

FIG. 3. Upper image is a posterior rectilinear scan of spleen and liver (Tc-99m sulfur colloid). Large splenic defect in an organ 18 cm in length, as well as right hepatic lobe lesion and absent left lobe (probably due to irradiation) can be seen. Bottom image, a posterior scintiphoto, was obtained 6 yr later. Absence of left lobe of liver was noted on anterior view as well. Spleen was of normal configuration.

a "hollow" appearance on radiocolloid scan, should suggest the diagnosis of histiocytic lymphoma.

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Inversion of the Spleen—Scintigraphic Features

Focal defects of the spleen observed on radionuclide images are usually due to infarction, neoplasms, trauma, cysts, and congenital diseases (1-3). Recognition of the upside-down spleen, an anatomic variant that may present as a more serious abnormality (4), became of utmost clinical importance to a patient recently encountered who had a malignant melanoma and a focal splenic defect on a spleen scan.

Two years before this admission, a 50-year-old white male had had a malignant melanoma resected from his right shoulder. Although apparently free of tumor, he began to complain of upper abdominal pain with no other gastrointestinal symptoms. A liver-spleen scintigram revealed a defect in the upper pole of the spleen (Fig. 1A and 1B), and metastasis was suspected. Physical examination, laboratory studies, and an upper gastrointestinal series were unremarkable. A celiac arteriogram demonstrated a "vascular tumor" in the left upper quadrant of the abdomen supplied by gastric vessels. Ultrasound study of the left upper abdomen was not diagnostic. Review of the spleen scans and the angiogram together suggested an anatomical variant, the upside-down spleen (4). For this reason, a combined radionuclide study of the stomach (oral $^{99m}\text{TcO}_4^-$) and spleen (Tc-99 SC) was performed. This procedure demonstrated that the spleen was inverted and that the V-shaped defect of the spleen was filled in by pertechnetate that was located in the horizontal fundus of the stomach (Figs. 2A and 2B). Subsequently, the abdominal pain subsided, and he became asymptomatic.

There is considerable variation in the configuration of

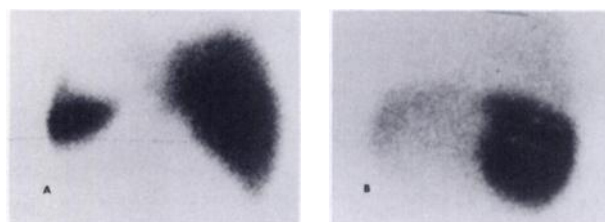


FIG. 1. Posterior (A) and left lateral (B) scintiphotos following injection of Tc-99m sulfur colloid shows notch-like defect directed superiorly.

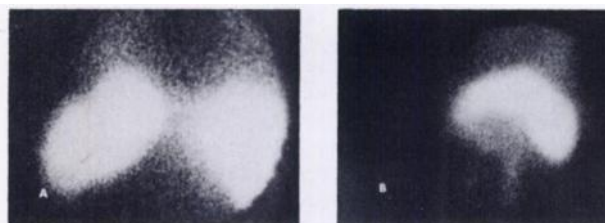


FIG. 2. Posterior (A) and left lateral (B) scintiphotos with pertechnetate in stomach; Tc-99m sulfur colloid in the spleen shows the V-shaped defect to be filled in by the stomach activity. Together they present a smooth convexity toward the diaphragm.

the normal spleen that can include notching, septation, and one or more accessory spleens. Notches of the spleen occur superiorly (80–100%), inferiorly (30–60%), and anteriorly (3–15%) (4), but rarely posterior or on the diaphragmatic surface. Notching, per se (4), does not result in change of the normal orientation of the splenic hilus, which is directed inframedially; however, if the spleen rotates on its horizontal anteroposterior axis, then the hilum points superiorly toward the diaphragm and faces the fundus and upper body of the stomach. Since the splenic anlage develops in the dorsal mesogastrium adjacent to the posterior or greater curvature of the stomach, the gastric fundus would occupy the large superior splenic cleft. This point was clearly demonstrated by the combined gastric-splenic scan. The major advantage of recognizing this variation by means of the combined gastric and liver-spleen scans is to differentiate it from serious conditions, or to recommend further investigations such as contrast arteriography.

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"Small Spleen" Due to Liquefied Hematoma

While splenomegaly is an alerting sign for further investigation of that organ, the "small" spleen may also indicate disease. By "small" we mean one having a functional (scan) length of more than 2 standard deviations below the median value found in the population. Because of this, we report the size of the spleen on liver-spleen radiocolloid scans. A "small" spleen implies either a reduction in the entire size of the organ, or the replacement of much of the functioning splenic volume. A recent case illustrates the latter finding.

A 45-year-old man entered the hospital because of left lower quadrant pain of 5 days duration. The pain was described as crampy, not associated with eating, and did not radiate. There had been a long history of ethanol intake. Physical examination revealed a thin man in moderate distress. The abdomen was distended; there were decreased bowel sounds. In the left upper quadrant there was a fullness, suggestive of a mass, which could not be clearly outlined. Initial workup for diverticulitis, including sigmoidoscopy and barium enema, was unproductive. An intravenous pyelogram revealed a left upper quadrant mass, with downward displacement of the left kidney. An upper gastrointestinal radiographic study demonstrated hypertrophic gastric folds. A spleen scan showed the organ to be only 5 cm in length (Fig. 1), our normal values being 10 ± 1.5 cm. A celiac arteriogram, by femoral approach, demonstrated a large avascular mass within the spleen (Fig. 2). A cyst was considered. The patient underwent exploratory laparotomy and splenectomy. The spleen contained a liquefied

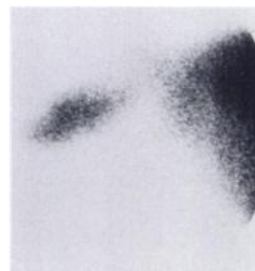


FIG. 1. Posterior scintiphoto showing spleen and part of liver. Functional splenic tissue was present as thin and short (5 cm) band.



FIG. 2. One view from celiac arteriogram performed on patient. Avascular intrasplenic mass is apparent.

hematoma. Postoperatively, the platelet count rose markedly. He was treated with aspirin for this, and was discharged from the hospital.

We regularly report the sizes of the liver and spleen in radiocolloid scans. This is done for two reasons: (a) to alert us to changes in the functional size of these organs, when the patient is studied at two or more times; and (b) in order to recognize an abnormally large or small organ. Our range of lengths for a normal spleen is identical with that found by Larson and coworkers (1) and is close to the values reported by Sigel and associates (2). A functional length of less than 7 cm is more than 2 standard deviations below the mean, in which case a reason for the reduction in functioning splenic tissue must be sought. A number of disorders resulting in a spleen of decreased overall size have been discussed (3). The present case illustrates that replacement of much of the splenic volume by abnormal tissue can produce a rather similar radiocolloid image.

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