Ultrasonography of Gastric Volvulus : “Peanut Sign”

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Abstract

We report a case of chronic gastric volvulus in which ultrasonography (US) was useful. An 81-year-old woman was hospitalized due to vomiting, and upper gastroduodenoscopy revealed that the stomach was spirally twisted and constricted. An upper gastrointestinal barium study demonstrated an organoaxial-mesenteroaxial combined type gastric volvulus. US showed constriction between the dilated upper stomach body and the lower stomach body similar to a “peanut”. Thereafter, the patient’s vomiting stopped and follow-up US demonstrated that the constriction of the stomach was loosened. Therefore, we believe that this characteristic US sign paralleled the symptoms of the patient. (Internal Medicine 40: 23–27, 2001)

Key words: chronic gastric volvulus, organoaxial-mesenteroaxial combined gastric volvulus, esophageal hernia

Introduction

A gastric volvulus is an uncommon condition of an abnormal rotation of the stomach around itself. Diagnosis of a gastric volvulus is suspected by its clinical presentation and confirmed by a barium X-ray study and upper gastroduodenoscopy. However, there are a few case reports which include ultrasonography (US) of gastric volvuli, that were described as normal.

We obtained a characteristic sign from US of a gastric volvulus, and this sign was useful for the diagnosis and clinical observation of the chronic gastric volvulus. This is the first report using US to determine a gastric volvulus.

Case Report

An 81-year-old woman with dementia presented with vomiting on November 19, 1999. The patient began vomiting 5 days before, and since the day before admission, she had vomited after every meal. She had no symptoms such as pain or

nausea other than post prandial vomiting. Her medical history included surgery for left breast cancer, hypertension and senile dementia. Upper gastroduodenoscopy performed 7 years previously showed only mild reflex esophagitis. An esophageal hernia was noted on chest X-ray 6 months previously, but she did not have symptoms at that time.

A physical examination revealed a pulse of 75/min, and blood pressure of 128/60 mmHg. The abdomen was flat and soft and showed no tenderness nor palpable masses. Her back was kyphotic.

On the laboratory examination, stool occult blood was negative. She had slight anemia (RBC $322 \times 10^4/\mu\text{l}$, Hb 10.6 g/dl), and the rest of the blood examination was normal. Chest radiography showed a retrocardiac air-fluid level as a sliding hiatal hernia.

The patient underwent upper gastroduodenoscopy on November 25, which showed the stomach twisted spirally counterclockwise at the upper body and constricted (Fig. 1). The diagnosis of a gastric volvulus was made. An ultrasonographic examination of the abdomen on November 26 revealed constriction between the dilated upper stomach body and the lower stomach body, in the shape of a peanut. The wall of the stomach including the constricted point was not thickened, ruling out edema (Fig. 2A, B). An upper gastrointestinal barium study demonstrated an inversed α type rotation of the stomach, and the gastric volvulus was determined to be organoaxial mesenteroaxial combined type (Fig. 3A, B). Abdominal computed tomography was performed but did not show clear images of the gastric volvulus.

After the examinations, the patient stopped vomiting. Follow-up US on December 1 demonstrated that the constriction of the stomach had loosened (Fig. 4A, B). Upper gastroduodenoscopy on the next day also showed a loosened constriction and no obstruction of the stomach, allowing an easy entry into the lower body and the antrum of the stomach (Fig. 5). Endoscopic reduction of the gastric volvulus was attempted but unsuccessful. We recommended laparoscopic surgery to the patient’s family, but due to the patient’s advanced age and dementia, they refused. Therefore, no operation was performed.

On December 4, the patient again began vomiting. Abdominal US again revealed the peanut sign. However, the frequency

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Figure 1. Upper gastroduodenoscopy when the patient's symptom existed demonstrated that the stomach was twisted counterclockwise at the upper body and constricted.

of her vomiting reduced daily, and follow-up US also showed a decreased peanut sign again. The patient's course was kept under observation without operation and she was discharged.

Discussion

Gastric volvulus was first described by Berti in 1866 in a female autopsied patient (1), and the first operation was performed by Berg in 1897. Since then, over 400 cases have been reported in the literature. The reported frequency of a gastric volvulus during barium X-ray studies was 0.15% (2).

A gastric volvulus can be classified, according to its axis of rotation, as organoaxial, mesenteroaxial and combined organo- and mesenteroaxial. An organoaxial rotation occurs around a line along the longitudinal axis of the stomach, connecting the gastroesophageal junction with the pylorus, so that the antrum moves from an inferior to superior position. This is the most common type, accounting for greater than 60% of all cases. A mesenteroaxial volvulus is less common and occurs when the stomach rotates from right to left or left to right along the axis from the lesser to greater curvature. A combined organoaxial and mesenteroaxial rotation is the least frequent (3, 4). The present case was diagnosed as a combined organoaxial and mesenteroaxial type by the upper gastrointestinal barium study, which demonstrated that the antrum had moved from the inferior to superior and right to left.

Clinically, a gastric volvulus can be classified as acute or

A

B

Figure 2. (A) Ultrasonogram of the abdomen when the patient's symptom existed revealed constriction between the dilated upper stomach body and the lower stomach body, similar to a "peanut". (B) scheme, * upper stomach body, ** lower stomach body; arrow, constriction by gastric volvulus.

A

B

Figure 3. Upper gastrointestinal barium study demonstrated inversed α type rotation of the stomach. (A) right front obliquity, (B) left front obliquity.

chronic. An acute gastric volvulus is serious, and needs immediate reduction. A chronic gastric volvulus can be asymptomatic or intermittent, varying from vague to severe abdominal pain. Therefore, the clinical picture of a chronic gastric volvulus may be difficult to distinguish from a biliary disease, peptic ulcer or gastritis (5). The present case was thought to be chronic from its clinical course. This case was easily diagnosed because upper gastroduodenoscopy was performed while the symptom appeared. However, in other cases in which the volvulus is reduced, a diagnosis may be difficult.

Based on the etiology, a gastric volvulus can be divided into primary and secondary. A primary gastric volvulus which accounts for one-third of the cases, occurs without diaphragmatic derangement or intraabdominal pathology. Abnormal lengthening of gastrocolic, gastrohepatic, gastrophrenic, and gastrosplenic ligaments is a major etiologic factor (3, 4, 6). A secondary gastric volvulus accounts for two-thirds of cases and is associated with diaphragmatic defects or interabdominal pathology such as a paraesophageal hiatal hernia, elevation of the diaphragm, trauma to the diaphragm, gastric ulcer or neoplasm, phrenic nerve injury causing diaphragmatic paralysis, and extrinsic pressure on the stomach from enlarged abdominal organs or adhesions within the abdomen (6, 7). The present case was secondary to a paraesophageal hiatal hernia.

Symptoms of an acute gastric volvulus are sudden: severe pain localized to the upper abdomen, distension of the upper abdomen and vomiting. Borchardt described a triad of symptoms to aid in the diagnosis: severe epigastric pain and distension, vomiting followed by violent nonproductive retching, and difficulty or inability to pass a nasogastric tube (8). On the other hand, a patient with a chronic gastric volvulus presents with less characteristic symptoms. Patients with a chronic gastric volvulus may present with vague abdominal symptoms or post prandial pain, abdominal distension, belching, vomiting and early satiety (9, 10).

Diagnosis of a gastric volvulus is suspected by its clinical presentation and confirmed by a barium X-ray study. Upper endoscopy is also useful. However, because of the vague symptoms of a chronic gastric volvulus, a barium examination is often delayed until late in the course or until the volvulus has become acutely incarcerated (11).

Abdominal US is non invasive and a convenient modality and can be performed repeatedly. It needs no special premedication and can be carried out on complicated or advanced aged patients. However, there are a few case reports of US of a gastric volvulus shown as normal (5, 12, 13). Abdominal US had been carried out with attention to parenchymal organs such as the liver, gallbladder, pancreas, spleen, and kidney. Recently,

Figure 4. (A) Follow-up US when the patient's symptom did not exist showed the constriction of the stomach was loosened. (B) scheme.

Figure 5. Upper gastroduodenoscopy when the patient's symptom did not exist showed loosened constriction and no obstruction of the stomach.

abdominal US has been used for the gastrointestinal and colon, and reports of its usefulness for gastric cancer, gastric lymphoma, acute gastritis, sliding gastric hiatal hernia, enteritis and other gastrointestinal diseases are increasing (14–18). Because no attention might be paid to the stomach on abdominal US, there were only normal descriptions regarding abdominal US of the gastric volvulus in the past.

We performed abdominal US on a chronic intermittent gastric volvulus and obtained the characteristic sign, consisting of a constricted part and two dilated parts located above and below the constriction, similar to a peanut. We named this the peanut sign. Because US enables observations in any direction on real time, a demonstration of the peanut sign is possible. Generally, the stomach is not routinely observed on US, but it is easy to detect if attention is paid. When constriction and dilatation exist, as in this gastric volvulus, detection is easier. Moreover, this sign paralleled symptoms of a chronic gastric volvulus. When vomiting progressed, the peanut sign was revealed, and when stenosis of the volvulus improved, the peanut sign decreased. Aliotta et al reported the ultrasonographic signs of a sliding gastric hiatal hernia as nonvisualization of the junction and a diameter greater than 16 mm (15). Those signs resembled our sonograms when the gastric volvulus loosened (Fig. 4A), but were completely different from the peanut sign. Thus, the peanut sign is thought to be characteristic of a

gastric volvulus, not a representation of a hiatal hernia. This US sign seems to be useful for observing a chronic gastric volvulus. Especially for high aged and demented patients, a barium study is difficult to perform because the patients can not follow instructions. Also, repeated endoscopy is invasive. In that respect, US needs no special instructions for patients, is painless, and can be repeated.

The treatment for gastric volvulus is generally surgery. Historically, an anterior gastropexy has been performed. Recently, endoscopic reduction of the gastric volvulus has been reported (13, 19–21), and reports of percutaneous endoscopic gastropexy (PEG) (3, 5, 22) and laparoscopic gastropexy (4, 12, 23) for a gastric volvulus have increased. In the present case, endoscopic reduction was attempted but failed. Despite our recommendation of laparoscopic surgery, the patient's family refused because of the patient's high age and dementia. However, surgery will be needed when the patient's symptoms reoccur. As for follow-up, a US observation would be more useful than a barium study or endoscopy. Although a larger series of patients including acute and other types is needed to confirm the abdominal US sign of a gastric volvulus, a US observation for a gastric volvulus is recommended.

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