jnm/CASE REPORT

RADIOACTIVE EMBOLIZATION FROM UPPER-EXTREMITY THROMBOPHLEBITIS

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A lung scan in a patient with upper-extremity thrombophlebitis showed "hot spots" that apparently resulted from embolization of a propagative thrombus.

"Hot spots" on lung scans have been recognized as a complication of faulty injection tcehnique (*1*). The following is a report of radioactive embolization observed during the performance of lung imaging despite use of proper injection procedure.

CASE REPORT

A 53-year-old white man, admitted for retrosternal chest pain, underwent lung imaging with 4 mCi of ^{99m}Tc-MAA to rule out pulmonary embolus. Injection into the left antecubital vein was uneventful although the patient had clinical thrombophlebitis of the arm. No blood was withdrawn into the syringe during injection. Anterior views were normal (Fig. 1A and B) as was a right lateral view. Posterior views demonstrated a focal area of increased activity in each lung (Fig. 1C and D). To eliminate the possibility of artifacts caused by inadvertent spillage of nuclide, the patient's clothing and linens were changed and the detector head cleaned. The "hot spots" were still present on repeat posterior images and were also demonstrable on anterior views (Fig. 2A and B). Repeat posterior imaging of the right lung demonstrated a third, less distinct area of increased activity medially.

Twelve hours later, there was virtually no activity seen on anterior view of the left lung (Fig. 3A). Imaging of the left arm after injection of 4 mCi of ^{99m}Tc-albumin microspheres slightly distal to the previously used site demonstrated increased activity proximal to the injection site (Fig. 3B) at the level of the evident thrombophlebitis. The patient developed no cardiorespiratory symptoms during or after the studies.

DISCUSSION

Radioactive embolization occurred during performance of lung imaging as evidenced by the completely normal initial anterior views and subsequent

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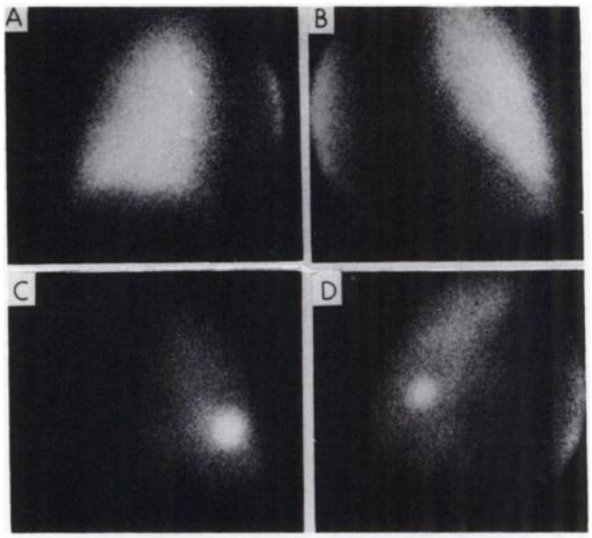

FIG. 1. Right anterior (A), left anterior (B), right posterior (C), and left posterior (D) lung images.

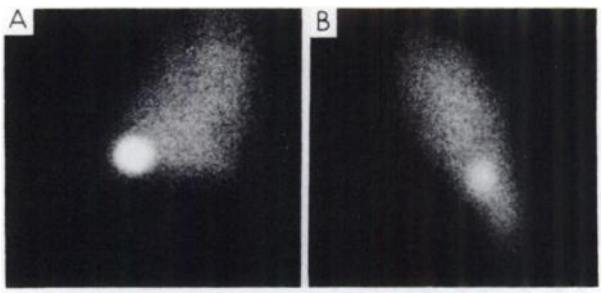

FIG. 2. Repeat right anterior (A) and left anterior (B) views.

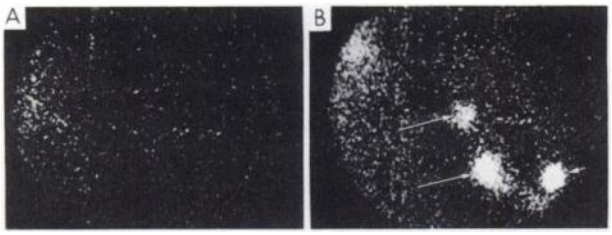

FIG. 3. Left anterior lung image 12 hr later (A). Left arm after reinjection with microspheres (B). Radioactive marker is placed at injection site (small arrow). Large arrows point to uptake in areas of thrombophlebitis proximal to injection site.

appearance of multiple "hot spots" that were not caused by spilled nuclide.

The ability of MAA to form large clots rapidly when mixed with blood and to cause pulmonary "hot spots" when injected has been demonstrated both clinically and experimentally (*1–3*). In this case, however, careful injection technique with no blood withdrawn before or during the procedure precluded the possibility that this mechanism was responsible for "hot" emboli.

MAA and microspheres labeled with ^{99m}Tc both incorporate into thrombi (*4*) and have been used clinically to localize areas of thrombophlebitis or endothelial damage (*5–8*). The incidence of false-positive results in imaging for thrombophlebitis is lower with microspheres so this preparation was used to demonstrate the thrombosis in this patient's upper extremity (*8*). Although lower-extremity thrombophlebitis is usually the origin of pulmonary embolization, radioactive emboli have been observed several days after MAA injection into an area of upper-extremity thrombophlebitis (*2*).

Although the "hot spots" appeared quite large on the scintiphotos, it is well known that the appearance does not correlate with the actual size of the embolus, which apparently need not cause a symptomatic perfusion deficit. The rapid disappearance of activity in the present case may have been hastened by the patient's anticoagulant therapy. Previous estimates of biologic half-life of radioactive pulmonary emboli range from 3–5½ days to 10½–23 days, the longer times being related to degree of incorporation of the radioactive compound into the clot before embolization occurred (*2,3*).

Since pulmonary embolization clearly can occur from upper-extremity thrombophlebitis, tourniquet manipulation of such areas when they are clinically evident should be avoided and intravenous injections made at uninvolved sites.

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