The Value of Pulmonary Isotope Scanning in the Diagnosis of Pulmonary Circulation Disturbance

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We have classified pulmonary circulatory disturbance in cardiopulmonary diseases into two basic types, namely increase and decrease of the pulmonary vescular bed. These two basic types are further subdivided into functional, organic or conbined increase or decrease. The pulmonary circulatory disturbance in pulmonary diseases is due to a decrease in the pulmonary vascular bed, whereas that in cardiovascular disease is manifested by an increase in pulmonary vascular bed. Pulmonary scanning with ^{131}I-M.A.A. is a usefuul means of detecting abnormal distribution of pulmonary blood flow. When there is a decrease in the pulmonary vascular bed, whether it be organic or functional, the pulmonary isotope scan well reflected decreased pulmonary perfusion and the scanning data correlated with the results of cardiopulmonary function tests. Where there was an increase in the pulmonary vascular bed due to cardiovascular diseases, it was not possible to differentiate whether it is organic or functional from the lung scan alone; cardiopulmonary function tests were required to make this differentiation.

When the pulmonary circulatory disturbance progresses from increase to decrease in the pulmonary vascular bed, this change is irreversible and the change is reflected in the pulmonary isotope scan.

The Studies on Circulatory Defects in Pulmonary Scintigram using RI in Bronchial Asthma (Pathophysiological studies on bronchial asthma VI)

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The pathophysiological aspects of bronchial asthma were studied on 45 asthmatic patients with pulmonary scintigraming using IMAA, and investigating local pulmonary circulation (circulatory defects) in asthmatic attack and non-attack. The following results were obtained.

1. Circulatory defects in pulmonary scintigram were seen in all cases in asthmatic attack, and the stronger the attack, the higher the circulatory defects tended to increase. Its findings showed the tendency of decrease owing to weakened attack, but only 4 cases (8.1%) showed the same findings as normal cases.

2. Circulatory defects on pulmonary scintigram were revealed in all cases which showed the findings of pulmonary emphysema in chest X-ray film. Even if the findings of pulmonary emphysema in chest X-ray film were not shown,, circulatory defects were seen in all cases in attack. In non-attack, they were seen in the cases of 87 per cents. The chest X-ray film was not always correlative to the circulatory defects.

3. In pulmonary dysfunction, circulatory defects were shown. However the pulmonary function was improved owing to weakening of attack, circulatory defects were remained in most cases, but they tended to decrease.

4. 4 cases in short term from the onset of asthma were disappeared circulatory defects and reversible after weakening of attack, but other cases in long term were not disappeared them . These cases were thought the complication of pulmonary emphysema and other secondary changes.

5. Extrinsic asthma were not seen specific differences from intrisic asthma on pulmonary scintigram.

Pulmonary Scintigram and Arteriogram by Injection of ^{131}I-MAA into the Vein and Bronchial Artery in Chronic Lung Diseases

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The authors carried out intravenous pulmonary arteriography and intravenous lung scanning of ^{131}I-MAA in 45 cases of primary pulmonary carcinoma, metastatic pulmonary carcinoma, chronic pulmonary emphysema, chronic inflammatory diseases and the like, and selective bronchial arteriography followed by pulmonary scanning upon injection of ^{131}I-MAA through the same catheter in 35 cases. The arteriogram and pulmonary scintigram were compared and the following conclusions were obtained.

1) Positive findings in pulmonary arteriogram being compression, dislocation, stenosis or complete occlusion, and delay in appearance of contrast, and those in scintigram being decrease of dots and cold spots, 35 cases out of 45 were positive in both pulmonary arteriogram and scintigram, and 7 cases were positive in one or the other. However, one case each of primary pulmonary carcinoma, metastatic pulmonary carcinoma and chronic pneumonia failed to show any positive finding. Histological and bacteriological studies are required for these three cases.

2) Positive findings in selective bronchial arteriogram were tumor stain, pooling of opaque solution, appearance of tumor margin, fluctuation of the caliber, hypervascularity, and vascular gathering. Tumor stain and pooling were more remarkable in the cases of pulmonary carcinoma than in the cases of chronic lung diseases. The more remarkable was pooling, the longer was the remaining period of positive pulmonary scintigram. In three cases of primary pulmonary carcinoma following radiological treatment, these findings became hardly recognizable and the remaining period of postitive pulmonary scintigram was reduced. In two cases of sarcoidosis, arteriographic findings were identical to those in the cases of primary pulmonary carcinoma and the remaining period of positive pulmonary scintigram was long. The latter was observed in one case even after the lapse of one week.

3) In the cases of these chronic lung diseases, various collateral circulations were formed between pulmonary circulation and systemic circulation mainly consisting of the bronchial artery. It was verified that an appearance of cold spots in intravenous pulmonary scintigram is caused not only by the occlusion of the pulmonary artery but also by the possibility that ^{131}I-MAA may not be retained in the pulmonary capillary vessels due to the communication with the systemic circulation.