

Title : OXYGENATION AS AN INDICATOR OF LUNG FLUID ACCUMULATION

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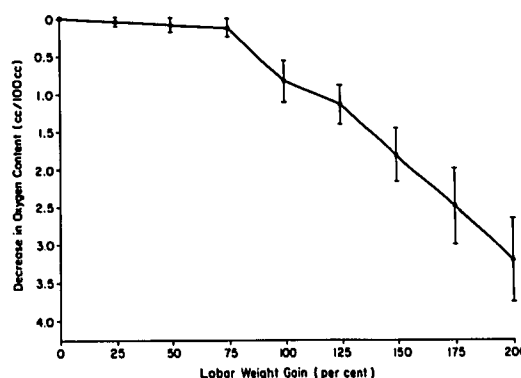
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Introduction. Arterial oxygenation is assumed to be a sensitive clinical indicator of lung fluid balance. To test this assumption, we utilized an *in-vivo* gravimetric technique we have developed to evaluate pulmonary capillary fluid exchange characteristics.

Methods. The intact canine left lower lobe was suspended from a force transducer in such a manner that the hilar connection was the only point of contact with the chest cavity. Lobar arterial and venous pressures were controlled at predetermined levels via appropriately placed balloon-tipped catheters connected to servo-controlled systems which regulated the size of the balloons. We continuously monitored lobar weight in seven dogs and maintained perfusion pressures sufficiently above oncotic pressure to assure continual lung fluid accumulation. Lobar venous oxygen content was calculated at regular intervals (utilizing the oxygen tension and hemoglobin concentration). The total increase in blood free lung weight calculated at the termination of the experiments compared well with the weight gain determined utilizing the gravimetric technique. Other ventilatory and circulatory parameters were maintained constant.

Results. The oxygen content of lobar venous blood did not change significantly until lung weight was increased by more than 70 percent. Once the increase in the lung fluid was sufficient to produce the initial decrease in oxygenation, additional accumulation of fluid produced progressive deterioration in oxygen content.

Discussion. The course of respiratory failure is often assessed and the success of therapy evaluated on the basis of arterial oxygen values. The difficulty with such practices is apparent from the observation that lung weight may have nearly doubled before appreciable oxygen content change occurs. The significance of this degree of lung pathology is emphasized by the fact that alveolar edema has been reported in association with lung weight gain of 30 to 50 percent¹. Emphasis on decreases in arterial oxygenation as an indicator of early lung fluid accumulation must be re-evaluated.



References.

1. Iliff, LD: Extra-Alveolar Vessels and Edema Development in Excised Dog Lungs. *Circ Res* 28: 524-532, 1971