Ultrasound demonstration of a benign gastric ulcer with gastric outlet obstruction

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CURRENT PRACTICE DICTATES that gastric ulcers are diagnosed by endoscopy, biopsy and contrast radiography. To date, ultrasound in adults has contributed little to the diagnosis of this entity. Benign gastric ulcers have been associated with gastric wall thickening (with or without ulcer crater) and loss of the five-layer structure of the gastric wall (1,2). However, these are not only features of benign ulceration, but also are observed in ulcerative carcinoma, lymphoma, metastases, submucosal tumours and gastritis (2,3). By ultrasound criteria alone, prediction of gastric lesion histology is difficult.

We report the ultrasound demonstration of a benign antral ulcer causing gastric outlet obstruction. Several features of this case allow not only the demonstration of a gastric ulcer by ultrasound, but also – possibly – prediction of ulcer benignity.

CASE PRESENTATION

A 72-year-old man with Alzheimer's dementia was admitted to hospital twice in the period between October 1989 and February 1990 with upper gastrointestinal bleeding. Endoscopy on both occasions revealed a large antral ulcer. Repeated biopsies of the ulcer showed no malignancy. The patient was treated medically with blood transfusions and ranitidine.

The patient was readmitted in March 1990 with symptoms of gastric outlet obstruction. Abdominal ultrasound using 3.5 and/or 5 mHz transducers revealed an antral hypoechoic area of symmetrical, homogeneous, heaped-up mucosa in the shape of a volcano (Figures 1-3). The opening of the volcano-shaped area was filled with hyperechoic substance, presumably blood clots or debris. A peristaltic wave was demonstrated through the muscu-
lars layer (Figures 2,3). An upper gastrointestinal series showed thickened folds in the antral region leading into a deep ulcer crater (Figure 4). Despite multiple attempts at positioning, the ulcer could not be demonstrated on profile during the barium examination.

The patient then underwent a subtotal gastrectomy with Billroth II gastrojejunostomy 24 h later. The surgical specimen showed a perforated benign antral ulcer and chronic gastritis with intestinal metaplasia (Figures 5,6).

DISCUSSION

The classical roentgenological demonstration of a gastric ulcer on profile view is a conical or volcano-shaped projection form the gastric lumen. Signs of a benign gastric ulcer are clear projection of the ulcer outside of the lumen, the Hampton line, an ulcer collar and a symmetrical ulcer mound (4). These findings can also be applied to sonography.

There have been several reports concerning the role of transabdominal ultrasound in the diagnosis of peptic ulcer disease in adults (1-3,5-10). All observed wall abnormalities are features of peptic ulcer disease. Sonographic wall abnormalities included increased wall thickness, asymmetric mucosal thickening, loss of the ability to distinguish between gastric wall layers, and spasm and deformity of the muscularis. In only one of the studies were gastric ulcers directly visualized (2). This report is the second in the English literature demonstrating direct sonographic visualization of a gastric ulcer.

The surgical specimen showed that the ulcer had actually perforated by the time of surgery. This had not been demonstrated by the preoperative imaging, possibly indicating that the perforation was small or occurred in the immediate preoperative period. Demonstration by ultrasound of gastric ulcer perforation has been reported (2,5). Findings indicating perforation are pneumoperitoneum, various fluid collections (subphrenic, subhepatic, gallbladder fossa) and demonstration of a sinus tract (2,5).

We suggest that our case demonstrates previously undescribed sono- graphic features that imply a gastric ulcer may be benign: homogeneous echogenicity of the ulcer crater, the characteristic mound or volcano-like appearance and, particularly, observation of peristaltic waves through the...
ulcer region on real-time scanning. The former are similar to classic roentgenographic criteria for gastric ulcer benignity. In comparison, features suggestive of carcinoma include: gastric wall thickening, localized or diffuse and smooth or irregular; a globular mass, nodular or irregular, poorly or irregularly echogenic or containing a necrotic cavity; and a combination of both (3). Uniform gastric wall thickening and loss of the ability to distinguish between gastric wall layers have previously been described as a sign of both benign and malignant gastric ulceration (2).

There are inherent difficulties in imaging the stomach because of frequent presence of gas or food debris, anatomical position (leading to areas of the stomach being inaccessible to ultrasound), spasm and obesity. Gastric outlet obstruction allows accumulated fluid in the stomach to provide a sonographic window to examine the layers of the posterior stomach wall. Detection of a large amount of fluid in the stomach on sonography also appears to be a feature of duodenal ulcer disease and gastric hypersecretory states (6). Graded compression was found to be useful for visualizing the posterior wall of the stomach. Cases in the literature, as in our case, always involved large ulcers in the antrum, thus allowing successful demonstration by ultrasound.

Ultrasound would have been useful in the follow-up of this patient had surgery not been performed. In patients where endoscopy is not appropriate, sonography may be suitable for diagnosis and for monitoring the healing process. We do not suggest that ultrasound replace endoscopy or barium imaging, but instead be used as an adjunctive diagnostic method. With use of a fluid-aided technique (1), ultrasound could be used in a wider group of patients; however, it may impede further investigations by endoscopy or upper gastrointestinal series.

CONCLUSIONS

The authors report features on ultrasound that suggest a gastric ulcer may be benign: homogeneity of the ulcer crater; characteristic mound or volcano-like appearance of the heaped-up...
folds of mucosa; and, particularly, observation of peristaltic waves through the underlying muscular layer.

REFERENCES
3. Yeh HC, Rabinowitz JO.