

G₂. Lung

Abnormal Pulmonary Perfusion and Ventilation In Aged Patients Studied by Lung Scintigraphy

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We have reported previously that two kinds of characteristic scan findings were frequently observed in geriatric patients besides the multiple perfusion defects. These findings include the major fissure sign and the decreased perfusion, particularly, in the lower lung field.

The incidence of fissure sign was 41% and that of the decreased perfusion to lower lung field was 22% respectively in 240 geriatric subjects.

This time for the purpose of further study to elucidate the cause of these perfusion defects, inhalation scannings were performed with 99m Tc-phytate inhalation using ultrasonic nebulizer in patients who were also studied by perfusion scanning. Sixteen cases, including five cases with emphysema, two cases with pulmonary fibrosis,

four cases with Takayasu disease and etc were investigated.

Results: Aerosol accumulation was decreased in the pulmonary area and/or in the major fissure of the aged cases where pulmonary arterial perfusion is decreased in the perfusion scanning. On the other and, radioactive aerosol was well inhaled and distributed uniformly in the patients with Takayasu's disease who showed frequently large pulmonary perfusion defects.

In conclusion, two characteristic findings of the pulmonary scan observed frequently in the aged patients were probably caused by the disturbance secondary to airway involvements including alveoli rather than by primary obstruction of pulmonary arteries.

Evaluation of Impedance Pulse by Lung Scintigraphy Detectability of Blood Shift After Bronchography

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Possibility of impedance method to detect the blood shift between both lungs after broncho-

graphy was studied by comparison with the results of lung perfusion scanning.

Transthoracic impedance pulse was recorded between subclavian region and supradiaphragmatic region of each thorax. Lung perfusion image was obtained 2 mins. after the injection of 5 mCi. of ^{99m}Tc MAA. Lung perfusion scanning and recording of impedance pulse was performed one week before and immediately after the bronchography in 15 cases having various lung disease. Distribution of blood flow was calculated from count rate measured on both the lung fields. Ventilation was also studied separately on each lung by impedance method or ^{133}Xe inhalation method.

After bronchography, blood flow calculated from MAA distribution was decreased 10–80% of

control in the lung in which contrast material was injected. Impedance pulse also decreased its amplitude after bronchography.

There was disparity between results obtained by perfusion scanning and impedance method in three cases. This disparity was caused by the pulsatile impedance change depending mainly on change of compliance of blood vessel and also by the difference of the detecting level of the vascular system.

Decrease of ventilation was correlated well with decrease of perfusion in the lung in which bronchography was performed.

Quantification of Lung Scintiscans in Pulmonary Emphysema

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In order to quantify the uniformity of lung scintiscans in pulmonary emphysema, following non-uniformity points were estimated from contour plots which were obtained from ^{131}I -MAA photo-scintiscans in 38 patients, using Sakura Isodensity Recorder PDI-10 installed the deffuser. Each line of the contour plots represented approximately 10% decrements in activity from the high center, and nonuniformity points were calculated based on differences in distribution between a subjects' right and left lungs and nonuniform distribution within a lung, according to Kronenberg with some modifications.

Although the nonuniformity points such ob-

tained appeared to have no evident relation to radiological vascularity pattern, that is the arterial deficiency pattern or the increased markings pattern, and had no correlation with RV/TLC nor with single breath D_{LCO} of the patients, it significantly correlated negatively with their $\text{FEV}_1\%$ and corresponded to each stage of the severity of pulmonary emphysema in respect to blood gas disturbance.

This would suggest that the presented method was appreciate for assessment of uniformity of the distribution of lung perfusion in pulmonary emphysema.