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EDITORIAL COMMENTARY

Prophylactic peritoneal dialysis after the Norwood procedure: Worth the risk?

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See related article on pages 222-8.

Despite iterative, incremental improvements in the mortality rates associated with complex newborn cardiac surgery, persistent morbidities related to perioperative care continue to plague intensive care unit and hospital lengths of stay, not to mention influence overall survival for these patients. Increasingly, the willingness of congenital heart surgeons to perform such procedures for neonates with low birth-weight, those who are premature, and those with other syndromes has further magnified some of these most basic obstacles, few as fundamental as the challenge of establishing early perioperative negative fluid balance without jeopardizing cardiac output. In this issue of the *Journal*, Ryerson and colleagues from Stollery Children's Hospital¹ describe the first randomized controlled trial of prophylactic peritoneal dialysis (PD) after the Norwood procedure. Previous retrospective studies evaluating the use of PD catheters for recipients of complex newborn repairs have examined varying aspects of their implementation (passive drainage vs dialysis, early vs late insertion, and presence vs absence

of acute kidney injury), and although their results have largely supported prior beliefs regarding the use of PD catheters in perioperative settings, none has been studied in such a finite cohort of arguably some of the most hemodynamically fragile neonatal cardiac patients.^{2,3}

As Ryerson and colleagues¹ concede, it was not possible for this to be a blinded study, and in that sense, because the management of the patients was not protocolized (although commencement of PD was overseen by a priori criteria), there is always a possibility of performance bias. Nevertheless, the lack of statistical improvement of either primary (negative fluid balance) or secondary end points—in concert with a striking rate of adverse events—certainly bring to mind the concept of no free lunch. The fact that this study cohort is somewhat different from those historically thought to benefit most from perioperative PD (ie, newborn tetralogy repairs and patients with restrictive right ventricular physiology) is slightly tempered by the Stollery group's universal use of right ventricle and pulmonary artery conduits in their cohort, where the likelihood of early aggressive fluid resuscitation (potentially in combination with right ventricular diastolic dysfunction) was no doubt considerable. Although negative fluid balance as a primary end point may seem less clinically powerful than more traditional outcome variables, it does represent an objective target, with fewer confounding influences.

Accordingly, Ryerson and colleagues¹ chose to include all-cause morbidities in the study group, and in doing so report not just the more peritoneal morbidities commonly associated with PD catheters, as was done by Sasser and colleagues,² but also the major adverse events that themselves either could have been related to the PD infusion (with resultant effect on both preload and pulmonary vascular resistance), or could have negatively biased the

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study group by including extracorporeal life support patients (it did not). Some may argue that the introduction of a foreign body in the setting of low cardiac output is a recipe for peritonitis, yet this was not reflected in the study by Ryerson and colleagues.¹ However, important to the consideration of such a prophylactic procedure are the potential unintended consequences, and although it has been suggested that the overall prognosis of kidney function after PD used in this setting is acceptable, certainly the long-term incidence of problems attributable to catheter placement (eg, bowel obstruction) are unknown.⁴

As advocates of peritoneal drains would submit, this randomized trial by Ryerson and colleagues¹ does not refute the fact that in selected patients passive peritoneal drainage may effectively treat intra-abdominal hypertension and thereby mitigate the progression toward progressive kidney injury.^{3,5,6} Moreover, tacit in this analysis is the fact that, for pediatric patients who experience acute kidney injury in the setting of congenital heart surgery, perioperative mortality ranges as high as 28% to 67%, and initiation of adjuncts such as PD in the first days after surgery may considerably decrease this risk.^{3,7} Finally, no single-center study can reliably account for intraoperative practice variations (eg, size of the bypass circuit or use of modified ultrafiltration) that could influence the overall postoperative utility of such adjunctive therapies at other centers.

As Roger Mee stated, “The decision to use PD becomes a very small one if the catheter is already in place,”⁸ and although this is surely true (in particular for those patients

in whom the results of additional PD may be equivocal), the work from the Stollery group¹ gives us pause to consider whether it follows the adage “if it’s not worth doing, it’s not worth doing well”—at least in the setting of prophylactic PD after the Norwood procedure. Future randomized studies may provide better insight toward identifying for whom this therapy is best suited.

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