304

NON-INVASIVE MEASUREMENT OF PULMONARY EXTRAVASCULAR WATER BY EXTERNAL COUNTING —— A COMPARISON OF THE METHODS USING Tc-99m AND I-123. A. Ishizaka, M. Kanazawa, T. Yokoyama, K. Kubo, S. Hashimoto. Keio University. Tokyo.

No methods have been clinically available for non-invasive and quantitative measurements of pulmonary extravascular water (PEVW).

We have developed a method to measure PEVW in man from external gamma-ray counts and marker concentration in peripheral blood using either Tc-99m or I-123 labeled markers. We use Tc-99m or I-123 labeled human serum albumin as an intravascular marker, and Tc-99m labeled DTPA or NaI-123 as an extracellular marker. We correct external gamma-ray counts for chest wall interference and tissue gamma-ray absorption in order to estimate PEVW.

In studies using a chest phantom mean errors between actually added and estimated water volume in a phantom lung were approximately 5% in both Tc-99m and I-123 methods.

In healthy subjects pulmonary plasma volume and interstitial volume in the Tc-99m study (n=9) were 0.075 ± 0.019 cm^3/cm^3 lung tissue and 0.065 ± 0.016 cm^3/cm^3, while those in the I-123 study (n=10) were 0.070 ± 0.010 cm^3/cm^3 and 0.073 ± 0.012 cm^3/cm^3, respectively. The differences between the two methods were statistially not significant.

These results agreed with the reported data by direct PEVW measurements.

305

RADIONUCLIDE VENOGRAPHY IN LUNG CANCER WITH SVC SYNDROME. T.Hirano, T.Isawa, T.Teshima, A.Ebina and K.Konno. Tohoku University, Sendai

The purpose of this study was to elucidate how radionuclide venography was useful to the diagnosis of SVC syndrome and the evaluation of response to treatment.

The tracer (Tc-99m MAA) was injected simultaneously into the bilateral antecubital veins with the patients in the supine position under gamma camera. When necessary, unilateral injection was made.

In normal subjects the tracer reached the superior vena cava almost simultaneously from both sides. No collateral circulation was seen. In patients with lung cancer with SVC syndrome collateral circulation was present without exception. The collateral pathways were 1) through the internal thoracic vein to the inferior vena cava, 2) through the lateral thoracic vein to the intercostal veins anteriorly or posteriorly and 3) through the jugular veins to the opposite side of the neck. These pathways were seen singly or in combination. A hot spot or a focus of increased radioactivity was seen on and off. A patient without SVC syndrome showed a collateral circulation and later developed the syndrome. Time required for radioactivity to travel from the axillary veins through the lung tissue was significantly increased in patients with SVC syndrome. In 5 patients, radionuclide venography was repeated after treatment of the SVC syndrome with radiation and chemotherapy. Two of them showed a marked improvement, and the remainder, no improvement.

In conclusion radionuclide venography with Tc-99m MAA is useful to the diagnosis of SVC syndrome and the evaluation of response to treatment.

306

EVALUATION OF COMBINED VENTILATION AND PERFUSION SCINTIGRAPHY OF THE LUNG. K.Uchida, T.Ashitaka, Y.Kotakehara, K.Hosaka, K.Kawata, H.Nukada, Y.Fukushima, Y.Maruyama, Y.Sasaki, H.Kurosawa. Toho University School of Medicine. Tokyo.

We evaluated clinical usefullness of vetilation and perfusion scintigraphies of the lung performed simultaneously on the patients of chronic obstructive pulmonary disease, lung cyst, old lung tuberculosis, lung cancer and diabetes mellitus. Kr-81m and Xe-133 gas were used for ventilation images and Tc-99m-MAA for perfusion images. Kr-81m ventilation scanning and Tc-99m-MAA perfusion scanning were performed in frontal, posterior and both lateral views. Xe-133 ventilation scanning was carried out with single breath and rebreathing method followed by Tc-99m-MAA perfusion scanning. In our study ventilation-perfusion mismatches were demonstrated in the patients with pulmonary arterial obstruction and bronchogenic carcinoma. Ventilation-perfusion defect in matched rate were visualized in the patients with chronic obstructive pulmonary disease, lung cancer, old lung tuberculosis and lung cyst. We also made the similar studies in patients of diabetes mellitus with hypoxemia who had not remarkable changes in chest X-ray and spirogram. Ventilation-perfusion defects in matched rate with delayed washout were noted in these patients. This method may prove useful for the study of localized pulmonary pathology concerned with DM.

307

OBSERVATIONS ON PULMONARY VENTILATION AND PERFUSION CONDITIONS IN PRIMARY HILAR TYPE LUNG CANCER BY FUNCTIONAL IMAGE. T.Suematsu, I.Narabayashi, K.Sugimura, C.Takemura, R.Matsui, Y.Inoue, T.Fukugawa, S.Nishiyama and S.Kimura. Department of Radiology, Kobe University, School of Medicine. Kobe.

Pulmonary ventilation and perfusion conditions in 24 patients with primary lung cancer in the hilus were studied while comparing them with the histological type, TNM classification, comprehensive pulmonary function test data, blood gas analysis in artery, etc..

Kr-81m and Xe-133 were used for ventilation study and Tc-99m-MAA and MISA for perfusion study. For functional image, $\dot{V}$, $\dot{Q}$, $\dot{V}/\dot{Q}$ image, Xe-133 equilibrium washout curve, MTT image, etc. were prepared. Before the start and after the termination of radiotherapy and 3 months after the termination of radiation, 7 patients had pulmonary scintigraphy, and observations were made on the therapeutic effect and the influence of radiation pneumonia.

It is difficult to evaluate pulmonary ventilation and perfusion by X-ray film, and the diseased regions were in many patients wider than imagined. The comprehensive pulmonary function test data and blood gas analysis in artery were not necessarily correlated with the results of ventilation and perfusion study. The preventive mechanism in each individual is supposed to participate largely in such findings. Preparation of the functional image was extremely useful in evaluation of the effect of radiotherapy and progress of radiation pneumonia.

As we have further made transaxial $\dot{V}/\dot{Q}$ image by ECT, we shall report its usefulness.