jnm / CASE REPORT

NONSPECIFICITY OF THE RADIOCOLLOID HEPATIC "HOTSPOT" FOR SUPERIOR VENA CAVAL OBSTRUCTION

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Nonspecificity of the radiocolloid "hotspot" for superior vena caval obstruction (SVCO) is illustrated with scintigraphic findings in two patients. One patient with documented SVCO fails to demonstrate the "hotspot" whereas another with documented absence of SVCO shows the abnormality.

Attention to areas of apparent increased concentration of radiocolloid in hepatic scintigrams has recently grown (*1–10*). The nature of this finding remains incompletely resolved but the abnormality has been associated with superior vena caval obstruction (SVCO) in at least 11 of the 27 reported cases (*3–7,9,10*). An important additional cause of this abnormality is hepatic vein obstruction (*2,8*).

A pathogenetic relationship of the "hotspot" to SVCO had been theorized, and was recently elegantly demonstrated to be attributable to caval–portal shunting (*5,7*). Recently we had the opportunity to study two patients whose findings fail to illuminate further the nature of the "hotspot" but raise questions as to the specificity of the "hotspot" for SVCO.

CASE REPORTS

A 23-year-old woman (Patient No. 1) delivered a hydatidiform mole in May 1971 6 months after her last menstrual period. A D&C was negative for trophoblastic tissue in June 1971. Normal menstruation resumed and chorionic gonadotrophin determinations were negative for the following 18 months. In January 1973 she noted pelvic discomfort and a 5-cm anterior vaginal mass associated with a one and one-half times enlarged uterus was found. Multiple pulmonary nodules were present and the chorionic gonadotrophin titers were positive at $1:10^6$ dilution. She began methotrexate therapy in February 1973 and has responded to treatment. At the time of the hepatic scintigraphy studies the following laboratory values were noted: Hb 13 gm%, HCT 38%, WBC 7,000/mm^3. SGOT 42 I.U., alkaline phosphatase, 83 I.U., LDH 302 I.U., albumin 3.3 gm%, globulin 3.3 gm%, proth. time 12.2 sec (100% = 11.8 sec). The slightly elevated enzymes are attributable to the methotrexate therapy.

A 54-year-old woman (Patient No. 2) noted increasing upper extremity and facial edema in December 1972. Chest roentgenograms revealed indistinct fullness of the right mediastinum and a 2.5- × 3-cm right upper lobe mass. Sputum cytology was suspicious but bronchoscopy was negative. Surgery was judged inadvisable because of the edema. Radiation therapy to the right upper lobe and mediastinum was administered with some relief of the patient's symptoms. Mediastinoscopy and supraclavicular node biopsy were planned to follow full response to the radiotherapy. At the time of hepatic scintigraphy (prior to the initiation of radiotherapy) the following laboratory values were noted: H6 13 gm%, HCT 40%, WBC 6,100/mm^3, SGOT 24 I.U., alkaline phosphatase 65 I.U., LDH 151 I.U., albumin 3.8 gm%, globulin 2.6 mg%, proth. time 11.2 sec (100% = 11.8 sec). These values are within normal limits.

MATERIALS AND METHODS

Hepatic scintigraphy was performed using a Searle Radiographics Pho/Gamma III HP scintillation camera and a parallel-hole low-energy collimator. For the SVCO studies, a low-energy diverging/converging collimator was employed in the diverging mode. Technetium-99m-sulfur colloid was used in doses of 6.5 mCi. The dose was divided and injected

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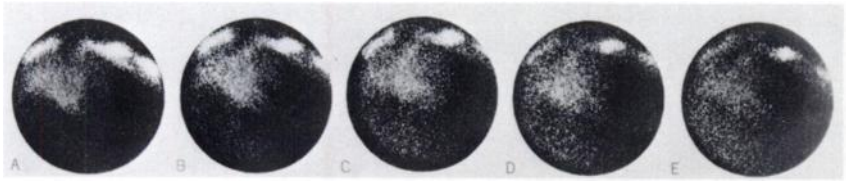

FIG. 1. Patient No. 1. Precordial dynamic study: (A) 0–5 sec; (B) 5–8 sec; (C) 8–11 sec; (D) 11–14 sec; (E) 14–17 sec. Normal transit of activity through central circulation is apparent.

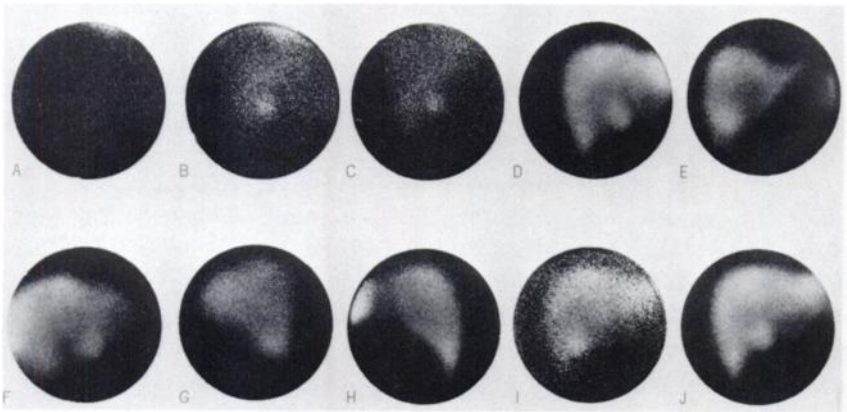

FIG. 2. Patient No. 2. Hepatic scintiphotos: (A) 0–30 sec; (B) 30–60 sec; (C) 60–90 sec; (D) right anterior; (E) left anterior oblique; (F) right anterior oblique; (G) right lateral; (H) right posterior; (I) ^{131}I-rose bengal, right anterior; (J) ^{99m}Tc-sulfur colloid, same position as I. "Hotspot" is evident medial to gallbladder.

simultaneously into both antecubital veins to obtain a dynamic evaluation of venous return patterns in a series of 4-sec time frames to test for the presence of SVCO (*11*). Patient No. 1 was studied on a second occasion with a right anterior hepatic flow study using ^{99m}Tc-sulfur colloid and with 0.2 mCi of ^{131}I-rose bengal. Hepatic scintiphotos were obtained 10–20 min following colloid administration in both patients and 1 hr following ^{131}I-rose bengal dosage in Patient No. 1.

RESULTS

Patient No. 1. The SVCO study demonstrates (Fig. 1) normal venous transit of the activity through the central circulation. The hepatic flow and early colloid accumulation sequence demonstrate an area of increased colloid uptake and flow in the inferomedial border of the right hepatic lobe. The static scintiphotos clearly demonstrate a "hotspot" which is anterior and medial to image of the gallbladder shown with ^{131}I-rose bengal (Fig. 2).

Patient No. 2. The SVCO study (Fig. 3) shows profound collateralization of superior venous transit through the central circulation. The static hepatic scintiphotos show no indication of a "hotspot".

DISCUSSION

Patient No. 1 had no indication of hepatic abnormality of SVCO but clearly exhibited a "hotspot." Patient No. 2 had no indication of a "hotspot" but clearly exhibited SVCO. It is concluded that a "hotspot" may be present in the absence of SVCO and may be absent in the presence of SVCO.

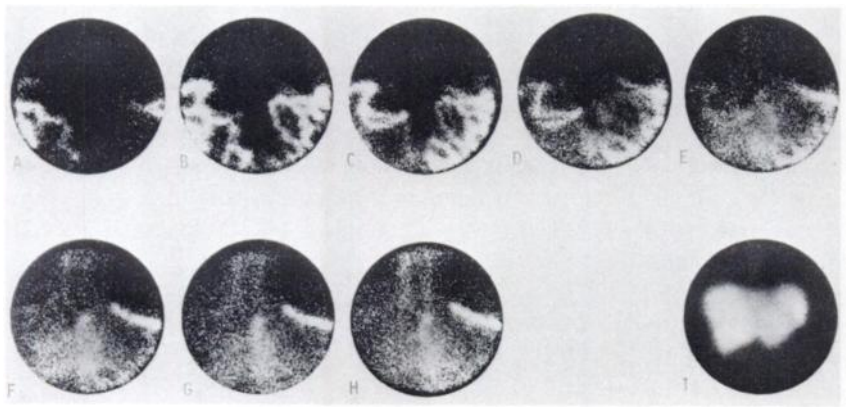

FIG. 3. Patient No. 2. Precordial dynamic study: (A) 0–6 sec; (B) 6–10 sec; (C) 10–14 sec; (D) 14–18 sec; (E) 18–22 sec; (F) 22–26 sec; (G) 26–30 sec; (H) 30–34 sec; (I) anterior hepatic scintiphoto. Marked delay in transit of activity through central circulation and collateralization of venous channels is evident. Hepatic scintiphoto shows absence of "hotspot."

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REFERENCES

1. VOLPE JA, JOHNSTON GS: "Hot" hepatic hemangioma: a unique radiocolloid-concentrating liver scan lesion. *J Surg Oncol* 2: 373–377, 1970

2. WOOD EJ, TAVILL AS: Liver and spleen scanning, some physical and clinical aspects. *Br J Radiol* 44: 402, 1971

3. MCCREADY VR: Scintigraphic studies of space occupying liver disease. *Semin Nucl Med* 2: 108–127, 1972

4. 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

5. JOYNER JT: Abnormal liver scan (radiocolloid "Hot-spot") associated with superior vena caval obstruction. *J Nucl Med* 13: 849–851, 1972

6. MIKOLAJKÓW A, JASIŃSKI WK: Increased focal uptake of radiocolloid by the liver. *J Nucl Med* 14: 175–176, 1973

7. HOLMQUIST DL, BURDINE JA: Caval-portal shunting as a cause of a focal increase in radiocolloid uptake in normal livers. *J Nucl Med* 14: 348–351, 1973

8. HELBIG HD: Focal iatrogenic increased radiocolloid uptake on liver scan. *J Nucl Med* 14: 354–355, 1973

9. MORITA ET, MCCORMACK KR, WEISBERG RL: Further information on a "hot spot" in the liver. *J Nucl Med* 14: 606–608, 1973

10. HOPKINS GB: Superior vena caval obstruction and increased radiocolloid activity on liver scintiphotos. *J Nucl Med* 14: 883, 1973

11. KRISHNAMURTHY GT, WINSTON MA, WEISS ER, et al: Demonstration of collateral pathways after superior vena caval obstruction with the scintillation camera. *J Nucl Med* 12: 189–191, 1971