More or less: Sometimes more is more if it's the lesser of evils

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For infants whose physiology relies on a surgical systemic-to-pulmonary artery shunt, the balancing of circulations so as to provide ideal amounts of both systemic output and pulmonary blood flow often remains a Goldilocks paradox, where a radical change in either can have catastrophic consequences. Because of this, the constant risk for major shunt complications remains concerning, causing us to admonish the house staff that the procedure never be referred to as “just a shunt.” Concurrent advances in the development of rapid-response extracorporeal membrane oxygenation (ECMO) programs have allowed for greater salvage of patients who succumb to cardiac arrest, but for those with patent systemic-pulmonary shunts, the conundrum remains as to how to reproduce a balanced circulation effectively while on device support. Simply put, one can either limit the pulmonary blood flow (ie, clip the shunt) to encourage cardiac (ie, ECMO) output, or increase ECMO output with a patent shunt at the risk of pulmonary overcirculation. In this issue of the *Journal*, the Emory group presents compelling data that we rethink whether “more is more,” and in fact that (as has been previously suggested) simply increasing ECMO flow without restricting shunt caliber may obtain good results in dire situations.^{1,2}

The entire cohort in this study demonstrated a survival to ECMO decannulation of 71.1%, and survival to hospital discharge of 50.9%, findings largely unchanged for those infants and neonates, those shunted or unshunted, and those with Norwood stage I palliation. To the uninitiated, these may seem concerning outcomes, but they are in fact comparable—if not superior—to most.³ Those with a systemic-pulmonary shunt demonstrated higher pre-ECMO and peak serum lactate levels, and longer times to achieve lactate clearance and negative fluid balance—a small price to pay for comparable overall survival. The nonshunted patients in the study also required considerably longer ECMO support times, a fact that may contribute to the “equalization” of overall survival—namely that, although requiring higher flows, an infant with an isolated shunt problem

(and salvageable cardiac function) ultimately may be weanable sooner than a patient with 2-ventricle physiology awaiting myocardial recovery. These data are consistent with previous studies demonstrating superior ECMO survival in patients with isolated shunt thrombosis.⁴

Moreover, dogma would suggest that carotid cannulation in the setting of a modified Blalock-Taussig shunt could presage proximal shunt occlusion and instigate thrombosis. One-fifth of those shunted underwent neck cannulation, all of whose shunts remained patent through the ECMO course with or without intervention.

While a retrospective single-center study cannot promote or refute the approach of shunt restriction to balance shunted physiology on ECMO, these data argue in favor of simplicity. Like other series from large ECMO centers, these data do beg for a disclosure of ‘best practices’ to achieve such results—when to start hemofiltration? How aggressive to be about shunt revision? When to initiate support? Does this management strategy apply to those with ductal stents? The first step in this process is debunking mythology, as “people saying ‘it can’t be done’ are always being interrupted by somebody doing it.”⁵

References

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**LESS
IS
MORE.**

[MORE OR LESS]

Central concept.

Central Message

For those infants with a patent systemic-pulmonary shunt and hemodynamic collapse, the conundrum remains as to how to effectively reproduce a balanced circulation while providing ECMO support.

See Article page 912.

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