Individualizing Sedation in Acute Respiratory Distress Syndrome Patients on Extracorporeal Membrane Oxygenation

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To the Editor:

DeBacker et al.[1] report sedation practice in acute respiratory distress syndrome (ARDS) patients supported with extra-corporeal membrane oxygenation (ECMO)—a practice that is complicated by the physiology of the patient and altered pharmacokinetics (PK).[2] Waking and mobilizing these patients is no mean feat but is feasible[3] in selected patients, especially when the lung disease is less severe or recovering.

Minimizing iatrogenic lung injury is the key principle that guides management on ECMO, including sedation. There are currently no evidence-based guidelines for mechanical ventilation practice on venovenous (VV) ECMO, although the major benefits of VV ECMO are based on minimizing stretch and further lung injury.[4] The "lung rest" strategies designed at minimizing secondary lung injury create a situation of near-total ECMO dependence with little or no contribution from patient lungs. The resultant shunting and deoxygenation across native lungs may necessitate higher ECMO blood flows, especially in patients with higher cardiac output. Attempts to reduce sedation and waken patients who have been made volume deplete in an attempt to optimize native lung function may induce a precipitous drop blood flow and can lead to a hypoxic crisis if the native lungs are still dysfunctional. Greater intravascular volume and a large multistage drainage cannula, well positioned in the inferior vena cava anecdotally are associated with less respiratory perturbations on reducing sedation. Therefore, the proven benefits of interruption of sedation must be weighed up against the equally well-proven risks associated with increasing fluid balance. Dexmedetomidine is a useful adjunct in this setting. Apart from its antianxiety, sedative, and analgesic properties, its negative chronotropic effects reduce cardiac output, thereby reducing the pulmonary shunt, although its vasodilatory effects can drop venous return.

Safety and comfort are important considerations too. Accidental decannulation can be frequently fatal. Extubation, where possible may overcome tube intolerance. Breathing spontaneously through their poorly complaint lungs is a challenging physiologic adaption for patients.[5] Lowering carbon dioxide content by increasing fresh gas flows may minimize the respiratory drive, ventilator desynchrony and hence sedation. Early tracheostomy may help minimize sedation requirements and may reduce duration of ECMO[6] with added patient-centered benefits such as potential ability to eat

and drink and vocalize.[7] Certainly, there is a need to investigate the risk: benefits of an early tracheostomy in this patient population.

Knowledge of altered PK[2] can inform choice of sedative and analgesic drugs. Hydrophilic agents such as morphine are less sequestered in ECMO circuits[8,9] and may have greater bioavailability. Although benzodiazepines are significantly sequestered and necessitate higher doses, they are widely used given their better cardiovascular tolerance, compared with propofol. Enteral longer-acting benzodiazepines, antipsychotics, methadone, and physical restraints can all be useful adjuncts in minimizing intravenous sedation requirements.

Sedation practice in respiratory failure patients treated with ECMO remains variable[10] in the absence of robust data to guide practice. Clinicians continue to individualize sedation not based just on their patient's physiologic needs but also on center experience, culture, resources, staffing, etc. Long-term prospective studies are indicated to guide the clinician, as the use of ECMO continues to grow.

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