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Re: Relationship of uni-lung percentage of blood flow to uni-lung percentage of carbon dioxide production in normal and unilateral injured lungs in a canine model

Management of uni-lung injury: A simple research tool with a marked clinical application

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In this issue of Critical Care and Shock, the well-respected group from the University of Pittsburgh presents a study in the relationship of uni-lung percentage of blood flow to uni-lung percentage of carbon dioxide production in normal and injured lung [1]. The clinician is routinely challenged by uni-lateral lung failure in a broad group of patients, aspiration, trauma, infection, and in a wide group of thoracic surgical patients, to name a few. One of the most difficult questions to answer at the bedside has been, "How well is the injured lung participating in the overall gas exchange, and are ventilatory support maneuvers improving the injured lung's function?"

Critical care physicians routinely perform independent lung ventilation on selected groups of patients in either the operating theater or in the ICU. In our experience in the management of such patients, we have required the use of expensive technology such as nuclear studies, which also places the patient in danger due to transport about the hospital [2]. The technique investigated by Pinsky's Group utilizes readily available technology of expiratory gas analysis and the measurement of VCO_2. Their analysis showed a significant linear relationship between percentage blood flow and percentage VCO_2 under all conditions. This study demonstrated that split lung $VC0_2$ measurements reflect individual lung blood flow over a broad range of flows in intact dogs. This linear relationship was maintained for both normal and injured lungs, the slopes however were different between normal and injured lungs. Thus, by using this technique in the ICU and OR, in patients with a double-lumen tube, we can follow uni-lung percentage of VCO_2 and be able to trend changes and thus, follow therapy [3]. The study also correlated well with animals with oleic acid injection a widely accepted model of ARDS the slopes were different and more than likely illustrate the mechanism shunt that is unequally distributed during unilateral lung injury. Thus the technique has broad clinical application in the management of ARDS patients and in a broad group of unilaterally lung injured patients.

This study is a relatively simple crossover of basic science philosophy research that can greatly impact the clinical care of patients. More importantly, it is the projection of readily available, low-cost technology that is universally available in all university centers throughout the world to address a complex clinical question. This investigation should also spur the readership to develop protocols that rapidly transition basic science physiologic research to the bedside.

References

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