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Imaging characteristics of liver metastasis from gastrointestinal stromal tumor before and after imatinib mesylate treatment

İmatinib mesylate'la tedavi önce ve sonrasında kistik karaciğer metastazının görüntüleme bulguları

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Our objective was to show the unusual imaging characteristics of cystic liver metastases from a malignant gastrointestinal stromal tumor before and after treatment with imatinib mesylate.

Key words: Ultrasonography, computed tomography, gastrointestinal stromal tumors, imatinib mesylate

Bu yazımızda malign gastrointestinal stromal tümörün kistik karaciğer metastazlarının imatinib mesylate'la tedavi önce ve sonrasında atipik radyolojik bulgularının gösterilmesi amaçlanmıştır.

Anahtar kelimeler: Ultrasonografi, bilgisayarlı tomografi, gastrointestinal stromal tümör, imatinib mesylate

INTRODUCTION

Most metastases from gastrointestinal stromal tumors (GISTs) are found in the liver and peritoneum; they rarely develop in the lung. Traditional chemotherapy or radiotherapy is not effective in treating this type of tumor (5). Recently, STI-571 imatinib mesylate (Gleevec; Novartis, Basel, Switzerland), a first-generation tyrosine kinase inhibitor with a high specificity for the c-kit proto-oncogene, was used in a clinical trial of the treatment of unresectable primary GISTs that had metastasized (6-8).

Some studies suggest that cystic changes demonstrated by computed tomography (CT) imaging in primary or metastatic GISTs treated with imatinib mesylate indicate the chemotherapeutic effectiveness of that agent (6-8). However, little information about the ultrasonographic appearance of GIST metastases treated with imatinib is available. The goal of this study was to determine the ultrasonographic characteristics of GIST-related hepatic metastases before and after treatment with imatinib mesylate.

CASE REPORT

A 65-year-old man was examined at our institution for an epigastric swelling of a few months' duration. Physical examination revealed a palpable abdominal mass in the patient's upper abdomen in addition to hematemesis, and this finding was accepted as upper gastrointestinal bleeding. A preoperative CT scan showed a large primary tumor (15x16x16 cm) that had invaded the stomach, colon, and small bowel (Figure 1). Precontrast and postcontrast CT scans of the abdomen revealed one hypodense lesion on the right lobe of the liver. The cystic nature of that lesion was established ultrasonographically. On sonographic examination, this hepatic lesion was anechoic with a well demarcated, thin wall and posterior acoustic enhancement. We very carefully performed Doppler examination and no vascularity was shown in this cystic lesion (Figures 2A and 2B).

Postsurgical findings indicated that the primary GIST site, which was very large and complex, involved the muscularis propria and serosa of the stomach, colon, and small bowel but not the muco-

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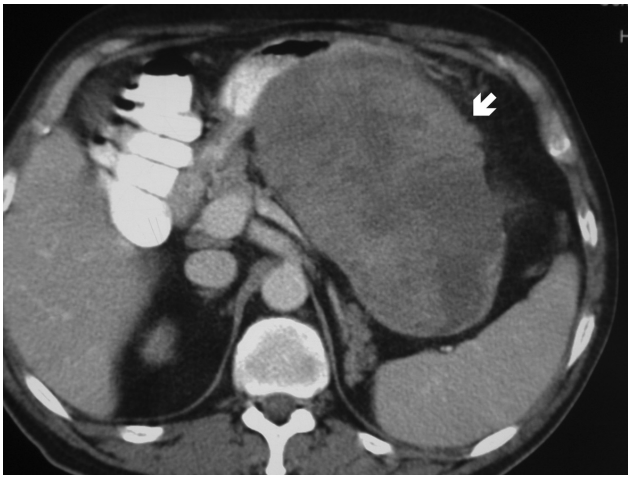

Figure 1. Post-contrast CT scan shows large primary tumor (white arrow).

sa of those organs. The tumor was thought to have originated from the colonic serosa. The results of pathologic examination indicated that the primary lesion had originated in the serosa of the colon and had then invaded the gastric and small bowel muscularis propria. Serial section of the mass showed the neoplasm infiltrating serosa and subserosal fat tissues and composed of epithelioid cells with round, vesiculated nuclei, prominent nucleoli and eosinophilic cytoplasm. Necrosis and 14-15 atypical mitosis/10 high-power fields were present across the tumor. Tumor cells were diffuse positive for CD-34, focally positive CD-117(c-kit) and negative for desmin, SMA and S-100 (Figure 3).

The patient was treated postoperatively with imatinib mesylate. After three months, his cystic liver lesion had increased in size and solid components had developed at the periphery of the cystic metastatic lesion (Figure 4). Six months after the patient's first presentation, a CT scan revealed mesenteric metastatic masses. The patient died 12 months after his first examination at our institution.

DISCUSSION

Although GISTs are rare, they are the most common non-epithelial neoplasm of the gastrointestinal tract. These nonepithelial neoplasms originate from the interstitial cells of Cajal, which are intestinal pacemaker cells, and arise from the muscularis propria of the gastrointestinal tract wall (1,2). Older medical literature refers to GISTs as leiomyomas, leiomyoblastomas, schwannomas, or leiomyosarcomas. In 1983, however, electron microscopic and immunohistochemical analyses revealed a lack of smooth muscle and Schwann cells in GISTs, which were then classified as spindle cell, epithelioid, or pleomorphic mesenchymal tumors of the gastrointestinal tract that express the KIT protein (CD 117, stem cell factor receptor) (1-3).

GISTs occur most frequently in the following anatomic sites: stomach (60%), small bowel (30%), colon and rectum (5%), and esophagus (<5%) (1-4). A

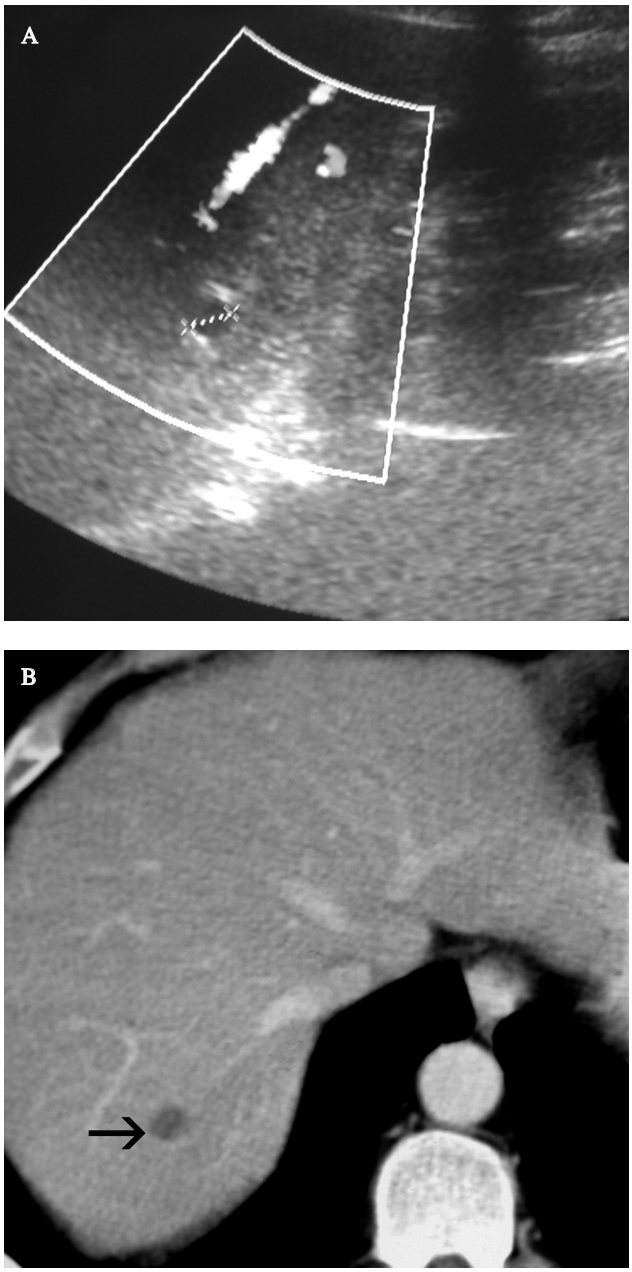

Figure 2-A) Ultrasonographic and **B)** CT scans before imatinib therapy show pure cystic and hypoattenuating metastatic lesions (0.8x0.9 cm) (arrows) in segment VII of the right liver lobe.

GIST may also develop as a primary tumor of the omentum, mesentery, or retroperitoneum. GISTs account for 1% to 3% of gastric neoplasms, 20% of small bowel tumors, and 0.2% to 1% of colorectal tumors (1-4).

A few studies have used CT or magnetic resonance imaging (but not ultrasonography [US]) to investigate GIST-related metastasis. The CT findings of some authors (6-8) are based on a comparison of CT scans of intra-abdominal or extrahepatic or intrahepatic GIST metastases before and after imatinib mesylate treatment. Those authors found the same radiologic results: CT showed that all hepatic and extrahepatic metastases resembled cystic lesions after imatinib mesylate therapy. In our patient treated with imatinib mesylate, the GIST-related liver metastases were ultrasonographically identified as being cystic before therapy. This simple hepatic cyst might in fact not be simple and might represent an early stage of metastases.

Chen and colleagues (7) did not use US to identify hepatic cysts or cystic lesions in their patients with metastatic lesions because their institution uses CT for the routine evaluation of hepatic metastases. Similarly, US is also not used in our institution for surveillance for metastatic disease arising from extrahepatic tumors, such as GISTs.

The case described in our report is important because the cystic liver lesion identified ultrasonographically was a GIST-related metastasis. Clinicians must be aware that an ultrasonographically identified simple liver cyst may be a metastatic lesion in a patient with a GIST, so that surgeons can be preoperatively alerted to that possibility. To our knowledge, this is the first report in which a metastatic lesion from a GIST is purely cystic in nature, mimicking a simple cyst on US and CT examinations.

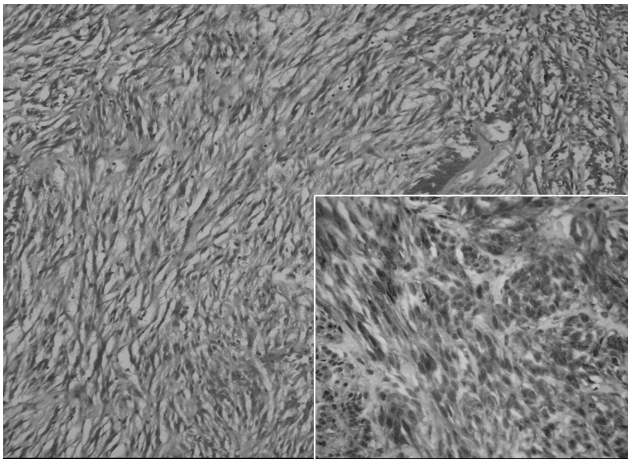

Figure 3. On microscopic examination, the tumor shows spindle cells with round hyperchromatic nuclei and prominent nucleoli forming bundles (hematoxylin and eosin, 200 x). Inset: Immunohistochemically, the cells were diffusely positive for CD-117 (c kit) (CD-117, 200 x).

Figure 4. CT scans obtained after 3 months (2x2 cm) of treatment with imatinib indicate that the hepatic lesions shown in Figure 2A (arrow) have increased in size and changed into cystic structures with peripheral solid components.

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