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SPECT demonstration of splenosis

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Splenosis is defined as the heterotopic autotransplantation of splenic tissue. The main cause of splenosis is splenic rupture following abdominal trauma, in which fragments of splenic tissue are seeded throughout the peritoneal cavity.

Demonstration of splenosis by scintigraphy or CT imaging has been reported, but there is no previous report of simultaneous demonstration by SPECT and CT imaging. Autotransplantation of splenic tissue in the abdominal cavity forms a solid tumor-like image on CT and is difficult to differentiate from other abdominal masses. In such cases, SPECT demonstration of splenosis is very important for identification of its exact site.

A case report of splenosis is presented, in which simultaneous demonstration by SPECT and CT was performed. This was confirmed at laparotomy for gastrectomy.

Key words: splenosis, SPECT, Tc-99m-Sn colloid, CT, laparotomy for gastrectomy

INTRODUCTION

IN 1939, Buchbinder and Lipkoff[1] defined splenosis as autoimplantation of splenic tissue following splenic rupture. They reported a case of multiple splenosis throughout the abdomen, involving the peritoneal surface, abdominal wall and omentum. Once splenic fragments are implanted, they are fed by a new blood supply.

About 80 cases of splenosis have been reported since 1939. In these cases, the imaging methods used were ultrasound, CT and scintigraphy.[2–10] The solid masses formed by the spread of splenic fragments mimic intraabdominal masses such as accessory spleen, hemangioma, endometriosis and metastatic peritoneal tumors.[11–13] There are several reports of splenosis mimicking tumors not only in the peritoneal space but also in the intrathoracic and perirenal space.[5,14]

The phagocytic Kupffer's cells of the reticuloendothelial system (RES) allow the evaluation of the splenic tissue by means of colloidal substances. In addition, scintigraphic study by SPECT makes possible a comparative study with CT, and can identify the precise location of implanted splenic fragments.

CASE REPORT

A 59-year-old man was admitted to our medical center to undergo surgery for early gastric cancer. The patient had a previous history of left abdominal trauma followed by splenectomy and left nephrectomy. Prior to surgery, a routine CT scan was performed to evaluate metastasis. CT images did not show liver metastasis but several nodules were present in the abdomen (Figs. 1 and 2). Anterior planar and SPECT data for the abdomen were obtained about 20 min after intravenous injection of 111 MBq (3 mCi) of Tc-99m Sn colloid. A paired large field of view gamma camera (Toshiba GCA-90A) with a high resolution collimator and a dedicated computer (Toshiba GMS-550 U) were used. The anterior whole body image was obtained at a scanning speed of 20 cm/min. The SPECT data were acquired continuously for 15 min through 180 degrees at 6 degree intervals with 20 sec. for each projection acquisition.

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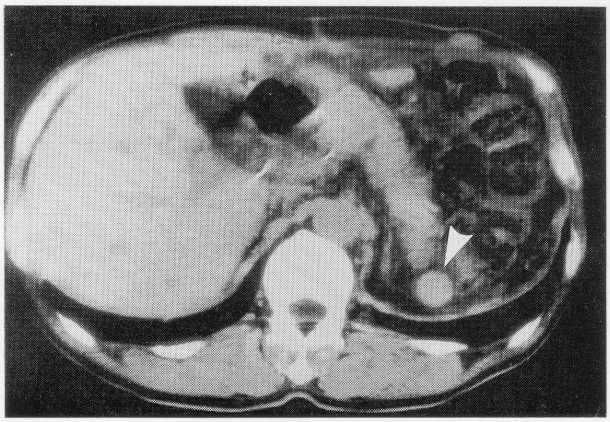

Fig. 1 CT image at the level of the pancreas. An abnormal small nodule (arrowhead) in the left posterior abdominal cavity is seen.

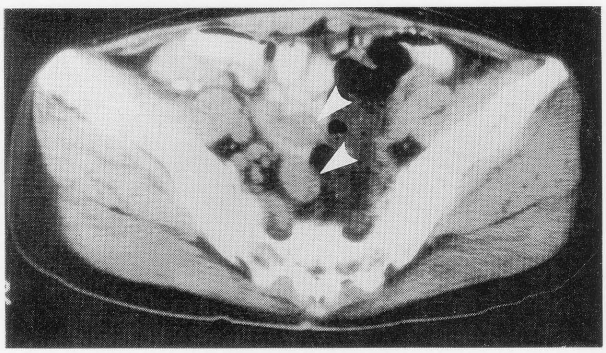

Fig. 2 CT image at the level of sacrum. 2 or 3 small nodules (arrow) are observed in the pelvis, which can be differentiated from the intestinal loop on gastrografin CT study.

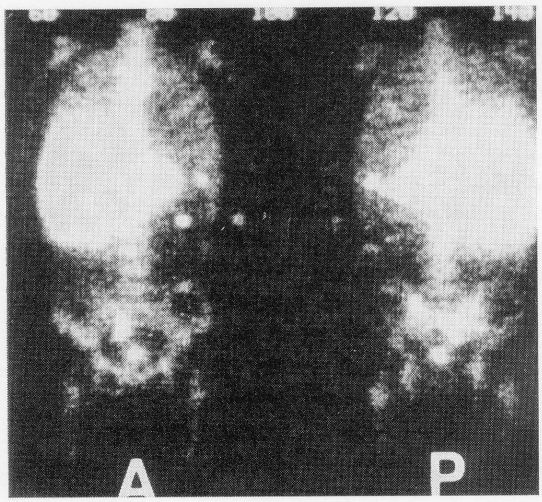

Fig. 3 Planar scan image with ^{99m}Tc Sn-colloid. (Anterior and posterior view). Normal hepatic and bone marrow uptake and abnormal spotty uptake in the left upper abdomen and pelvic cavity are delineated.

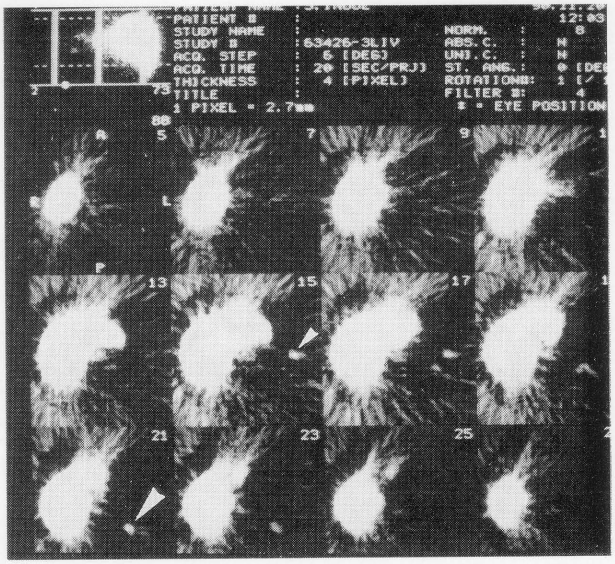

Fig. 4 SPECT image of the upper abdomen. Normal hepatic uptake and abnormal spotty uptake (small and large arrowhead) in the left abdomen is observed.

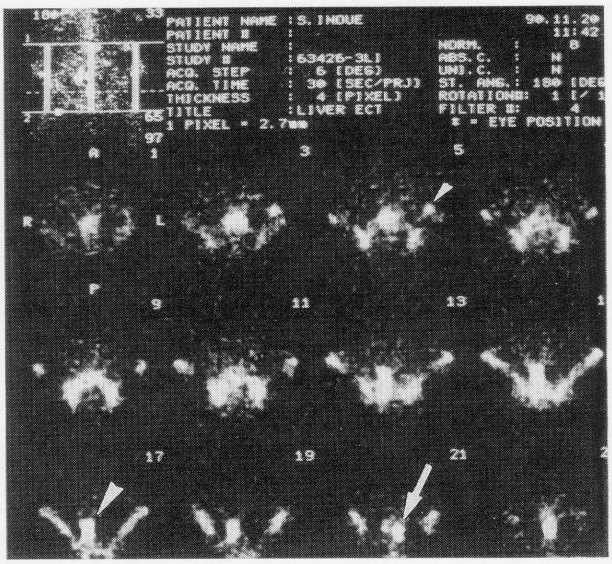

Fig. 5 SPECT image of the pelvis. Normal pelvic bone marrow uptake and abnormal spotty uptakes in the left upper pelvis (small arrow head) and in the lower middle pelvis (large arrow head and arrow).

Projection data were pretreated by the 9 point smoothing method and reconstructed with a Chesler filter. Photon attenuation was not corrected.

Anterior whole body scintigraphy revealed abnormal hot spots in the upper and lower abdomen. As the display mode was used in a low window setting to delineate the small nodules, normal hepatic and bone marrow uptake was very high (Fig. 3). SPECT images, but not the planar images, could detect the precise location of hot spots (Figs. 4, 5). The SPECT images showed hot spots in the follow-

Fig. 6 On laparotomy, some reddish brown small tumors (small, 5 mm and large, 30 mm arrow head) attached to the peritoneum are visualized. The surface of tumors are smooth and are engorged with some feeding vessels.

ing sites: 1) the middle part of the left upper abdomen 2) the posterior part of the left upper abdomen 3) the left upper portion of the pelvis contiguous to the left crista iliaca. 4) the lower pelvis adjacent to the right sacroiliac joint, and 5) the lower pelvis near the rectum. These hot spots corresponded to the abnormal nodules on CT.

The laparotomy performed for gastrectomy revealed multiple reddish brown nodules, with diameters ranging from 5 to 30 mm, attached to the peritoneum in the pouch of Douglas, on the serosal surface of the duodenum and near foramen of Winslow (Fig. 6). A frozen section of one of the nodules showed splenic tissue microscopically. The blood specimen did not demonstrate Howell-Jolly bodies, indicating the presence of splenic function.

DISCUSSION

Since the first reported case of splenosis by Buchbinder and Lipkoff in 1939.[1] the number of reported cases of splenosis is now over 80. In most cases, diagnosis of splenosis depends on a past history of left flank injury with splenic rupture. CT and US provide useful information for the differentiation of splenosis from other abdominal tumors. Splenosis has been found in various sites in the peritoneal cavity, including the intestinal serosal surface, the parietal peritoneum, and the diaphragmatic surface.[1,15] In addition, unusual cases of retroperitoneal and intrathoracic splenosis have been reported.[5,14] The peripheral blood supply of splenulus is derived from small perforating vessels that arise at the implanted site.

Splenosis mimics solid masses, such as endometriosis, hemangioma and metastatic tumor.[12,14] An accessory spleen can be differentiated from splenosis, based on its location at the splenic hilus. The implants are described as dark reddish-brown, sessile or pedunculated nodules. They vary in number, with as many as 400 having been reported. The size varies from millimeters to several centimeters. The CT appearance of these masses is nonspecific. However, CT has high sensitivity for masses smaller than 1 cm in diameter. Although the resolution of the scintigram is rather poor, the method of radionuclide study with Tc-99m Sn colloid or Tc-99m- heat damaged RBC[4-9] allows presise specific confirmation. The present study utilized Tc-99m-Sn colloid uptake by the RES of the liver, spleen, and bone marrow. With Tc-99m-labelled heat-denatured autologous erythrocyte splenic imaging in 90 splenectomized patients, splenosis was detected in 32%. The incidence was 50% in those patients with traumatic rupture, and was only 16% in those who underwent splenectomy for hematologic disorders.[4] Radiolabelled heat-damaged red cell scanning and Indium 111 (In-111-labelled autologous platelet) scanning have also been used to image residual splenic tissue.

SPECT imaging was able to demonstrate the precise location of splenosis and its results were compatible with those of CT imaging.

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