3.

Follow-up

No recurrence or metastases were found in all patients during the follow-up period at a median follow-up time of 32 months (range, 3–62 months).

Table 1: The clinical data of 11 patients with gastric glomus tumor

No.	Age/Sex	Symptom	Size of tumor (mm)	Location	Endoscopic appearance	EUS layer	EUS appearance
1	38/male	Abdominal pain	19	Greater curvature of antrum	SMT	Fourth	Mild-hyperechoic round mass
2	62/female	Abdominal discomfort	10	Greater curvature of gastric body	SMT	Fourth	Mild-hyperechoic round mass
3	56/female	Abdominal discomfort	11	Anterior wall of antrum	SMT	Fourth	Hypoechoic oval mass
4	52/female	Abdominal pain	27	Posterior wall of antrum	SMT	Fourth	Mild-hyperechoic oval mass
5	59/female	Abdominal discomfort	27	Posterior wall of antrum	SMT	Fourth	Mild-hyperechoic round mass
6	48/female	UGH	35	Gastric body	SMT with a ulcer on the surface	Third, Fourth	Mild-hyperechoic oval mass with hypoechoic spots
7	47/female	Abdominal discomfort	12	Greater curvature of antrum	SMT	Fourth	Mild-hyperechoic round mass
8	56/male	Abdominal distension	28	Greater curvature of antrum	SMT	Fourth	Mild-hyperechoic oval mass
9	50/male	Abdominal discomfort	27	Greater curvature of antrum	SMT	-	-
10	37/female	Abdominal discomfort	22	Anterior wall of antrum	SMT	Fourth	Mild-hyperechoic round mass
11	46/female	Abdominal discomfort	20	Greater curvature of antrum	SMT	Fourth	Mild-hyperechoic round mass

SMT, submucosal tumor.

Table 2: The EUS features of gastric glomus tumors were compared with those of gastric GISTs, leiomyoma, schwannoma, and ectopic pancreas

Tumor type(case number)	Mean size (range), mm	Layer	Shape	Echogenicity	Marginal halo	Cystic change	Calcification
Glomus tumor (10)	19(10–35)	Nine lesions were from fourth layer; one lesion was from third, fourth layer	Ten lesions were round or oval shape	Nine lesions were mild-hyperechoic; one lesion was hypoechoic	No	One lesion had cystic change	No
GIST (10)	18(12–42)	Ten lesions were from fourth layer	Ten lesions were oval shape	Hypoechoic	No	No	3 lesions had calcification
Leiomyoma (10)	14(10–36)	Ten lesions were from fourth layer	Ten lesions were oval shape	Hypoechoic	No	No	No
Schwannoma (10)	18(12–25)	Ten lesions were from fourth layer	Ten lesions were oval shape	Hypoechoic	Four lesions had marginal halo	No	No
Ectopic pancreas (10)	13(8–23)	Nine lesions were from third layer; one lesion was from third, fourth layer	Eight lesions were flat shape; two lesions were oval shape	Mixed-echoic	No	No	No

DISCUSSION

Gastric glomus tumors are rare with a significant female dominance.^[2] Most of the gastric glomus tumor are located in antrum.^[6] We got similar results as previously reported. Patients with gastric glomus tumor can present different symptoms, such as abdominal discomfort or pain, and gastric glomus tumor is one of rare causes of gastrointestinal hemorrhage.^[11–14] One patient (1/11) presented with upper gastrointestinal bleeding in our report.

Preoperative diagnosis of gastric glomus tumor is the key point for the treatment. Glomus tumors, GISTs, schwannomas, and neuro-endocrine tumors, however, exhibit similar findings on computed tomography, making it difficult to differentiate glomus tumor from other tumors.^[15–18] Moreover, some cases of glomus tumor of the stomach do not show the typical characteristics on CT. With EUS being widely used,^[19–21] EUS is of great importance for differential diagnosis of gastric submucosal tumor. In our report, the typical EUS features of glomus tumor of the stomach can be listed as follows: the lesion is located

Table 3: The treatment of 11 patients with glomus tumor of the stomach

No	Treatment	Patology	Postoperative bleeding	Postoperative perforation	Recurrence	Follow-up, month
1	ESD	Glomus tumor	No	No	No	3
2	ESD	Glomus tumor	No	No	No	62
3	ESD	Glomus tumor	No	No	No	48
4	EFTR	Glomus tumor	No	No	No	60
5	Laparoscopy	Glomus tumor	No	No	No	61
6	Laparoscopy	Glomus tumor with uncertain malignant potential	No	No	No	18
7	Laparoscopy	Glomus tumor	No	No	No	56
8	Laparoscopy	Glomus tumor with uncertain malignant potential	No	No	No	24
9	Laparoscopy	Glomus tumor	No	No	No	32
10	Laparoscopy	Glomus tumor	No	No	No	6
11	Laparoscopy	Glomus tumor	No	No	No	12

ESD: endoscopic submucosal dissection; EFTR: endoscopic full-thickness resection.



Figure 1: Gastric glomus lesion presenting as a submucosal tumor, with an ulcer on its surface



Figure 2: Gastric glomus lesions presented with mild-hyperechoic round or oval mass

in antrum; its shape is round or oval on EUS; it is a mild-hyperechoic lesion from fourth layer. Hu *et al.* reported that gastric glomus tumors were oval ($n = 4$) and round ($n = 6$) in shape.^[22] The mild-hyperechogenicity may be due to its vascular nature. Yan *et al.* reported that Doppler EUS showed a prominent vascular signal in gastric glomus tumor.^[23] The typical EUS features of glomus tumor of the stomach were described in some reports.^[6, 24-26] Nine patients (9/11) were presented with typical EUS features. Two lesions did not have the typical EUS features. One lesion was hypoechoic and one lesion was from third and fourth layer. Compared with other common gastric submucosal tumor, such as GISTs, leiomyoma, ectopic pancreas, and schwannoma, the typical EUS features of glomus tumor of the stomach can make the differential diagnosis. Some gastric glomus tumor with atypical EUS

features is still difficult to differentiate on EUS. EUS elastography and contrast-enhanced EUS can provide more information.^[27-31] In addition, endoscopic ultrasound guided fine needle aspiration (EUS-FNA) can help in diagnosis.^[32-34] Although glomus tumor is a vascular lesion, it is safe to perform EUS-FNA. No complications, such as bleeding, happen. Few reports had demonstrated that gastric glomus tumor could be diagnosed by EUS-FNA.^[10, 35-39]

Glomus tumors are mesenchymal tumors with malignant potential.^[40-42] Although most of glomus tumor of stomach are benign, some malignant cases have been reported.^[3-5, 43] In our study, there were two patients diagnosed with glomus tumor with uncertain malignant potential. So resection is the only curative therapy with a favorable prognosis for benign glomus tumor.

Traditionally, surgery is the first choice of treatment for gastric glomus tumor.^[25, 44, 45] Endoscopic resection, such as ESD and EFTR, are being increasingly used in treating gastric submucosal tumors.^[46-48] However, to the best of our knowledge, there is rare report that gastric glomus tumor was treated by endoscopic resection,^[49] which may be due to its rarity and its vascular nature. Four patients in our study were treated by ESD or EFTR, and there was no fatal bleeding. During the follow-up, there was no residual tumor and no recurrence.

CONCLUSIONS

The typical EUS feature of glomus tumor of the stomach is that a round or an oval mild-hyperechoic lesion originating from fourth layer is located in antrum. Endoscopic resection is a safe and effective treatment of choice for gastric glomus tumor.

Conflict of Interest

None declared.

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