Determination of Ineffective Output in the Tetralogy of Fallot

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The distribution of $^{131}$I-MAA after iv injection to the tetralogy of Fallot was determined using Ring Type Total Body and Section Counter with $4\pi$ moving bed geometry.

In 33 cases of 5 to 27 years old patients, ineffective output was 27 to 74% due to right to left shunt. Blood supply to the head was 8 to 40% and the average was 21%. In case of a retarded child, 10% of MAA, entered the body circulation, was distributed in the head. In case a patient was crying seriously when MAA was injected, 30% of extrapulmonary activity was found in the head. The distribution of MAA was relatively low in the liver, where the main blood supplier is portal artery. In contrast to the liver, a large portion was trapped by the kidneys.

The length of lung scintigram in normal cases and the length of base of activity curve over the pulmonary section were proportional. Therefore the amount of trapping of MAA in the lung in Fallot was determined excluding the contribution of activity from extrapulmonary section. Blood flow through the bronchial artery was thought insignificantly small, since blank parts were observed in many lung scintigram of severe cases.

The determination of ineffective output in the tetralogy of Fallot was done quantitative and served for the diagnosis and determination of indication for operation.

Clinical Estimation of the Right Heart Function by Analysis of $^{131}$I-MAA Build up Curve

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It is important to estimate the washout process of an indicator form the right ventricle to study the right heart function. This, however, encountered technical difficulty to obtain accurately right ventricular dilution curve, because the curve recorded from external counting at right heart region includes dilution components of both right auricle and right ventricle, even through the rapid single injection might be actually carried out. Using an indicator of RISA, dilution curve is deformed by overlapping of subsequent left heart curve, and using MAA it is also affected by accumulation of indicator in lung field. $^{131}$I-MAA build up curve might be considered to reflect a dilution process of the right ventricle and to imply an integral of right ventricular washout curve. According to this principle MAA build up curve develops as follows: A detector with 2 inch NaI crystal and tapered collimator was placed on the right upper lung posteriorly, and time concentration curve was recorded following raped injection of $^{131}$I-MAA into a medial vein. Upon assuming the downslope of the dilution curve from the right ventricle by an exponential equation of $10 \cdot e^{-\lambda t}$ an integral of the exponential is given in the equation of $C - \frac{10}{\lambda} \cdot e^{-\lambda t}$ (C: integral constant).

Since this latter equation can be replaced by the equation of $\frac{10}{\lambda} \cdot e^{-\lambda t}$, theoretically $\lambda$ value

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