

Case Report

Brunner's Gland Hamartoma: A Case Report, Meta-Analysis, and Algorithm Approach to Obstructing Duodenal Masses

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Abstract

Background: Brunner's Gland Hamartomas (BGH) are rare, benign lesions. First described by Cruveilhier in 1835, there are fewer than 200 cases reported in the English literature and no large characterizing studies.

Methods: We present a patient found to have a 6 cm hamartoma just distal to the pylorus. We also include a meta-analysis of 93 cases of BGH dating from 1952 through 2010.

Results: Sixty four percent of patients with BGH were male and the mean age was 52.6 years. The average size was 4.2 cm. 63.4% of hamartomas were in the first part of the duodenum, with 23.7% in the 2nd, and the rest distributed between the remaining small bowel. 56.6% of patients experienced abdominal pain and discomfort as a presenting symptom. 53% of patients reported melena, while 22.9% of patients reported fatigue, dizziness, weakness, or syncope. Nausea and vomiting were found in 14.5 and 26.6 percent of patients, respectively. 25.8% of lesions were removed endoscopically, while 65% were removed at laparotomy. There were no adverse outcomes reported.

Conclusion: BGH are most often found in men. They often come to physician attention through physical complaints of abdominal discomfort and/or GI bleeding, and can be removed endoscopically or surgically with excellent outcomes.

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Introduction

Brunner's glands are submucosal glands which extend from distal pylorus to ligament of Treitz. Dandalides, et al. found them most numerous in the second portion of the duodenum [1]. Their main function is to provide alkaline environment by secreting mucin, pepsinogen, and urogastrin in response to acid. Hamartomas of Brunner's Glands (BGH) are relatively rare, benign neoplasms first described by Cruveilhier in 1835 [2]. There are less than 150 cases reported in the English literature, with the largest characterizing study including 27 patients [3]. There has been only one case reported where the lesion was suspected to have malignant potential [4].

The reported global incidence of all neoplasms of the duodenum is generally less than 1.0 per 100,000 [5]. However, the actual prevalence of benign tumors of the entire small bowel is difficult to determine due to their tendency to be asymptomatic, although two autopsy series including 22,810 and 2648 specimens found incidences of 0.15% and 0.83%, respectively [6,7]. Autopsy studies have also found that benign tumors account for up to 75% of small bowel tumors, making them far more prevalent than malignant neoplasms [8].

Here we present a patient with abdominal pain, nausea, vomiting, melena, and jaundice found to have a 6cm Brunner's gland hamartoma just distal to the pylorus.

Case Report

A 35-year-old Hispanic male with no past medical history presented to LAC+USC Medical Center with abdominal pain and melena for two months. Pain was frequent and short-lasting, located in the epigastrium, and radiated to the lower quadrants of the abdomen. He reported an 8 pound weight loss in the previous two weeks. He drank three to four beers per week for ten years, and smoked one pack per day for one year.

On exam, he had epigastric tenderness without rebound or guarding. Digital rectal examination reveal maroon stool and positive guaiac. Labs were unremarkable except for a hemoglobin of 7.6.

Computed tomography scan showed a six centimeter mass in the second and third portions of the duodenum, which appeared to be a leading edge of severely thickened gastric mucosa prolapsing into the duodenum (Figure 1). Upper endoscopy showed a large pedunculated submucosal tumor in the duodenal bulb with a deformed antrum and pylorus. Biopsy of the mass showed ulceration with acute and chronic inflammation without any evidence of malignancy.

The patient underwent distal gastrectomy with partial duodenectomy and the histopathology showed a Brunner's gland hamartoma. (Figures 2 and 3). Given the paucity of characterizing studies for BGH, we include a meta-analysis of 93 cases of BGH dating from 1952 through 2004 [3,4,9-81].

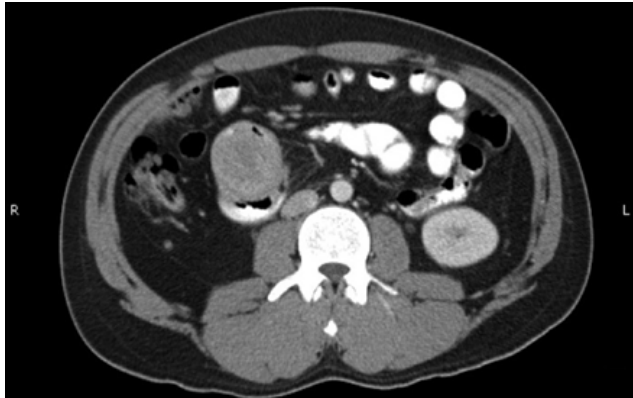


Figure 1: CT Abdomen with contrast.



Figure 2: Gross specimen of Brunner's Gland Hamartoma.

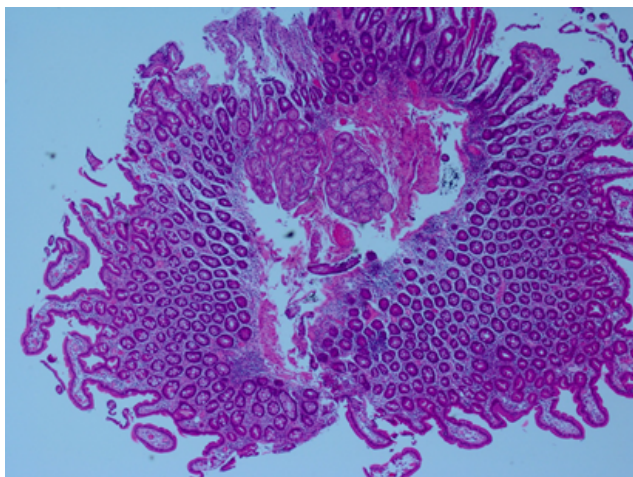


Figure 3: Microscopic specimen showing Brunner's Glands.

Methods

Cases of Brunner's gland hamartoma were found using PubMed searches of the English literature. All available reports describing patient presentation and management were included in our study, for a total of 93 patients. Patient characteristics including age, sex, presenting symptoms, size and location of tumor, and treatment

modality were extracted and analyzed. As articles varied in their method of describing tumor size, we used the largest single dimension reported in this study. The location of the tumor was characterized along anatomical boundaries, including the stomach, pylorus, first, second, third, and fourth portions of the duodenum, and the jejunum. Treatment modality was grouped by surgical removal, endoscopic removal, or other. Symptoms were analyzed by including all symptoms that the patient had experienced from the time of symptom onset until the time of presentation. Statistical analysis was done using Statistical Package for Social Sciences (SPSS Windows), version 17.0 (SPSS Inc, Chicago, IL).

Results

In 93 patients with Brunner's Gland Hamartoma, the most common presenting symptom was abdominal pain or discomfort, which 56.6% of patients experienced (Table 1). 53% of patients reported melena, while 22.9% of patients reported fatigue, dizziness, weakness, or syncope and 21.7% were found to be anemic. Nausea and vomiting were found in 14.5 and 26.6 percent of patients, respectively.

Symptom	Percent	N
Abdominal pain/discomfort	56.6	47
Melena	53	44
Vomiting	26.5	22
Fatigue/dizziness/syncope	22.9	19
Anemia	21.7	18
Nausea	14.5	12
Anorexia	8.4	7
Shortness of breath	6	5
Gas	4.8	4
Weight loss	4.8	4
Reflux	2.4	2
Diarrhea	2.4	2
Jaundice	2.4	2
Hematochezia	1.2	1

Table 1: Symptoms.

64.5% of patients with BGH were male and the mean age was 52.6 years old. The average lesion size was 4.2cm and ranged from 0.5 up to 12cm. 52.7% of tumors were pedunculated. 63.4% of hamartomas were in the first part of the duodenum, 23.7% were in the second, and the rest were distributed between the remaining duodenal segments, pyloric ring, stomach, and jejunum (Table 2).

	Percent	N
Male	64.5	60
Female	35.5	33
Tumor location		
D1	63.4	59
D2	23.7	22
D3	4.3	4
D4	1.1	1
Jejunum	2.2	
Pyloric ring	3.2	3
Stomach	1.1	1

Total	100	93	
	Range	Mean	SD
Patient age (years)	14-82	52.6	16.2
Tumor size (cm)	0.5-12	4.2	2.8
	Yes (Percent)	No (Percent)	
Pedunculated	49 (52.7)	44 (47.3)	

Table 2: Patient and tumor characteristics.

25.8% of lesions were removed endoscopically, while 65% were removed at laparotomy. One hamartoma detached spontaneously and was eliminated per rectum [71]. There was no size difference between tumors removed endoscopically versus surgically, with the average tumor size being 3.97cm and 4.21cm, respectively (p=0.71). There was only one case where the lesion was suspected to have malignant potential and there were no adverse outcomes reported (Table 3) [4].

Type of treatment	Percent	N
Surgical removal	69.9	65
Endoscopic removal	25.8	24
Observation	1.1	1
BGH eliminated per rectum	1.1	1
Not specified	2.2	2
Total	100	93

Table 3: Treatment modality.

Discussion

Brunner's gland hamartomas can present in a nonspecific and variable fashion. They can be removed endoscopically or surgically with excellent outcomes. The ratio of these treatment modalities is likely skewed in our study due to the inclusion of cases prior to the use of endoscopy. We chose to remove the mass surgically secondary to an inability to snare the polyp endoscopically, as well as an inability to obtain a tissue diagnosis and with the malignant potential of duodenal lesions in mind. This provides an example of how the approach to obstructing duodenal tumors such as BGH can be difficult. The differential diagnosis is extensive and dependable endoscopic characteristics of individual polyps, with the exception of villous adenomas, are lacking [82].

Differential diagnosis

Benign tumors of the duodenum include leiomyoma, adenoma, lipoma, BGH, hemangioma, and nodular lymphoid hyperplasia. Neuroendocrine tumors include carcinoid, ganglioneuroma, gastrinoma, somatostatinoma, and VIPoma [83].

Adenocarcinoma, lymphoma, Gastrointestinal Stromal Tumor (GIST), sarcoma, leiomyosarcoma, and ampullary, adenocarcinoma make up the malignant tumors of the duodenum. Bilimoria et al., looked at 67483 primary malignant tumors of the duodenum found in the SEER and NCDB studies. 37.4% were carcinoid tumors, 36.9% were adenocarcinomas, stromal tumors accounted for 8.4%, and 17.3% were lymphomas [84]. During the study period, the incidence of carcinoid tumors increased 4-fold, making them currently the most common small bowel malignancy [84-86].

Patients at increased risk for adenocarcinoma of the duodenum include those with Hereditary Nonpolyposis Colon Cancer Syndrome (HNPCC), Peutz-Jegers syndrome, Familial Adenomatous Polyposis

(FAP), Turcot's syndrome, and Gardner's syndrome. Additionally, those with FAP, Turcot's syndrome, and Gardner's syndrome are also at increased risk for desmoid tumors of the small bowel. Patients with neurofibromatosis type 1 are at higher risk of developing GISTs, which can be multiple [87].

Metastatic tumors of the duodenum outnumber primary tumors [8]. Common tumors metastatic to duodenum include melanoma, which is the most common, bronchogenic malignancy, and breast cancer [83]. Testicular and renal tumors can also metastasize to the duodenum, and direct invasion can occur from surrounding structures [8].

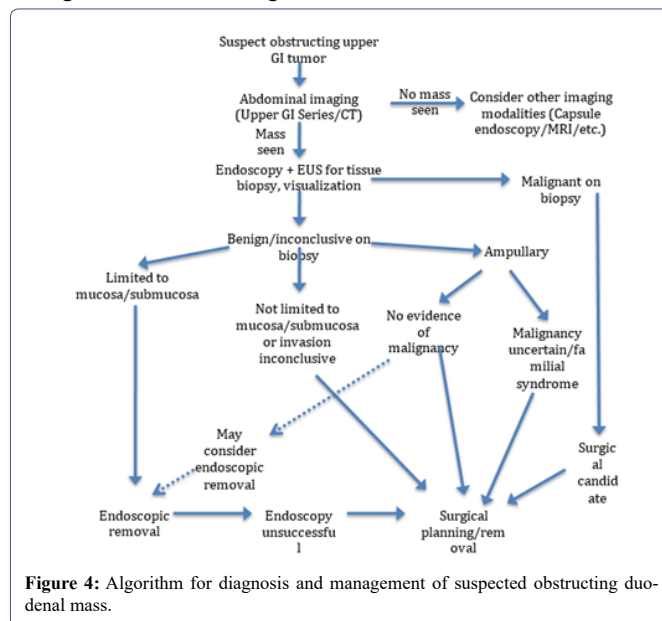
Features of duodenal polyps

To clarify the features of polyps in the duodenum, Matsui et al., looked at 263 patients with polyps in the duodenal bulb. 69.2% of the polyps revealed gastric tissue, 19.4% were cysts, and the remaining 11.4% were miscellaneous lesions such as tubular adenomas and BGH [88]. Reddy et al., looked at biopsies done in 38 patients with duodenal polyps found on duodenoscopy. In 19 patients, they found normal duodenal mucosa or chronic inflammation. In the remaining patients, they found eight adenomatous polyps, six villous adenomas, and two BGH. Two lipomas and one carcinoid tumor were also found [82].

Many duodenal tumors, both primary and metastatic, can be pedunculated. Pedunculated small bowel tumors reported in the literature include ampullary adenocarcinoma, villous adenoma, pleomorphic sarcoma, angiosarcoma, metastatic osteosarcoma, and direct invasion of an ovarian mature cystic teratoma [89-94]. Shiba et al., reported a case of a pedunculated ampullary adenocarcinoma where the atypia was limited to the mucosa [89].

Approach to suspected small bowel tumors

While adhesions are the most common cause of partial or complete small bowel obstruction, tumors are also a leading cause. Symptoms are similar, with nausea, vomiting, and abdominal pain, and were seen in our study as well [95]. An algorithm approach to diagnosis and management is shown in figure 4.



When a small bowel tumor is suspected, imaging should be performed first. An upper GI series may show a filling defect and will characterize whether the lesion is completely obstructing with high sensitivity. These studies will not, however, help in characterizing the etiology and as a result, many surgeons recommend using Computerized Tomography (CT) scan as the initial test of choice [96].

CT may be helpful in diagnosing duodenal tumors, including BGH. Hur et al., correlated the CT images with histopathologic diagnosis of BGH in 9 patients and found that the masses generally display internal cystic change, are located in the submucosa, and are hypoattenuated. 67% of the masses also displayed peripheral rimlike enhancement in the early phase, and most enhanced homogeneously in the later phase [97]. Their study looked at smaller tumors with a mean size of 1.9cm, so larger tumors or those that intussuscept may be less suggestive of BGH on CT.

If a mass is not detected on UGI or CT but a tumor is still suspected, other imaging modalities such as capsule endoscopy or MRI can be utilized.

If CT scan does show a mass, an endoscopy with or without Endoscopic Ultrasound (EUS) is often helpful in visualization of the tumor. Although diagnosis at endoscopy is difficult, EUS may be helpful as it can provide information about the origin of the tumor as well as vascularity and echogenicity [98-102]. Endoscopy can also be used as a treatment modality [100]. Endosonographic features of BGH, characterized by Hizawa et al., were found to be heterogenous solid and/or cystic masses within the submucosa. They concluded that the tumor could be safely removed by endoscopic resection after confirmation that the tumor origin is within the submucosa [101].

Treatment

If the tumor is benign or inconclusive on biopsy, gross features of the tumor can aid in management. If the tumor is limited to the mucosa or submucosa, endoscopic snare removal can be attempted. Abbas et al., managed 59 patients with duodenal polyps endoscopically with a 98% removal success rate and an average polyp size was 1.72cm. They found, however, that 37% of polyps recurred within a mean follow-up time of 26 months and that recurrence was more common in polyps greater than 2cm [102]. If endoscopic removal fails, surgical removal should be considered.

The management of benign ampullary tumors is more controversial. Historically, management was surgical but recently, endoscopic management has become an additional treatment modality in those with no evidence of invasive cancer. Often, multiple endoscopic attempts were necessary and success varied widely. It has been recommended that endoscopic removal be performed by an experienced endoscopist and patients should undergo post-procedure surveillance [103,104].

For lesions that are invasive beyond the submucosa, or for which invasion cannot be determined, surgical management should be considered. When biopsy of the mass shows malignancy, the patient should be evaluated for surgical and/or chemotherapeutic candidacy as indicated for the type of tumor found.

Conclusion

Brunner's Gland Hamartoma is a rare, benign lesion of the duodenum and presents with a wide variety of symptoms. BGH may have characteristic findings on CT and EUS. It can be removed

endoscopically or surgically with excellent outcomes. In the workup of suspected BGH, a systematic approach should be taken given the potential for malignancy among the wide differential diagnosis.

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