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Commentary

# Cannulation for Neonatal and Extracorporeal Membrane Oxygenation

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## ABOUT THE STUDY

Extracorporeal Membrane Oxygenation (ECMO) has typically only been performed on young patients who are sedated and intubated due to the possibility of life-threatening complications such as cannula dislocation, haemorrhage, or unintended decannulation. Sedation and intubation do not, however, come without hazards and side effects of their own. Trials evaluating the viability of "awake ECMO," in which patients are not intubated before to cannulation and maintain spontaneous breathing during the process, have recently been conducted in adult populations. There is relatively less information available regarding cannulation in a sedated but spontaneously breathing juvenile patient, despite extubation of pediatric patients after cannulation that indicate as far as long-term negative effects. We discuss one of the few cases of ECMO cannulation in a young child who was in cardiogenic shock and was sedated but not intubated.

Since its invention in the middle of the 20th century, cardiopulmonary illness has typically been treated with ECMO as a "last resort" option. A sedated and mechanically ventilated patient is preferable due to the numerous serious and life-threatening hazards, such as accidental decannulation. Sedation and mechanical breathing, however, carry their own unique set of serious hazards, thus it is important to take each patient's medical history into account. The patient had severe fulminant heart failure, and even though he was taking several drugs to sustain his cardiac function, he continued to deteriorate, necessitating the use of an ECMO machine as a necessary next step. It was a complex decision that was not made lightly to proceed without intubation and mechanical ventilation. The physiology of respiration is altered by mechanical ventilation, switching from expansion caused by negative intrathoracic pressure to expansion caused by positive intrathoracic pressure. While this somewhat reduces afterload, which should be advantageous for the physiology of this patient, it also has the potential to lower left ventricular preload due to decreased systemic venous return. Reduced cardiac preload in our case would have made his already significantly diminished cardiac output worsen. Risks associated with sedative drugs include detrimental inotropic effects and lower systemic vascular resistance, both of which put our patient's precarious condition of cardiogenic shock in jeopardy. These considerations precluded our patient from receiving general anesthesia. Ketamine is particularly helpful in that it not only protects cardiac stability but also maintains spontaneous breathing, airway muscular tone, and reflexes. Ketamine creates a state of dissociation that provides drowsiness, forgetfulness, and analgesia. Finally, the fact that our patient was already having cardiac dysrhythmia as a result of his diminished cardiac function and growing lactic acidosis increased the urgency of reducing his cardiac workload and safely transferring him to ECMO.

Prior to ECMO cannulation, patients have historically and are still routinely intubated. There has been interest in "awake ECMO" over the past ten years, which involves either not intubating patients during cannulation or extubating them shortly after cannulation while they are still on ECMO. A published report describes the cannulation of two young patients with mediastinal cancer without intubation out of fear for a serious airway compromise that would result in airway collapse. Without the necessity for general anesthesia or intubation, both children were effectively managed with conscious sedation and then decannulated.

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