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## Case Report

# A case of idiopathic gastric intramural hematoma diagnosed using contrast-enhanced ultrasonography and followed up with conservative treatment<sup>☆</sup>

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## ARTICLE INFO

## Article history:

Received 14 July 2022

Revised 25 August 2022

Accepted 28 August 2022

## Keywords:

Contrast-enhanced ultrasonography

Esophagogastroduodenoscopy

Idiopathic intramural hematoma

Stomach

Magnetic resonance imaging

## ABSTRACT

We herein report a case of an idiopathic intramural hematoma in the gastric wall that presented with symptoms of anemia. Esophagogastroduodenoscopy revealed a submucosal tumor-like lesion on the anterior gastric wall below the gastric fundus. Noncontrast-enhanced ultrasonography showed an anechoic area with indistinct boundaries mainly located within the submucosal layer in the gastric wall, and the lesion showed no contrast enhancement on contrast-enhanced ultrasonography. Based on a comprehensive analysis of the above-mentioned ultrasonographic imaging findings, a final diagnosis of idiopathic intramural gastric hematoma was made. The patient was treated conservatively, and changes in the size and internal ultrasonographic characteristics of the mass were followed up by ultrasonography. Six months later, esophagogastroduodenoscopy confirmed that the mass had disappeared.

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<sup>☆</sup> Competing Interests: The authors declare that they have no competing interests.

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<https://doi.org/10.1016/j.radcr.2022.08.105>

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## Introduction

An intramural hematoma of the gastrointestinal tract mainly develops in the submucosa or muscularis propria. More than 90% of such hematomas occur in the duodenum; they are rare in the stomach [1]. This disease is most often seen in patients with underlying hemophilia or other hemorrhagic predisposition as well as in patients receiving anticoagulant therapy [2]. Because of the submucosal tumor-like appearance of the hematoma, it is important to distinguish it from various kinds of submucosal tumors, including gastrointestinal stromal tumors (GISTs) [3]. We herein report a case of an idiopathic gastric intramural hematoma diagnosed by ultrasonography (US) that was followed up with conservative treatment.

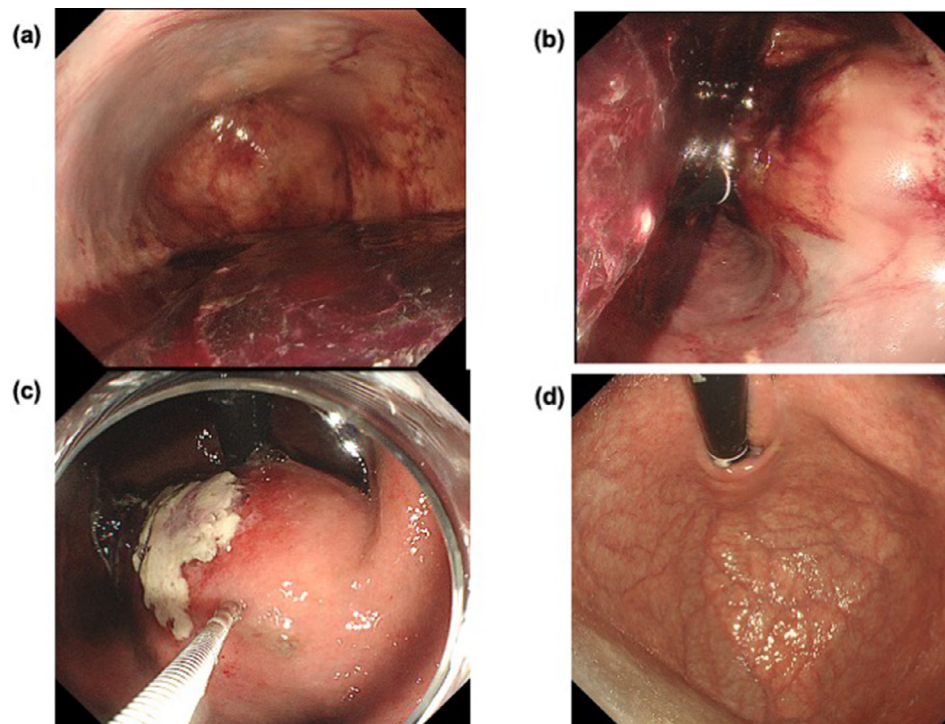
## Case report

A man in his 70s had black stools for 2-3 days, but he did not visit a hospital and instead stayed at home. On the morning of the day of his emergency admission to the hospital, his family found him lying on the floor at home and called for an ambulance. He was admitted to our hospital on an emergency basis on the same day for examination of the cause and treatment of his condition.

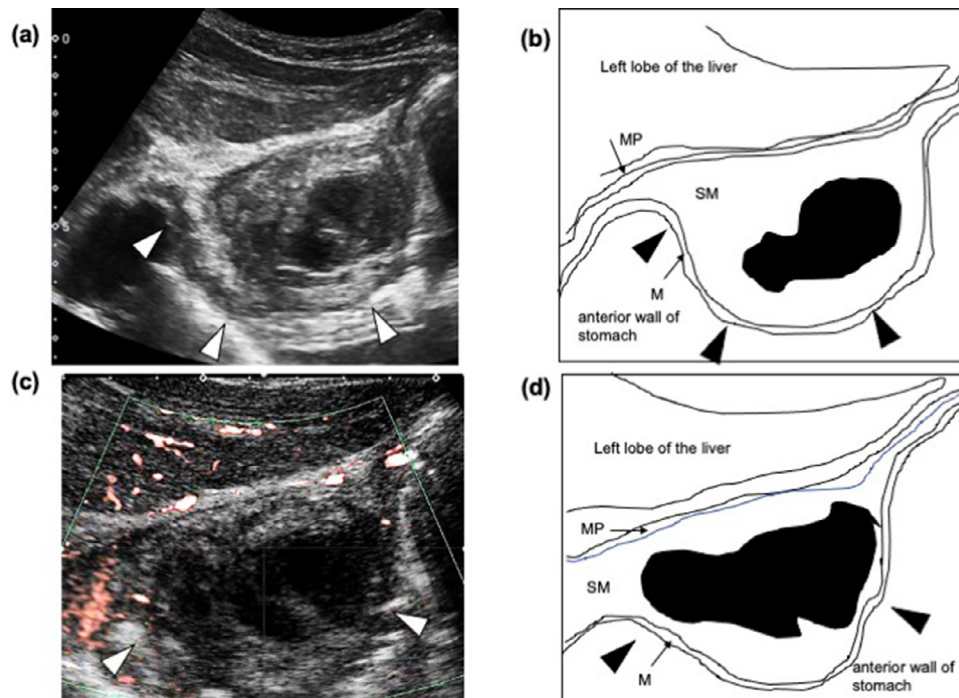
On admission, the patient had hemodynamic instability as indicated by a body temperature of 36.7°C, blood pressure of

85/40 mmHg, heart rate of 110 beats/min, respiratory rate of 16 breaths/min, and oxygen saturation on room air of 98%. Physical examination revealed no conjunctival jaundice. His abdomen was soft, but mild tenderness was noted in the epigastric region. Blood tests revealed a high white blood cell count [16,180 cells/ $\mu$ L (reference range: 3300-8600 cells/ $\mu$ L)], anemia with a hemoglobin concentration of 10.5 g/dL (reference range: 13.7-16.8 g/dL), and a mildly elevated C-reactive protein concentration [2.25 mg/dL (reference range:  $\leq$  0.14 mg/dL)]. Liver function indices [aspartate aminotransferase, 20 U/L (reference range: 13-30 U/L); alanine aminotransferase, 21 U/L (reference range: 10-42 U/L)] and the creatinine concentration [1.03 mg/dL (reference range: 0.65-1.07 mg/dL)] were normal. The patient had been receiving anticoagulation therapy for nonvalvular atrial fibrillation for 5 years.

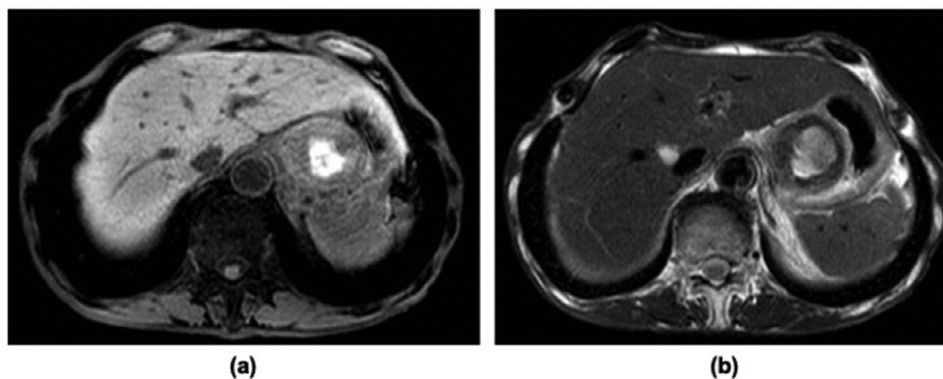
Esophagogastroduodenoscopy (EGD) performed on the day of emergency admission revealed retention of a large amount of blood in the stomach (Fig. 1A). In addition, a submucosal tumor-like lesion was found on the anterior wall immediately below the gastric fundus (Fig. 1B). EGD performed the next day revealed a submucosal tumor-like mass with a diameter of more than 60 mm on the anterior wall immediately below the gastric fundus; it had a white coating on its surface that was very hard when compressed with a forceps (Fig. 1C). Contrast-enhanced computed tomography (CT) showed a slightly high-density mass lesion in the stomach, and contrast-enhanced US was then performed for closer examination of the mass. On noncontrast US, the lesion was visualized as a 60-mm mass on the anterior wall immediately below the gastric fundus.



**Fig. 1 – Esophagogastroduodenoscopy (EGD), (A) EGD performed on the day of emergency admission revealed retention of a large amount of blood in the stomach. (B) A submucosal tumor-like lesion was found on the anterior wall immediately below the gastric fundus. (C) EGD performed the next day revealed a submucosal tumor-like mass with a diameter of more than 60 mm on the anterior wall immediately below the gastric fundus. (D) Six months later, EGD showed that the mass in the anterior wall immediately below the fundus had almost disappeared.**



**Fig. 2 – Ultrasound images at the time of initial hospitalization. (A)** The mass (indicated by white arrows) was characterized by indistinct hypoechoic areas predominantly located in the submucosal layer. **(B)** Schema of Fig. 2A. M, mucosal layer; SM, submucosal layer; MP, proper muscular layer. **(C)** Subsequent contrast-enhanced US showed no contrast effect within the mass (indicated by red arrows). **(D)** Schema of Fig. 2C. M, mucosal layer; SM, submucosal layer; MP, proper muscular layer.

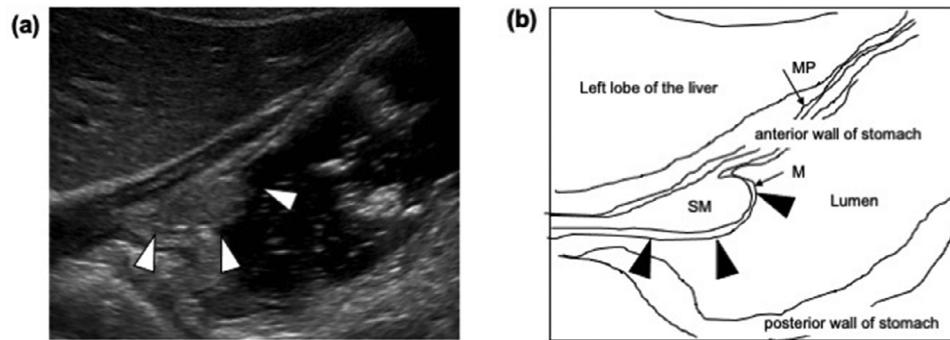


**Fig. 3 – Magnetic resonance imaging (MRI). (A)** T1-weighted MRI showed a high-intensity signal from the periphery to the center. **(B)** T2-weighted MRI showed a high-intensity signal reflecting the water content of the hematoma.

The mass was characterized by indistinct hypoechoic areas predominantly located in the submucosal layer (Figs. 2A, B). Subsequent contrast-enhanced US showed no contrast effect within the mass, and the diagnosis was a hematoma rather than a neoplastic lesion such as a GIST, malignant lymphoma, or gastric cancer (Figs. 2C, D). T1-weighted magnetic resonance imaging showed a high-intensity signal from the periphery to the center, reflecting methemoglobin hemolysis of the mass (Fig. 3A). T2-weighted magnetic resonance imaging showed a high-intensity signal reflecting the water content of

the hematoma (Fig. 3B). Based on a comprehensive analysis of the above imaging findings, a final diagnosis of intramural gastric hematoma was made.

Under the diagnosis of intramural gastric hematoma, the patient was treated conservatively and followed up with US. Two months later, US showed that the diameter of the mass had decreased from 60 to 15 mm (Figs. 4A, B). Six months later, EGD showed that the mass in the anterior wall immediately below the fundus had almost disappeared (Fig. 1D).



**Fig. 4 – Ultrasound image after 2 months. (A) Two months after treatment, US showed that the diameter of the mass (indicated by arrows) had decreased from 60 to 15 mm, (B) Schema of Fig. 4A. M, mucosal layer; SM, submucosal layer; MP, proper muscular layer.**

## Discussion

Based on previous reports of gastric intramural hematoma including our case [4,5], the mean age of the patients was in their 40s, and most of them were male; this may have been related to the presence of hemophilia in the patients' backgrounds. Intramural gastric hematomas are relatively rare, but they are occasionally seen in patients on anticoagulation therapy or with a bleeding predisposition, such as patients with hemophilia. Our patient also had nonvalvular atrial fibrillation and had been receiving anticoagulation therapy for 5 years. Many of the gastric intramural hematomas reported to date were relatively large, measuring  $\geq 5$  cm in diameter. Therefore, the possibility of a GIST cannot be completely ruled out in such patients, and surgery is performed in 39.4% of cases; this is considered to be a clinical problem [4,5].

The differential diagnoses of gastric intramural hematoma include gastric intramural diseases such as gastric submucosal tumors, including GISTs, gastric malignant lymphoma, gastric cancer, and gastric intramural abscesses. Extra-gastric lesions such as pancreatic cysts or pancreatic tumors are also differentials [6]. They can be easily differentiated from extra-gastric wall compression. Therefore, it is important to ensure the differential diagnosis of lesions within the gastric wall. In the present case, the mass was recognized on US as an anechoic area with indistinct boundaries and was located in the submucosal layer. These US findings are different from those of GISTs, malignant lymphoma, and gastric cancer and can be differentiated to some extent from gastric intramural hematoma even by noncontrast-enhanced US. Furthermore, the absence of blood flow in the mass on contrast-enhanced US suggests the possibility of a hematoma. In this case, it was important to distinguish the lesion from a gastric intramural abscess. Our patient had no fever or abdominal pain, and the clinical characteristics were different from those of a gastric intramural abscess. Our patient's lesion was also differentiated from a gastric intramural abscess by the absence of inflammation around the anechoic area on noncontrast US images and the absence

of ring-shaped early enhancement of the anechoic area on contrast-enhanced US images. Another clinically significant aspect of this case is that US could be used to monitor the size and internal ultrasonographic characteristics of the mass.

Unlike CT, US is radiation-free, can be performed repeatedly, and has excellent real-time performance. US is already considered to be a valuable method for assessment of various gastrointestinal diseases and clinical conditions. Many studies have focused on its diagnostic utility [7,8]. Additionally, unlike magnetic resonance imaging, US does not require high-cost equipment. Furthermore, US readily provides extramural information such as the relationship of lesions with surrounding organs and real-time blood flow information through the use of color Doppler and ultrasound contrast media [9]. Contrast-enhanced CT and magnetic resonance imaging cannot be performed in patients with renal dysfunction or those allergic to contrast media, but contrast-enhanced US can be performed in such patients. Contrast-enhanced US can also be used to evaluate blood flow in real time and to determine the presence of active bleeding [9]. However, contrast-enhanced US has 2 main limitations. First, it is sometimes difficult to separate the tissue signal from the contrast agent, especially in the high echoic band of the submucosal layer. Thus, close attention is required when making judgments on still images. Second, to evaluate active bleeding in the gastrointestinal tract, the clinician must pay attention to the value of the mechanical index and gain settings because the frequency used is often high and the ultrasound contrast agent bubble does not easily generate resonance. In addition, because there is no objective indicator of flow velocity, judgments regarding oozing of blood must be based on the examiner's impression, which requires caution [9]. As mentioned above, contrast-enhanced US has the potential to replace CT or magnetic resonance imaging, although some improvements are needed.

In summary, we have herein reported a case of idiopathic intramural gastric hematoma in a patient on anticoagulant therapy that was diagnosed by contrast-enhanced US and followed up by conservative treatment with US.

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### Compliance with ethical standards

This study was conducted in compliance with the principles of the Declaration of Helsinki. This study was reviewed and approved by the Institutional Ethics Committee of Kawasaki Medical School (IRB permission number: 5695-00). This article does not contain any studies involving human participants performed by any of the authors.

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### Patient consent

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images.

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### Acknowledgment

We thank Angela Morben, DVM, ELS, from Edanz (<https://jp.edanz.com/ac>), for editing a draft of this manuscript.

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