jnm/ CASE REPORT

FALSE-POSITIVE SCINTIGRAMS DUE TO MALPOSITION OF LIVER

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A ^{99m}Tc-sulfur colloid liver scintigram showed changes consistent with a space-occupying defect due to malposition of liver.

A false-positive hepatic scan is defined as one in which a discrete area of reduced or absent radioactivity erroneously suggests a space-occupying lesion. It may be due to cirrhosis of the liver as documented by Johnson and Sweeney (*1*). In their series of 24 patients with known cirrhosis, seven cases had scans suggestive of space-occupying lesions, giving a 29% false-positive results. This high figure does not represent false-positive scans in unselected cases but represents a series of selected cases of advanced cirrhosis.

Disease processes in adjacent organs and structures may cause false-positive hepatic scans. Examples are: enlarged gallbladder, right kidney and spleen, pancreatic masses, intrahepatic bile duct dilatation, subdiaphragmatic fluid collection, and adrenal and lymph node metastases (*2*). Normal anatomical variation in liver shape may also lead to false-positive interpretation of the liver scan (*3*).

Overall accuracy of interpretation of liver scan is variously quoted as 90% (*4*), 85.2% (*5*), and 85.9% (*6*). Of the false interpretations positive errors are reported to be 2.6% (*4*), 9.7% (*5*), and 17% (*6*).

CLINICAL FINDINGS

A 44-year-old white man was brought to the emergency room of Woonsocket Hospital following a sudden onset of seizure, in which his head and eyes were turned to the right and he had tonic and clonic motion of the extremities. Examination revealed right homonymous hemianopsia. A week later he developed drowsiness and right hemiparesis. Clinically, organic pathology of the left hemisphere was suspected. In the meantime, a routine chest x-ray was obtained, which was suspicious for malignancy of the upper lobe of the right lung. On admission, slight elevation of SGOT, LDH, alkaline phosphatase, and bilirubin were found. All other chemistry values were normal. Routine scintigrams of brain and liver were performed.

FINDINGS OF SCINTIGRAMS

The liver scintigram was performed after injection of 1.5 mCi of ^{99m}Tc-sulfur colloid on an Ohio-Nuclear dual-probe rectilinear scanner. The anterior view revealed no visualization of the entire left lobe and the medial part of the cephalic half of the right lobe with a concave medial edge, giving the impression of a globoid space-occupying lesion. The caudal half of the right lobe had good radioactive uptake (Fig. 1). The lateral view showed a vertically enlarged

Received Dec. 18, 1973; original accepted Mar. 7, 1974.

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FIG. 1. AP view of liver scan showing single large defect involving entire left lobe and part of cephalic half of right lobe.

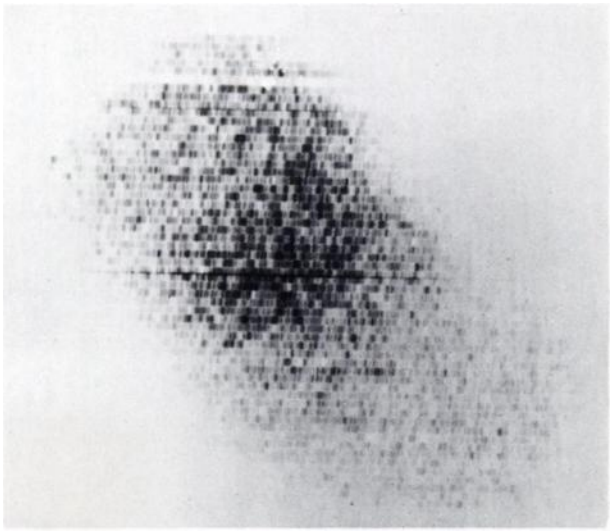

FIG. 2. Right lateral view of liver scan showing enlarged liver with no visible space-occupying lesion. Note difference in density between upper and lower halves.

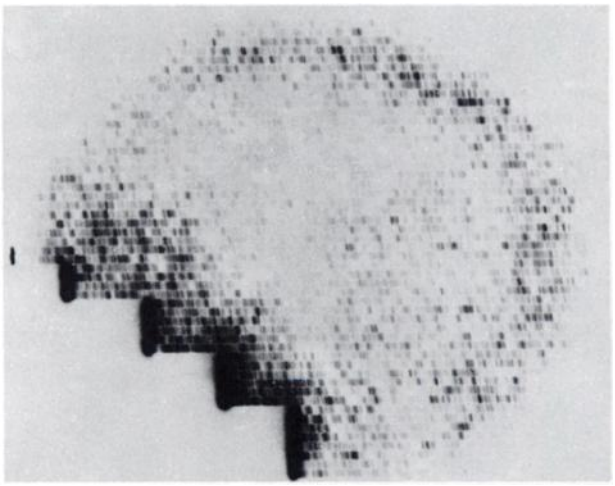

FIG. 3. Left lateral view of brain scan showing ill-defined radioactivity in parieto-occipital region.

right lobe with a good radioactive uptake in the cephalic half and decreased activity in the caudal half, just the reverse picture of the AP view (Fig. 2).

The brain scintigram was performed after injection of 10 mCi of ^{99m}Tc-pertechnetate on the same scanner and showed an ill-defined positive uptake in the left parieto-occipital region (Fig. 3). Angiography of the brain confirmed the presence of a lesion in the same location. In view of the suspicious chest x-ray for tumor, further studies were directed to confirm or to rule out the diagnosis of bronchogenic carcinoma.

FINDINGS OF SURGICAL BIOPSIES

Multiple cytological studies of sputum and bronchial washings, including bronchial biopsies, showed no evidence of tumor. Laparoscopic examination revealed no evidence of tumor of the liver. Biopsy performed at the same time showed early cirrhosis of the right lobe of the liver and marked scarring with atrophy of the left lobe. A left craniotomy was performed and biopsies were diagnostic of a well-differentiated astrocytoma. The patient was readmitted 3 months after craniotomy because of progressive neurological deterioration and died 1 month later.

FINDINGS OF AUTOPSY

A large brain abscess was found at the site of the biopsy and acute meningitis. There were areas of residual tumor.

The liver was enlarged by size and weight (2,450 gm). It was malpositioned in such a way that the left lobe of the liver was located posteriorly and the entire right lobe was placed more or less anteroposteriorly in contrast to normal transverse position (Fig. 4). There was marked atrophy of the left lobe of the liver and sharp demarcation between the two lobes, indicative of vascular compromise of the left lobe (Fig. 5).

DISCUSSION

The scintigram when compared with in situ photograph reveals the space-occupying lesion in the AP

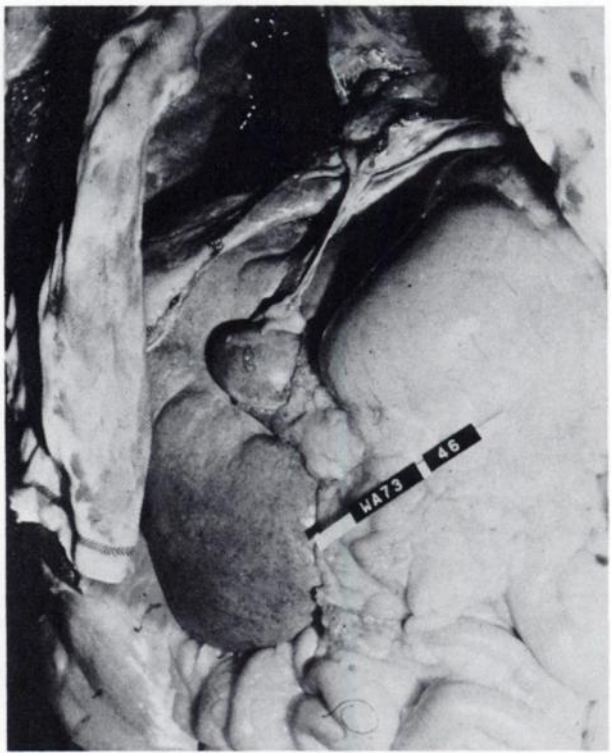

FIG. 4. In situ photograph of liver showing anteroposterior rotation of liver, upward position of gallbladder. Left lobe rotated posteriorly and covered by stomach. Note falciform ligament extending obliquely from diaphragm to gallbladder.

FIG. 5. Photograph showing enlarged right lobe and atrophied left lobe.

view to be due to malposition of the liver and interposition of the stomach in front of the anteroposteriorly rotated liver. To explain the difference in appearance of the right lobe of the liver in the AP and right lateral views and the difference in the counting rate between the upper and lower halves in the lateral view, we believe that the upper half of the enlarged liver was in the focus of the probe due to its fixed position by the diaphragm whereas the lower half moved and rotated away from the focus of the collimator.

In a review of the literature we could not find any record of false-positive liver scan due to malposition. Autopsy examination and in situ photograph of the liver documented the cause of the false-positive scintigram. The somewhat similar appearance of a scan is seen in Case 3 of Johnson and Sweeney (*1*). They also describe cephalic rotation of the left lobe which resembles the malposition we have described.

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