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Evaluation of uptake and release of technetium-99m MIBI SPECT of pulmonary and mediastinal lesions

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We evaluated the uptake and release of Tc-99m MIBI in 7 benign and 30 malignant pulmonary and mediastinal lesions. Of the 37 patients, 13 underwent surgery; malignant involvement was examined in 21 mediastinal lymph nodes. Tl-201 SPECT was also performed in 10 patients. Tc-99m MIBI SPECT studies were performed on transverse SPECT images acquired 30 minutes and 3 hours after intravenous injection of 600 MBq of Tc-99m MIBI with three gamma camera detectors (GCA-9300A). Regions of interest were set in the area of abnormal uptake of Tc-99m MIBI and in an area of normal tissue in the contralateral lung. The uptake ratio of the lesion in the contralateral normal lung was obtained on the early image (early ratio; ER) as well as the delayed image (delayed ratio; DR). The benign lesions showed significantly lower ER (1.6 ± 0.3) and DR (1.4 ± 0.4) than the malignant lesions (1.9 ± 0.5 and 1.8 ± 0.5, respectively; both $p < 0.05$). There was no significant difference in the retention index (RI), calculated as $RI = (DR - ER)/ER \times 100$. The DR obtained with Tl-201 SPECT images was significantly higher than that obtained with Tc-99m MIBI SPECT ($p < 0.05$). For the detection of mediastinal lymph node metastases, the early images showed sensitivity, specificity, and accuracy of 85.7%, 100%, and 95.2%, respectively, for the delayed images these values were 85.7%, 92.9%, and 90.5%, respectively. These results suggest that the uptake ratio of Tc-99m MIBI is a useful index in assessing benign or malignant pulmonary and mediastinal lesions.

Key words: technetium-99m MIBI, lung cancer, single photon emission computed tomography (SPECT), thallium-201