LIVER AND LUNG SCINTIPHOTOS FOR THE DETECTION OF SUBDIAPHRAGMATIC ABSCESS—AN EASY TECHNIQUE

Many papers and articles have been written describing several different techniques for obtaining combined liver and lung scintiphotos using a wide variety of radionuclides. The technique described here can be used by every hospital that performs liver scans with ^{99m}Tc-sulfur colloid and lung scans with ^{131}I-macroaggregated albumin.

Because of the wide separation of the two gamma energies (140 keV and 364 keV) combined liver and lung scanning can be accomplished by standard spectrometry with acceptable crossover between radionuclides. This dual-radionuclide scintiphotography can be accomplished in 20–30 min with a scintillation camera.

A Pho/Gamma scintillation camera with a diverging-hole collimator was used for the study. A variable persistence oscilloscope was used for positioning the patients. Commercially obtained ^{99m}Tc-pertechnetate and sulfur colloid kits were used for the liver, and commercially obtained ^{131}I-macroaggregated albumin was used for the lungs.

With the patient in the supine position, a standard dose for liver scanning (1–3 mCi) is injected intravenously, and sufficient time for localization in the liver tissues is allowed to pass. Three hundred microcuries of ^{131}I-macroaggregated albumin are then injected intravenously and again sufficient time for lung localization is allowed to pass.

With the spectrometer set for the detection of ^{99m}Tc, a preliminary scintiphoto of the liver is obtained. If a variable persistence oscilloscope is available, this need not be done. The position of the patient is adjusted so that the dome of the liver is at the mid portion of the viewing area. The spectrometer is then adjusted to detect ^{131}I to record the lungs.

After the proper positioning of the patient, a lung scintiphoto is made. Routinely 70 thousand counts are obtained in 5–6 min. Without closing the slide

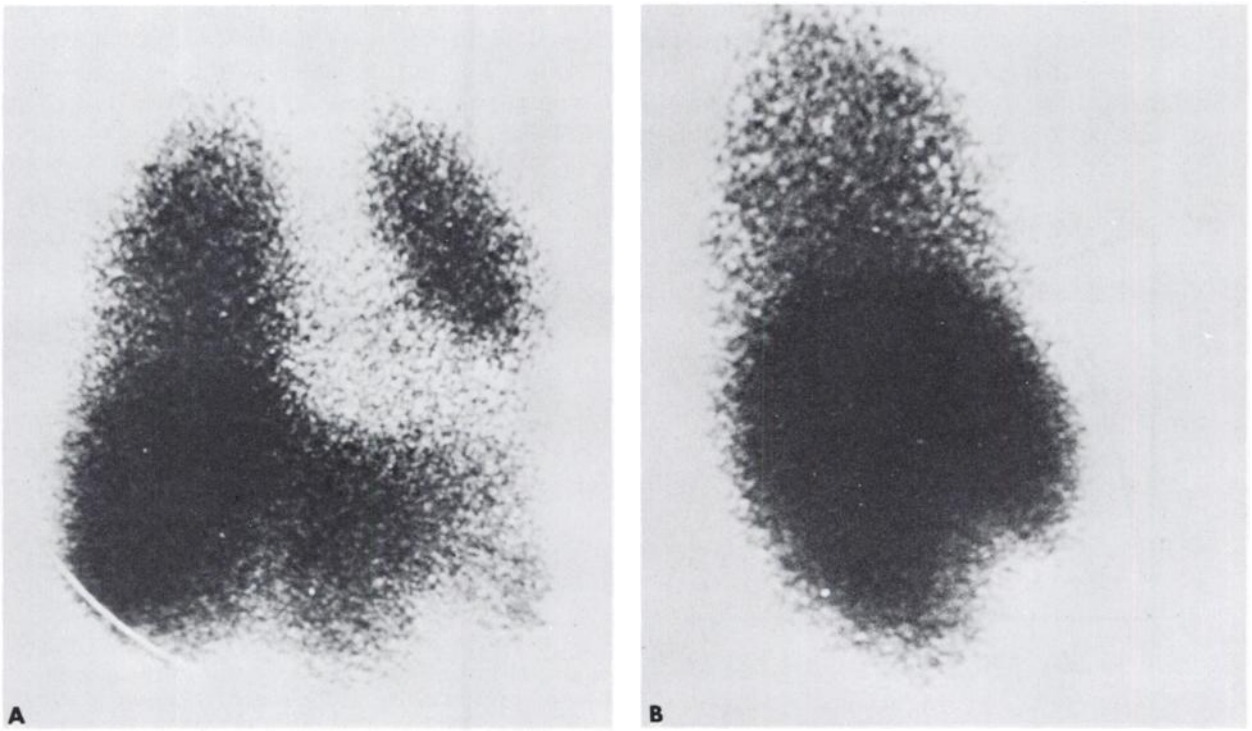

FIG. 1. A is normal anterior view of superimposed liver and lung scintiphoto showing no detectable separation between liver and lung. B shows normal right lateral liver and lung scintiphoto again with no detectable separation.

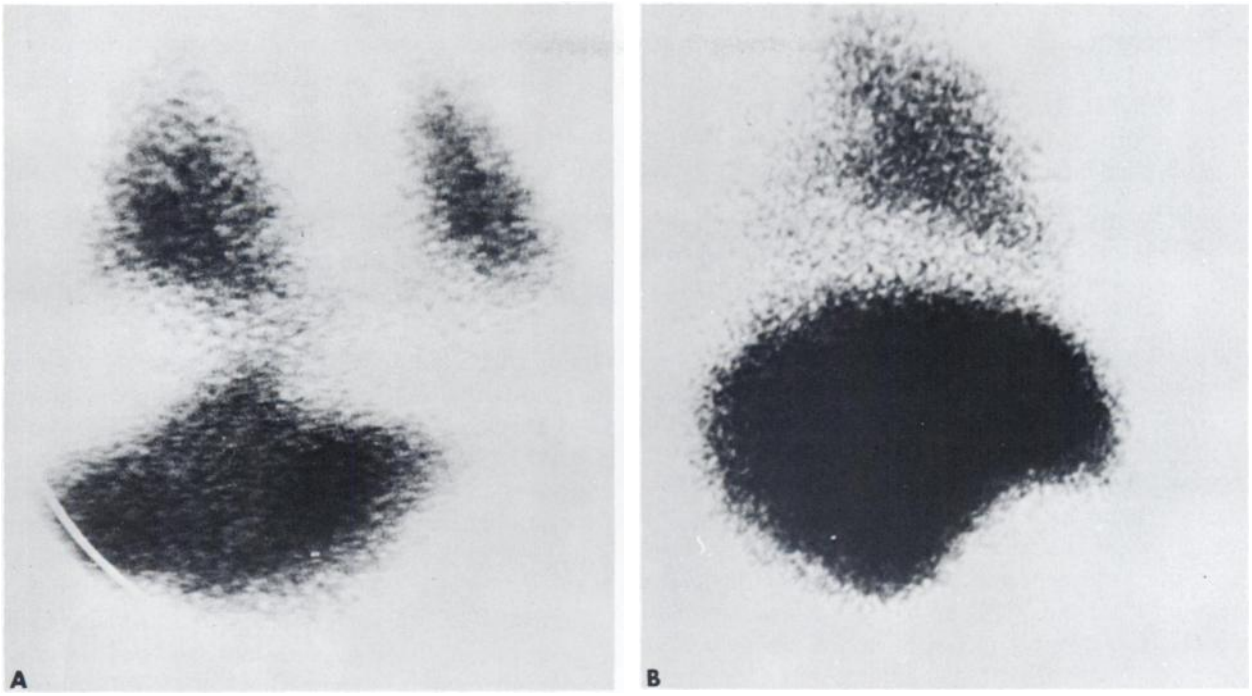

FIG. 2. A is abnormal anterior view of liver and lung showing definite separation of liver and lung in superior lateral area. B shows separation of liver and lung in right lateral position. Liver scans were made with ^{99m}Tc-sulfur colloid; lung scans with ^{131}I-macroaggregated albumin.

of the Polaroid camera (or inserting the slide in the photoscope cassette) the spectrometer is changed to the proper settings for ^{99m}Tc. Two hundred thousand additional counts are obtained in 3–4 min. This technique superimposes both organs on a single film.

Figure 1A is a normal anterior view of a superimposed liver and lung scintiphoto showing no detectable separation between the liver and lung. Figure 1B shows a normal right lateral liver and lung scintiphoto again with no detectable separation.

Figure 2A is an abnormal anterior view showing definite separation of the liver and lung in the superior lateral area. Figure 2B shows the separation of the liver and lung in the right lateral position.

Thus, a technique for the detection of suspected subdiaphragmatic abscess is readily available for those hospitals that are presently performing liver scans with ^{99m}Tc-sulfur colloid and lung scans with ^{131}I-macroaggregated albumin using a gamma scintillation camera.

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MONITOR FOR ^{133}Xe CONTAMINATION OF AIR

We have recently begun doing ^{133}Xe ventilation studies and have found a simple, inexpensive way to monitor background radiation levels from ^{133}Xe airborne contamination. In general, we found that when most nuclear medicine laboratories have been faced with the decision of whether to buy a gas monitor, which commonly costs a few thousand dollars, or to ignore monitoring completely on the assumption that exhaust fans adequately keep airborne contamination below acceptable levels, they usually chose the latter alternative. Even though the biological half-life of ^{133}Xe is measured in seconds, if there should be an exhaust fan failure or if room ventilation is inadequate, there is a radiation hazard for the patient and especially for the radioisotope technician. Also, from a health physics point of view, it should be proven in each laboratory that the maximum permissible concentration (MPC) of ^{133}Xe in air of 3×10^{-7} μCi/ml is indeed not exceeded in uncontrolled areas during ^{133}Xe studies.

The dose delivered at a point P a distance r from a small volume of air containing a concentration C (μCi/cc) of gamma-emitting gas characterized by

$$\Gamma\left(\frac{\text{mR}}{\text{hr}}\frac{\text{cm}^2}{\text{mCi}}\right)$$

is

$$dD = e^{-\mu r}\frac{\Gamma}{r^2}C(\vec{r})\,r^2 dr\,d\Omega \qquad (1)$$