

ABNORMAL LIVER SCAN (RADIOCOLLOID "HOT SPOT")**ASSOCIATED WITH SUPERIOR VENA CAVAL OBSTRUCTION**

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We have recently observed three patients with superior vena caval obstruction who show a unique abnormality in the ^{99m}Tc -sulfur colloid liver scan, namely, a well-defined area of increased radioactivity above the gallbladder fossa on anterior view. This abnormality was not shown with rose bengal scan in two patients and did not appear when sulfur colloid was injected through a leg vein on a repeat study in one patient.

MATERIALS AND METHODS

Liver scans were performed with a Nuclear-Chicago Pho/Gamma scintillation camera with low-energy collimator after i.v. injection of 2 mCi of ^{99m}Tc -sulfur colloid (prepared from the Tesuloid Kit) into an antecubital vein or (Case 3) a pedal vein. The study was started 5–20 min after injection, and anterior, posterior, and right lateral views were obtained. Repeat images were obtained up to 3 hr after injection in one patient (Case 3).

In two patients ^{131}I -rose bengal was used (100–150 μCi through the antecubital vein), and the scan was obtained using the camera and high-energy collimator.

CASE REPORTS

Case 1. Patient RC, a 51-year-old male, underwent right pneumonectomy on December 12, 1966, for squamous cell carcinoma (Grade III) of the right upper lobe. He was readmitted on November 29, 1969, because of cough, dyspnea, and weight loss. Dilated veins were noted over the neck, anterior chest, and abdomen. Chest x-ray showed right pleural effusion. Bronchoscopy revealed a growth in the right main bronchus which on biopsy proved to be poorly differentiated squamous cell carcinoma. Liver scan (1.5 mCi ^{99m}Tc -sulfur colloid) showed a discrete area of increased radioactivity near the junction

of the right and left lobes on anterior view (Fig. 1). Alkaline phosphatase was 15.7 units (normal 2–15), albumin was 2.3 gm/dl, and globulin was 4.4 gm/dl. Bilirubin and SGOT were normal. His condition deteriorated rapidly, and he died on December 11, 1969. Autopsy was not permitted.

Case 2. Patient EE, a 47-year-old male, was hospitalized on December 7, 1970, with a 1-week history of pressure sensation in the upper chest with swelling of face and neck when supine. Dilated veins were noted over the neck and anterior chest. The face appeared swollen and purplish. Chest x-ray revealed upper mediastinal widening. Bronchoscopy and transcarinal biopsy were negative. A large tumor mass was seen on mediastinoscopy and found on biopsy to be undifferentiated small cell carcinoma. Liver scan (1.6 mCi ^{99m}Tc -sulfur colloid) on December 14, 1970, (Fig. 2) showed a large discrete area of increased radioactivity on the anterior view near the junction of the right and left lobes. Repeat

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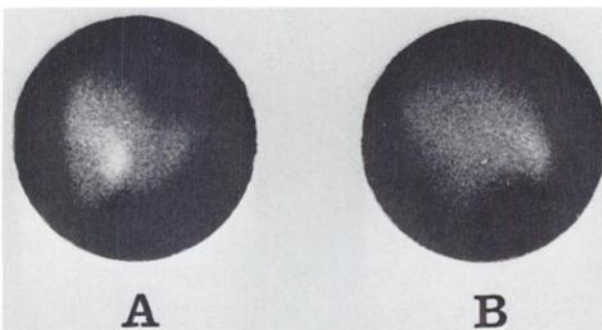


FIG. 1. Case 1. Technetium-99m-sulfur colloid liver scans. Anterior (A) and right lateral (B) views.

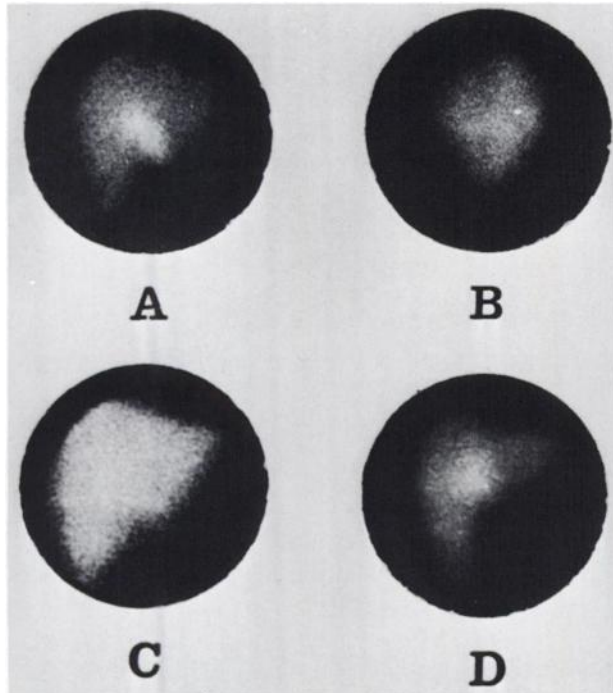


FIG. 2. Case 2. Initial (December 14, 1970) ^{99m}Tc -sulfur colloid liver scans. Anterior (A) and right lateral (B) views. (C) Rose bengal liver scan (anterior view), December 20, 1970. (D) Repeat ^{99m}Tc -sulfur colloid scan, February 11, 1971 (after cyclophosphamide and 6 weeks cobalt teletherapy to mediastinum).

^{99m}Tc -sulfur colloid scan (December 18, 1970) showed the same pattern, but rose bengal scan showed no abnormality. Alkaline phosphatase was normal. Following these studies the patient received 2 gm cyclophosphamide i.v. and ^{60}Co irradiation therapy to the mediastinum. His vena caval obstruction improved. A third radiocolloid liver scan (February 11, 1971) showed slight decrease in the intensity of the liver "hot spot," and an unexplained change in configuration of the liver. On April 20, 1971, he was readmitted because of abdominal pains, nausea, and vomiting. He had lost weight and was weak, drowsy, and hoarse. No venous distention was noted. Coarse rhonchi were heard bilaterally. A poorly defined upper abdominal mass was noted. Chest x-ray showed a superior mediastinal mass. Alkaline phosphatase was elevated (34 units). Bilirubin and SGOT were normal. During the next 3 weeks his nausea and abdominal pains increased and were accompanied by jaundice (bilirubin 14.4 mg/dl) and further elevation of alkaline phosphatase to 135. He died on May 10, 1971.

Autopsy revealed undifferentiated small cell carcinoma involving mediastinal and abdominal lymph nodes, lungs, heart, liver, intestines, peritoneum, pancreas, kidneys, adrenals, and thyroid. The common bile duct was compressed by metastases in the head of the pancreas, causing obstructive biliary

cirrhosis. The liver weighed 2,000 gm and contained several metastases averaging 5 mm in diam (largest, 2 cm). The gastrohepatic ligament contained a firm yellowish-white material. No large localized abnormality was found to explain the discrete defect on liver scans. Microscopic studies of the liver showed areas of neoplastic round cell infiltration in the hilum and adjacent areas.

Case 3. Patient RTS, a 60-year-old male was hospitalized on March 29, 1972, complaining of non-productive cough and increasing dyspnea since January 1972 with rapid progression of dyspnea for 10–14 days prior to admission. In the sitting position he demonstrated marked dilatation of veins in the neck and upper chest. X-ray showed a right superior mediastinal mass, and bronchoscopy revealed a fungating tumor involving the right main bronchus and carina. The biopsy diagnosis showed an undifferentiated oat cell type carcinoma. Technetium-99m-sulfur colloid scan showed a localized area of increased radioactivity just above the gallbladder notch. This persisted on repeat scans at intervals up to 3 hr after injection but was not shown on ^{131}I -rose bengal scan and did not appear when ^{99m}Tc -sulfur colloid scan was repeated after injection of radioactive material into a pedal vein rather

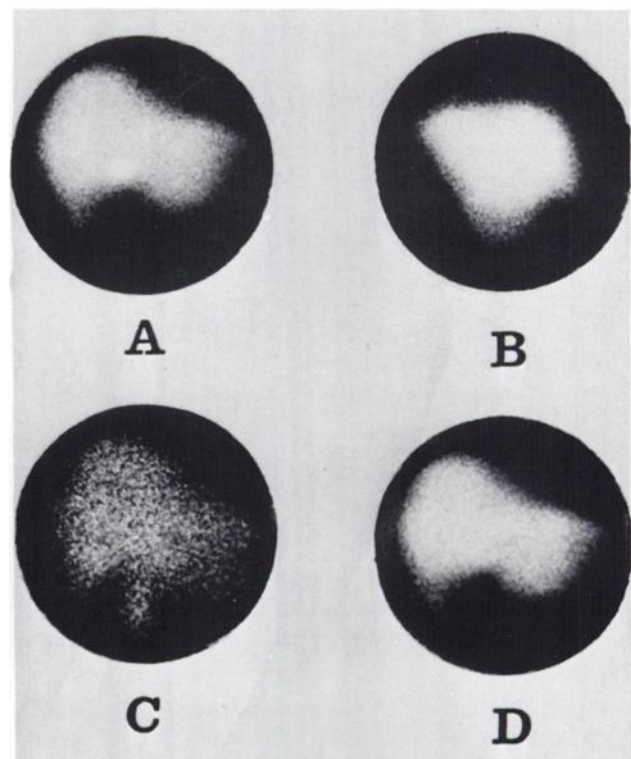


FIG. 3. Case 3. (A, B) ^{99m}Tc -sulfur colloid liver scans (anterior and right lateral views), April 12, 1972. (C) Rose bengal liver scan, April 14, 1972. (D) ^{99m}Tc -sulfur colloid liver scan with injection of radionuclide through right pedal vein, April 12, 1972.

than the antecubital vein (Fig. 3). The patient has started palliative ⁶⁰Co teletherapy and has noted moderate improvement in his symptoms.

DISCUSSION

Coel, et al (1) recently presented the case report of a patient with liver scan similar to those reported here. The patient also had a mediastinal mass and superior vena caval obstruction. The rose bengal scan was thought to show an area of decreased radioactivity where the "hot spot" appeared on radiocolloid scan. Because of this and an abnormal ultrasonic scan it was concluded that a mass was present in this area but the patient was lost to followup. In one of our patients an autopsy performed several months after the initial studies failed to reveal a mass that seemed adequate to explain the "hot spot". There was some thickening of the gastrohepatic ligament but metastatic areas in the liver were quite small and widely scattered. It should be noted that the radiocolloid "hot spot" on the liver scan gradually faded as the patient's superior vena caval obstruction was relieved by radiation therapy. These findings and the observation that the "hot spot" does not appear on injection of the radiocolloid through

the inferior vena cava suggests the abnormal area is in some way related to collateral circulation and passage of the radiocolloid through channels in the vicinity of the ligamentum teres with subsequent phagocytosis, perhaps augmented by relative stasis of blood flow or increased number of activity of RE cells in this area. We have started animal studies to attempt to reproduce and clarify this phenomenon.

SUMMARY

An unusual area of increased radioactivity was noted on the radiocolloid liver scans of three patients with mediastinal tumor and superior vena caval obstruction. The abnormal area did not appear when radiocolloid material was injected in the leg instead of the arm. The area diminished in one patient during the course of radiation therapy to the mediastinal mass and autopsy did not adequately explain the scan finding. It is postulated that the "hot spot" is related to collateral venous and lymphatic circulation on the anterior surface of the liver.

REFERENCE

1. COEL M, HALPERN S, ALAZRAKI N, et al: Intrahepatic lesion presenting as an area of increased radiocolloid uptake on a liver scan. *J Nucl Med* 13: 221-222, 1972

WORLD FEDERATION OF NUCLEAR MEDICINE AND BIOLOGY

First World Congress of Nuclear Medicine and Biology

September 30–October 5, 1974

Tokyo and Kyoto, Japan

The First World Congress of Nuclear Medicine and Biology will be held in Tokyo and Kyoto, Japan, from September 30 to October 5, 1974, under the auspices of the World Federation of Nuclear Medicine and Biology (WFNMB).

The Congress is the first international event to be organized following the official foundation of WFNMB in Mexico on October 26, 1970. This meeting represents one of the most authoritative scientific projects ever planned in the field of nuclear medicine based on the Foundation Charter of 1970, and similar meetings are to be held every four years.

The Organizing Committee for the Congress is now making extensive preparations and has selected a meeting date that will not conflict with other international congresses in related fields scheduled for that time of year. Since a large number of participants from all over the world are expected, the Organizing Committee would appreciate information from every country on the number of persons who might attend.

A second progress report on the meeting will be mailed out soon. If you have any questions concerning the congress, please contact:

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