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Neonatal venovenous ECMO: Should we use it more?

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Since its development in the early 1990s, extracorporeal membrane oxygenation (ECMO) has become a standard therapy for a wide variety of respiratory and cardiac problems in neonates. Traditionally, the preferred method of access and support has been using a venous inflow, with arterial outflow methodology (venoarterial or VA ECMO), bypassing the cardiac circulation.[1] Ongoing improvements in catheter configuration have made the use of a dual lumen catheter, with venous inflow from above and below the atrium and directed outflow of oxygenated blood into the right atrium, possible in the majority of neonates (venovenous or VV ECMO).[2,3] The advantages of VV ECMO include improved physiology with preservation of pulsatile blood flow, reduced cardiac stun, delivery of oxygenated blood to the pulmonary circulation, maintenance of normal cerebral perfusion, and reduced risk of emboli. However, only 30% of infants are supported using VV methodology, while up to 80% are potential candidates.[1] The reasons cited for choosing VA ECMO are patient size, instability, and the need for ongoing pressor support. Although these are concerns, none, except for patient size, are absolute indications for VA support. With appropriate cannulation methods, and verification of catheter position and function, the majority of neonates can be supported using VV ECMO. This article reviews the practical considerations for using VV ECMO in neonates. Patient selection is based on diagnosis and size. Almost all respiratory, septic, and most cardiac indications can be supported with VV ECMO if the patient weighs more than 2500 g. The two main catheter types differ in size and configuration; both have been shown to be efficient when properly placed. Catheter positioning during cannulation should be confirmed with an echocardiogram for flow and mixing, and a radiograph for positioning. The Avalon catheter must have an echocardiogram for placement and has a higher

reported incidence of complications.[4] Typically, a secondary venous inflow catheter is required, either as a cephalad jugular or as a femoral line. Medical management during a VV ECMO run commonly requires pressor management; however, this is also associated with a more stable perfusion profile. There are no other changes in management required; anti-coagulation requirements and decannulation are simpler with the VV ECMO methodology. Overall, outcomes (survival and neurological status) in all major disease classes are better with VV ECMO; however, controversy exists as to whether this is due to the therapy, or a selection bias in choosing candidates.[1] In summary, with appropriate preparation of the team and selection of catheter sizes, the majority of neonates can be supported with VV ECMO. This offers the potential for improvement in survival, and reduced incidence of neurological injury. These long-term outcomes should be the primary consideration in the choice of cannulation technique.

Keywords: venoarterial, venovenous, Avalon catheter, echocardiogram catheter confirmation, diaphragmatic hernia, meconium aspiration

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