

Ultrasound Demonstration of Lesions of the Gastrointestinal Tract

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Abstract. An ultrasonographic pattern of mass lesions with strong central echoes appears to be specific for lesions of the luminal GI tract. Three lesions from different portions of the GI tract showing this appearance are presented. Although ultrasound is not the technique of choice in the diagnosis of lesions of the luminal gastrointestinal tract, it is sometimes preferable to perform ultrasound prior to barium studies, and hence it is important to recognize this characteristic appearance.

Key words: Ultrasonography — Gastrointestinal tract.

There has been a rapid improvement in ultrasound technology recently, which has led to increased sensitivity in imaging and interpretation of disease processes. The ability of abdominal ultrasound examinations to detect and evaluate lesions of the parenchymal organs and retroperitoneal structures is well known [1–5]. The sonographic patterns in gastrointestinal tract tumors have become apparent through experience, with several papers dealing mainly with malignancy of the gastric antrum appearing in the literature in the past 2 years [6–9]. These lesions have demonstrated an echo-free periphery, with strong echoes centrally. We have had experience with several cases and present three examples illustrating findings in the stomach, small bowel, and large bowel.

Case Reports

Case 1. A 68-year-old man, with a Hemoglobin of 6.8 g/100 ml, presented with a 50-lb weight loss over the previous 18 months.

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An abdominal sonogram showed an elongated mass lesion measuring 7 × 8 cm with an echo-free periphery and strong echoes centrally. There was some acoustic shadowing deep to the lesion (Fig. 1A, B). This was interpreted as a concentric carcinoma of the stomach or transverse colon. A barium enema showed complete obstruction to barium by a concentric lesion proximal to the splenic flexure. This was confirmed by other barium studies (Fig. 1C). At surgery a 12 × 15 cm mass was removed which showed adenocarcinoma; this was also attached to the small bowel and stomach.

Case 2. An 85-year-old man was well until 3 weeks prior to admission when he developed severe vomiting and painless epigastric fullness. He had experienced a 10-lb weight loss over the previous year. The abdominal sonogram showed a mass lesion in the epigastrium measuring 7 × 5 cm with an echo-free periphery and echoes arising in the centre. There was also a 3 × 4 cm echo-free area in the left lobe of the liver which was interpreted as representing necrosis in a metastatic lesion (Fig. 2). A GI series was unsuccessful due to emesis, and a nasogastric tube could not pass the area of obstruction. Endoscopy showed extensive carcinoma of the antrum and the body of the stomach to within 5 cm of the cardia. A gastroenterostomy was done for bypass and the operation revealed a primary adenocarcinoma of the stomach with a secondary involvement of the liver. The patient did poorly postoperatively and died 25 days later.

Case 3. A 51-year-old man had a 2-day history of abdominal cramps and a 25-lb weight loss over the previous 6 months. A firm suprapubic mass was palpable. An abdominal sonogram demonstrated a mass lesion measuring 10 × 8 cm with an echo-free periphery and dense central echoes (Fig. 3A). A barium followthrough examination revealed an irregular loop of ileum with other bowel loops displaced away from this area by a soft tissue mass (Fig. 3B). At laparotomy a large lymphocytic sarcoma was found overlying the dome of the bladder, involving the loop of ileum. An enterocolic anastomosis was performed joining the ileum 10 cm above the tumor to the right side of the transverse colon. The patient did well postoperatively.

Discussion

As demonstrated by these cases, the typical sonographic appearance of bowel malignancies is a mass lesion with an almost echo-free periphery and dense central echoes. This appears to hold true for lesions involving the wall of any portion of the alimentary tract and is caused by the concentric thickening of

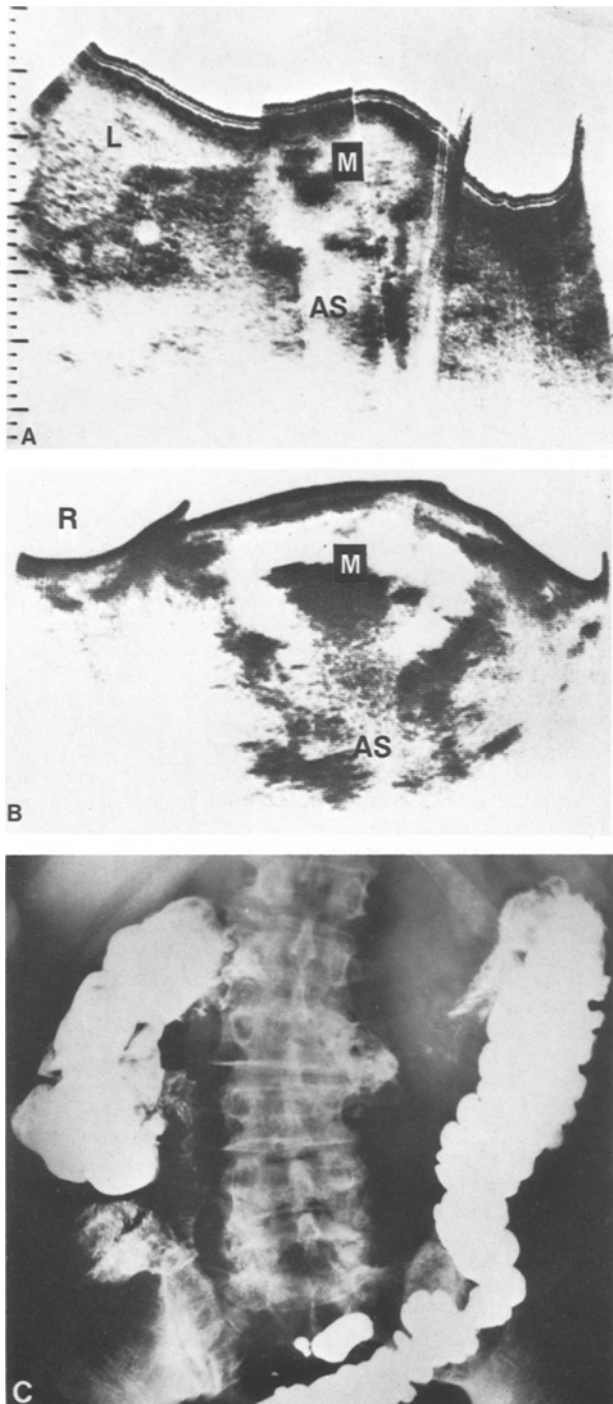


Fig. 1. Case 1. Adenocarcinoma of the colon. **A** Longitudinal and **B** transverse sonograms showing a mass (*M*) 6 × 7 × 8 cm with a dark echogenic area centrally. (*L* liver; *AS* acoustic shadowing **C** Delayed film following barium meal showing a constricting lesion with a surrounding soft tissue mass in the transverse colon

infiltrated bowel wall appearing almost echo-free. The strong central echoes arise from the lumen, and if gas is present within the lumen, acoustic shadowing

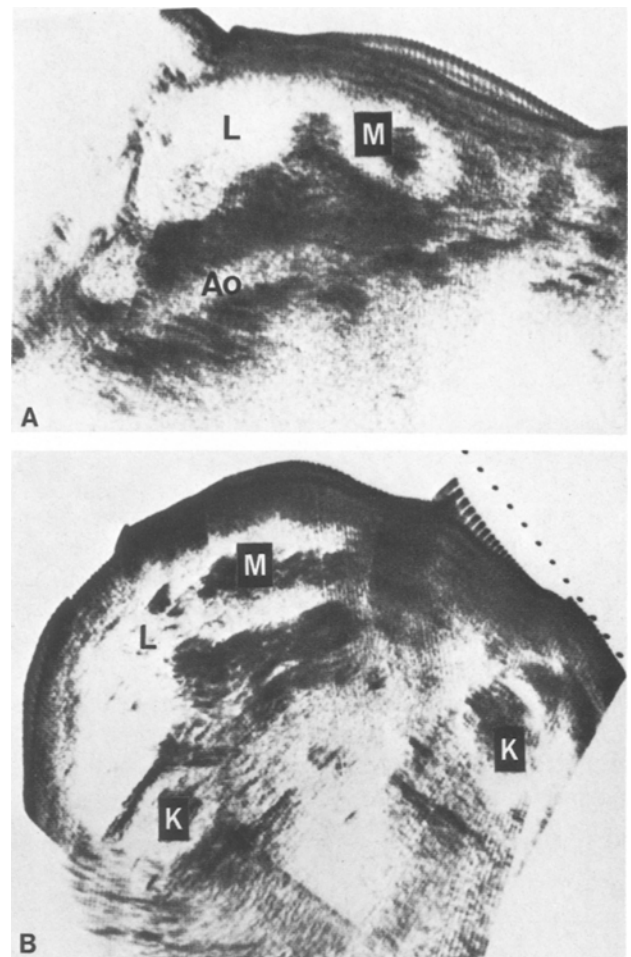


Fig. 2. Case 2. Adenocarcinoma of the antrum of the stomach. **A** Longitudinal and **B** transverse ultrasound scans which show a 7 × 4 × 5 cm mass inferior to the left lobe of the liver (*L*) and anterior to the aorta (*Ao*). The mass (*M*) contains a dark area of echoes in the center representing the lumen. *K* kidney

results deep to the luminal echoes. Normal collapsed bowel can show a similar appearance of a thin rim of relatively echo-free bowel wall surrounding the collapsed echogenic mucosa (Fig. 4). If the bowel is fluid filled, it appears cystic and may show a fluid level if scanned from posterolaterally with the patient in the supine position. Gas-filled loops show no echo-free zone and cause considerable acoustic shadowing deep to them.

We are not suggesting by this report that ultrasound should replace barium studies and gastroscopy in the diagnosis of gastrointestinal disease. However, since barium is known to be detrimental to abdominal ultrasonography [7, 8], the ultrasound study in the presence of an abdominal mass lesion may be done

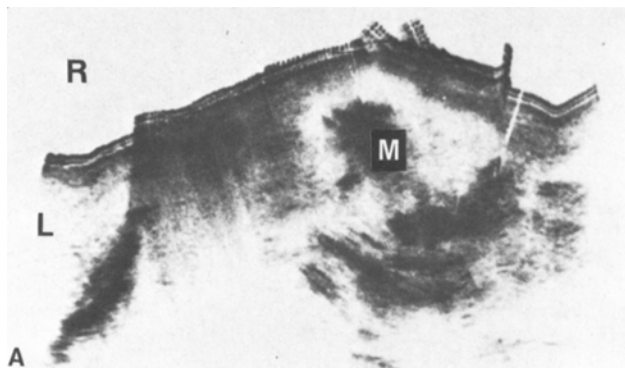


Fig. 3. Case 3. Lymphosarcoma of the distal small bowel. **A** Transverse sonogram showing a homogeneous mass (*M*) peripherally with dark echoes in the center arising from gas. No acoustic shadowing deep to the luminal echo. *L*, liver **B** Small bowel followthrough demonstrating abnormal segment of ileum with soft tissue mass displacing adjacent loops

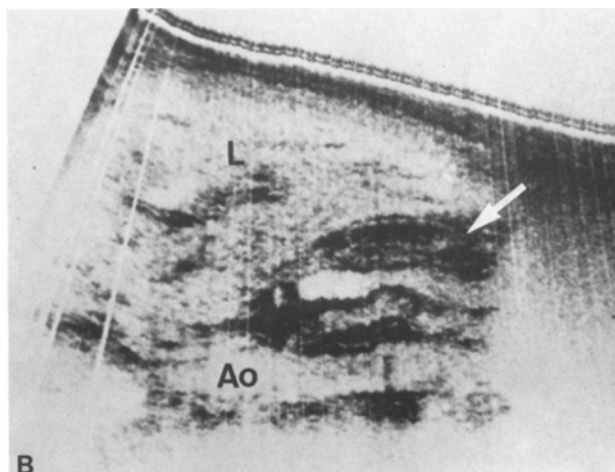
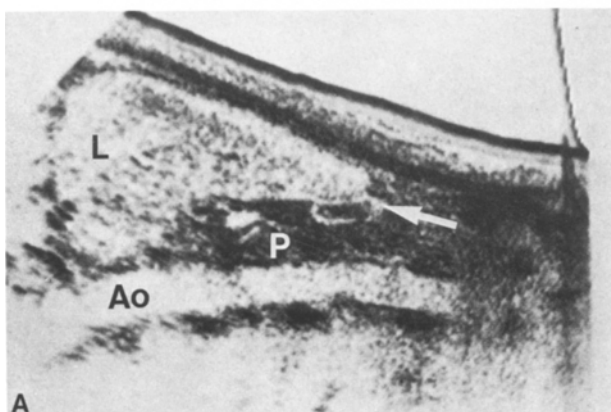


Fig. 4. **A** Longitudinal sonogram showing the normal stomach (*white arrow*). The echogenic mucosa (black) is shown within the muscularis (light). *L*, left lobe of liver; *P*, pancreas; *Ao*, aorta. **B** Longitudinal sonogram showing the normal stomach (*white arrow*). From anterior to posterior note: left lobe of liver (*L*), collapsed stomach (*white arrow*), body of pancreas, superior mesenteric vein, superior mesenteric artery, aorta (*Ao*), anterior surface of spine. Note the echogenic (black) mucosa in collapsed lumen of the stomach and relatively echo-free (light) muscularis of the stomach

prior to the barium studies. It is therefore helpful and important to appreciate the features of lesions in the gastrointestinal tract to differentiate them from parenchymal lesions of the abdomen and retroperitoneum.

In addition to demonstrating the lesions, sonographic study may disclose other helpful findings. Metastases can be demonstrated in the liver. If considerable obstruction exists, a large fluid collection may be demonstrated proximal to the lesion. This occurs principally in the stomach but may occur at any level. When such a fluid collection is in the stomach, it can be proven sonographically by having the patient swallow water and demonstrating the movement of bubbles and particulate matter by real-time ultrasound scanning of the stomach.

The lesion must be large to produce the typical sonographic pattern and involve approximately one-half the circumference of the bowel wall. Although our examples involve malignancies, benign lesions which cause significant thickening of the localized portion of the alimentary tract could give the same appearance. Such patients can present with acute symptoms, as in our malignant examples. The abdominal sonographic findings can speed localization of disease processes, and therefore aid in the treatment of the abdominal emergency. The examination is quickly performed and is completely innocuous.

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Received: February 3, 1978; accepted: February 23, 1978