

# Giant Hepatic Hemangioma Masquerading as a Gastric Subepithelial Tumor

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Finding a gastric mass, bulge, or impression with apparent normal overlying mucosa during upper endoscopy is common. The differential diagnosis of such lesions is broad, and the origin of the mass may be intramural or extramural. The term “subepithelial” tumor (SET) is preferred over “submucosal” tumor because the mass may arise from outside the gastrointestinal wall or from layers other than the submucosa. The diagnostic evaluation of gastric SETs is evolving with the advent of newer technologies such as endoscopic ultrasound (EUS). The spectrum of diagnostic studies includes endoscopy, radiologic imaging (eg, computed tomography [CT] or magnetic resonance imaging), and EUS. In the hands of an experienced operator, the accuracy of EUS in distinguishing intramural lesions from extramural lesions approaches 100%.<sup>1,2</sup> However, in some cases, this distinction may be difficult, and a multimodality approach is warranted.

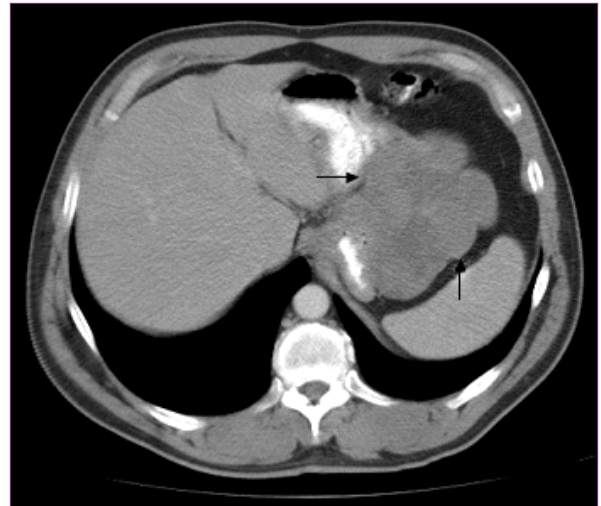
Hepatic hemangiomas are the most common benign tumors of the liver and may have varied presentations.<sup>3</sup> However, there are few, if any, reported cases of patients with hepatic hemangiomas that cause extraluminal gastric compression and pose a diagnostic dilemma. We report the case of a giant hepatic hemangioma in a middle-aged man who presented with abdominal pain and was found to have a large intra-abdominal mass that was misdiagnosed as a gastric SET by both CT and EUS. The lesion required laparoscopy for accurate diagnosis.

## Case Report

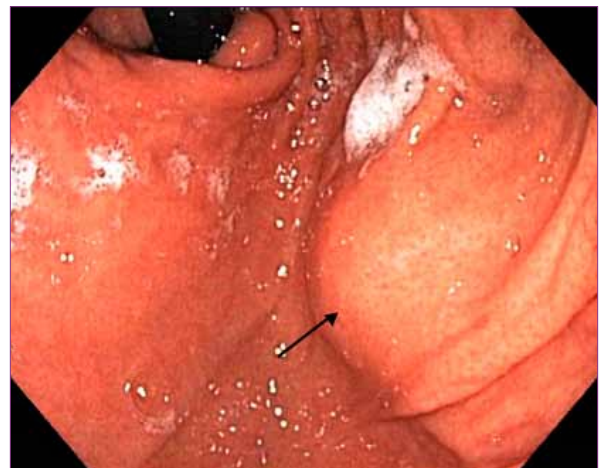
A white man, age 55 years, who had no significant medical history presented with left-sided abdominal pain for

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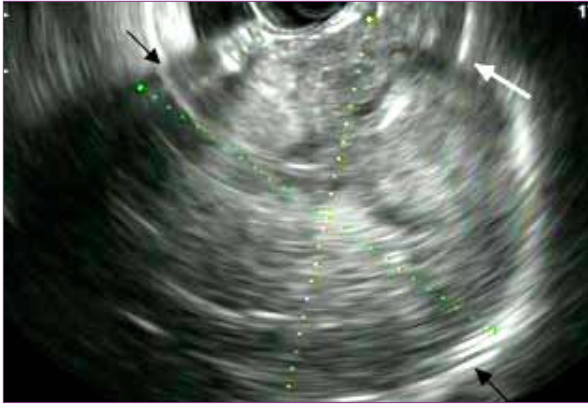
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**Figure 1.** An abdominal computed tomography scan shows a heterogeneous intramural gastric mass (arrows) along the greater curvature extending to the splenic hilum.



**Figure 2.** A subepithelial bulge (arrow) along the greater curvature is best seen on retroflexion.



**Figure 3.** An endoscopic ultrasound depicting a hypoechoic mass (black arrows) arising from the muscularis propria (white arrow).

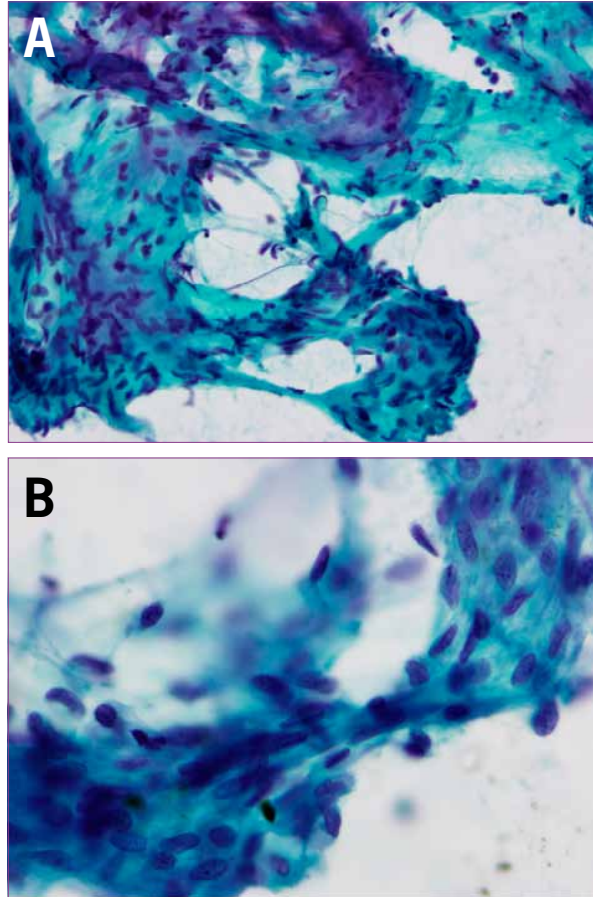
6–8 weeks. Physical examination findings were unremarkable, and routine laboratory studies did not show any abnormalities. An abdominal CT scan revealed a large (12 cm × 10 cm × 8 cm) heterogeneous mass arising from the greater curvature of the stomach and extending to the splenic hilum (Figure 1). The mass appeared hypoechoic with lobulations, and the radiologist suspected that it was a SET in the form of a gastrointestinal stromal tumor (GIST) or leiomyoma.

An endoscopy revealed a subepithelial bulge along the greater curvature of the stomach (Figure 2). On EUS, the mass was well circumscribed and appeared to arise from the muscularis propria (Figure 3). EUS-guided fine-needle aspiration (EUS-FNA) and biopsy revealed scant fibrous tissue with no malignant cells identified. The nondiagnostic EUS-FNA prompted a CT-guided percutaneous FNA and core needle biopsy of the mass. The CT-FNA showed sparse benign spindle cells (Figure 4). The concurrently acquired core needle biopsy was diagnostic for a hemangioma (Figure 5). A laparoscopy revealed a 12 cm × 10 cm tumor arising from the left hepatic lobe. It was attached to the left diaphragm without any attachment to the stomach or spleen.

A left lateral hepatic resection was performed whereby the tumor was dissected from the diaphragm. Histopathology revealed a partially fibrotic hemangioma (Figure 6). The postoperative course was uneventful, and the patient was discharged home on Postoperative Day 4.

## Discussion

Hepatic hemangiomas are the most common benign mesenchymal tumors of the liver, with a prevalence of 1.5–20%. Hepatic hemangiomas are commonly asymptomatic and are most often managed conservatively. Giant hepatic hemangiomas (>5 cm) are less common

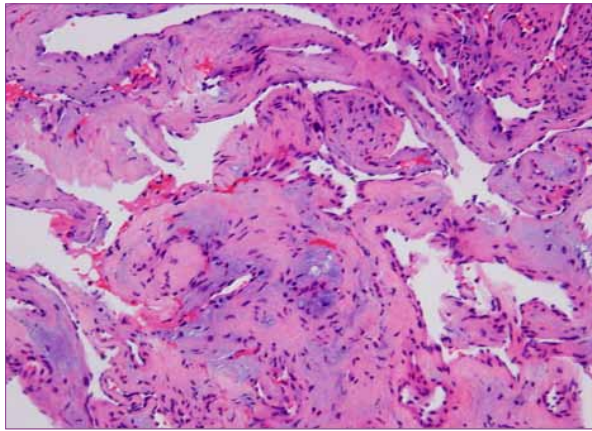


**Figure 4.** A: A computed tomography-guided deep fine-needle aspiration specimen showing benign spindle cells. B: A closer view of the spindle cells.

but more frequently symptomatic. The most common symptoms are abdominal pain and right upper quadrant discomfort and fullness. Other symptoms include nausea, anorexia, and early satiety. The symptoms vary according to the size and location of the tumor.<sup>3,4</sup> A large series of hepatic hemangiomas, inclusive of 249 patients, found a tumor size greater than 4 cm in 27% of the patients, and symptoms were noted in 31% of patients.<sup>5</sup> Most of the diagnoses were made with radiologic imaging, and all of the symptomatic patients were managed with surgical resection.

The patient described in this case had an atypical presentation, as the tumor originated from the left hepatic lobe and was attached to the diaphragm, causing left-sided abdominal pain. In addition, the diagnosis and management were difficult due to tumor location and appearance on EUS and CT scan.

A left hepatic cyst or hemangioma rarely mimics a gastric SET.<sup>6</sup> Involvement of the spleen and splenic vessels is the most common cause of extraluminal gastric com-



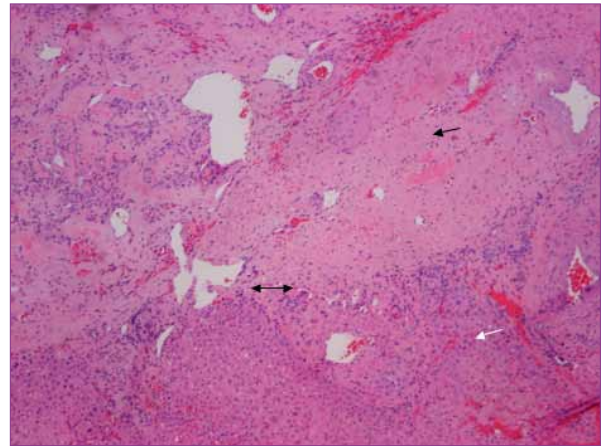
**Figure 5.** A computed tomography-guided biopsy of the mass shows features that are diagnostic of a hemangioma with intervening areas of sclerosis.

pression.<sup>7</sup> Other causes of extraluminal lesions or extrinsic gastric compression include the liver and gallbladder as well as pathologic conditions such as pancreatic pseudocysts, enlarged lymph nodes, and intra-abdominal tumors and abscesses.<sup>3</sup>

The differential diagnosis of intramural gastric SETs includes benign lesions (such as GISTs, leiomyomas, lipomas, neural tumors, lymphangiomas, and pancreatic rests) and malignant lesions (such as lymphomas, metastases, carcinoids, and malignant GISTs).<sup>1</sup> Modalities that are useful in differentiating gastric SETs from extrinsic compression include radiologic imaging, endoscopy, and EUS. The sensitivity and specificity of endoscopy in differentiating SETs from extraluminal compression are reported to be 87% and 29%, respectively, compared with the sensitivity and specificity of EUS, which are 92% and 100%, respectively.<sup>8</sup> Although the accuracy of EUS in differentiating gastric SETs from extragastric compression approaches 100%,<sup>2</sup> some cases may require additional diagnostic studies to establish this difference.

Our patient received a misdiagnosis of gastric SET despite having undergone multiple diagnostic studies, including EUS and CT. Large hemangiomas usually have more fibrous tissue compared with smaller hemangiomas, which leads to variable enhancement with contrast and a higher likelihood of an atypical appearance on CT scan.<sup>9</sup> In addition, FNA of such lesions has a very low diagnostic yield.<sup>10</sup> Therefore, due to the large size and fibrotic composition of the tumor in this case, the EUS-FNA was nondiagnostic, and the CT appearance was not typical of a hemangioma. One case of a hepatic lesion mimicking a gastric SET has been reported in the literature; however, the SET was a hepatic cyst and not a hemangioma.<sup>6</sup>

Recently, a group of Korean researchers reported the case of a pedunculated hepatic hemangioma that caused



**Figure 6.** This surgical specimen shows characteristic features of a fibrotic hemangioma (black arrow) and adjacent normal liver parenchyma (white arrow). The interface between the normal liver parenchyma and the hemangioma is marked with a double-headed arrow.

extraluminal gastric compression.<sup>11</sup> No diagnostic challenges were reported for that case. To the best of our knowledge, the case presented here is the first report of a symptomatic giant hepatic hemangioma misdiagnosed as a gastric SET by both CT and EUS and removed by surgical resection.

In conclusion, giant hepatic hemangiomas that develop in the left lobe of the liver may be misdiagnosed on CT and EUS as gastric SETs arising from the greater curvature of the stomach. Accurate diagnosis in such cases may require laparoscopic examination. Surgical resection is the definitive treatment.

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# Review

## Differential Diagnoses and Diagnostic Troubleshooting of Upper Abdominal Masses

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The clinician is occasionally faced with the diagnostic dilemma of an indeterminate upper abdominal mass. Despite thorough evaluation with cross-sectional imaging, endoscopy, endoscopic ultrasound (EUS), and even biopsy, not all upper abdominal masses can be diagnosed preoperatively. As described in the case report by Kochar and colleagues, hepatic lesions—including hemangiomas—can infrequently appear as apparent extrahepatic tumors.<sup>1</sup> In this case report, a symptomatic, exophytic hepatic hemangioma abutting the greater curve of the stomach was misdiagnosed as a gastric subepithelial tumor (SET) by both computed tomography (CT) scan and EUS. The correct diagnosis was subsequently made by core biopsy and laparoscopy.

In contrast to other liver tumors, hemangiomas can usually be diagnosed using cross-sectional imaging. On CT scan, hepatic hemangiomas are typically hypodense on unenhanced images.<sup>2</sup> Following administration of intravenous contrast medium, hepatic hemangiomas have a characteristic pattern of enhancement, with early peripheral nodular enhancement, followed by centripetal filling in of the lesion on delayed phases. This delayed-phase CT imaging can be particularly helpful in the diagnosis of an hepatic hemangioma. In fact, a late-contrast phase should be included when evaluating all masses in proximity to the liver, and care must be taken not to interpret imaging of tumors adjacent to the liver solely based on noncontrast or early-phase CT scan.

Magnetic resonance imaging (MRI) can be particularly accurate for diagnosing a liver hemangioma. Even without contrast, hemangiomas have a pathognomonic appearance on MRI in most cases. On MRI, these tumors are characterized as homogeneous, well-demarcated lesions with very high signal intensity on T2-weighted images. Like CT, contrast-enhanced MRI of hepatic

hemangiomas typically display early peripheral nodular enhancement with centripetal fill-in on delayed images. In one recent study by Szurowska and colleagues, the sensitivity of contrast-enhanced CT for a hemangioma was 76%, and the specificity was 90%.<sup>3</sup> In comparison, the sensitivity of MRI (both noncontrast and with contrast) was 98%, and the specificity was 99%.

Unlike smaller hemangiomas, very large hemangiomas can have more heterogeneous features on CT or MRI.<sup>4</sup> This is often secondary to hemorrhage, thrombosis, fibrosis, or extensive hyalinization. Although such tumors can be more difficult to diagnose on cross-sectional imaging, they still commonly display characteristic peripheral nodular enhancement with delayed centripetal filling after contrast administration on both CT and MRI. However, the centripetal filling of these lesions is often incomplete, representing the areas of hemorrhage, fibrosis, or hyalinization. This underscores the importance of the use of delayed-contrast CT and MRI in the evaluation of indeterminate masses in or adjacent to the liver.

Biopsy is rarely required for the diagnosis of a liver hemangioma. Early reports of fine-needle aspiration (FNA) of a liver hemangioma demonstrated significant risk of often fatal complications as a result of bleeding.<sup>5-7</sup> In addition, the diagnostic yield from FNA is low. In one early report by Taavitsainen and colleagues, FNA was performed in 36 patients with suspected hepatic hemangiomas; however, diagnostic cellular material could only be obtained in 21 patients.<sup>7</sup> Core biopsy, although perhaps riskier than FNA, may improve the accuracy of needle biopsy because a larger volume of tissue is sampled. However, biopsy of lesions suspected to be hepatic hemangiomas is rarely advised, given the high sensitivity and specificity of contrast-enhanced CT and MRI, the risk of bleeding associated with percutaneous biopsy, and the low diagnostic yield of percutaneous biopsy.

The presence of symptoms requiring tumor resection for palliative indications can make the preoperative evaluation of tumors in this region less complicated in most cases. When symptomatic, surgical resection is generally recommended in patients with liver hemangiomas. Most commonly, patients with symptomatic hepatic hemangiomas present with pain or with symptoms of compression of extrinsic organs (nausea, vomiting, and early satiety), as did the patient in the case presented by Kochar and colleagues.<sup>1</sup> Complications from hepatic hemangiomas, including spontaneous rupture, are exceedingly rare. In addition, when followed over time, the size of most hemangiomas remains stable. Thus, when asymptomatic, even giant hepatic hemangiomas can safely be observed.<sup>8,9</sup> Prior to resection, it is imperative that other potential causes of a patient's symptoms be fully investigated and ruled out. In a series published by Pietrabissa and colleagues, 50% of patients continued to be symptomatic

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following intervention for a symptomatic hepatic hemangioma,<sup>9</sup> indicating the existence of an alternative cause for the patients' symptoms.

The differential diagnoses of gastric SETs are extensive and include gastrointestinal stromal tumors (GISTs), leiomyomas, lipomas, gastric varices, tumors of neural origin, pancreatic rests, duplication cysts, carcinoid tumors, lymphomas, and metastases.<sup>10</sup> SETs outside the stomach can mimic gastric tumors, originating from adjacent structures (including the liver, spleen, biliary tract, and pancreas), and cause extrinsic compression of the stomach. For gastric SETs that are clearly resectable, biopsy is generally not needed because initial resection is indicated, even when the SET is not symptomatic. For borderline resectable and unresectable SETs—or if lymphoma is suspected based on imaging—biopsy can be useful in dictating management and is generally indicated. For example, preoperative imatinib therapy may be useful in some cases of a borderline or unresectable GIST to improve resectability. Similarly, gastric lymphoma is generally treated with either *Helicobacter pylori* eradication, systemic therapy, radiation, or a combination of the above therapies, and surgery is rarely indicated for gastric lymphoma. When the diagnosis is uncertain, the asymptomatic lesion will often undergo more thorough diagnostic evaluation to rule out tumors that do not require resection. Although cross-sectional imaging alone is often sufficient to diagnose hepatic hemangioma, indeterminate lesions may necessitate further testing, including endoscopy, EUS, or biopsy.

In summary, this interesting case illustrates that the diagnosis of upper abdominal masses can be challenging. Although hepatic hemangiomas are typically less difficult to diagnose using triple-phase contrast imaging, the diagnosis of those that may not have classic imaging features may be problematic. In particular, atypical hemangiomas that are exophytic and abut other organs such as the stomach, as in the case reported by Kochar and colleagues,<sup>1</sup> may masquerade as gastric SETs.

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