Sevoflurane for Sedation in Acute Respiratory Distress Syndrome

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Acute respiratory distress syndrome (ARDS) represents approximately 10% of intensive care unit (ICU) admissions and more than 20% of patients requiring mechanical ventilation, with a hospital mortality rate of 35-45%. Its pathophysiological landmark, diffuse alveolar damage, is associated with alveolar inflammation, epithelial injury and impaired alveolar fluid clearance (AFC) Despite intense research and advances in terms of limiting mechanical injury from ventilation (e.g., with the use of lower tidal volumes), the identification of a single, targeted, effective ARDS pharmacological therapy has failed to date, and ARDS is still a deadly condition for patients and a serious challenge for clinicians. Several preclinical studies have shown that a volatile anesthetic agent such as inhaled sevoflurane improves gas exchange, reduces alveolar edema and attenuates pulmonary and systemic inflammation in experimental models of ARDS. These effects could be explained by restored lung epithelial function and by immunomodulatory effects of sevoflurane.

Volatile anesthetic agent use in the ICU, aided by technological advances, has now become more accessible to critical care physicians. With increasing concern over adverse patient consequences associated with our current sedation practice, there is growing interest to find non–benzodiazepine-based alternative sedatives. Research has demonstrated that volatile-based sedation may provide superior awakening and extubation times in comparison with current intravenous sedation agents (propofol and benzodiazepines such as midazolam). Volatile agents such as sevoflurane may also possess important end-organ protective properties mediated via cytoprotective and anti-inflammatory mechanisms.

Recent results from a first pilot randomized controlled trial in patients with moderate-severe ARDS reinforce those from previously published preclinical studies as they suggest a protective effect of sevoflurane from alveolar/systemic inflammation and from reduced epithelial injury and/or improved AFC, as assessed by plasma sRAGE.

The aim of this talk will be to summarize current available evidence that supports beneficial effects of sevoflurane for lung protection in ICU patients with ARDS, and to discuss future directions for research on inhaled sedation in the critically ill patients.