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Commentary: Cardioplegia for immature hearts utilized in adult hearts: What is at stake?

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Heart surgery is myocardial protection. Inadequate protection leads to poor short- and long-term outcomes. Myocardial protection during minimally invasive cardiac surgery (MICS) is challenging because a surgeon operates in a confined space requiring a bloodless field. This has led surgeons to utilize cardioplegia solutions that allow for safe myocardial protection with a single infusion. This facilitates the flow of the procedure, decreasing the morbidity and mortality associated with long cardiopulmonary bypass and crossclamp times. Custodiol histidine-tryptophan-ketoglutarate (HTK) solution has been used in adult heart surgery for a long time. This is in contrast to del Nido (DN) cardioplegia, designed for immature hearts, which is now being employed in conventional surgery and MICS in adults.

HTK is an intracellular crystalloid solution, known to provide up to 3 hours of protection with single infusion.^{1,2} On the other hand, DN cardioplegia is an extracellular crystalloid solution and, as mentioned, was designed for protection of immature hearts.³ It allows preservation of intracellular phosphate concentration, maintains intracellular pH, and reduces intracellular damage by calcium ion influx during ischemic arrest. The safety and efficacy of HTK cardioplegia in adult and pediatric patients have been well established.⁴⁻⁶ Extrapolation of DN cardioplegia to adult hearts remains unclear, lacking basic science investigation.

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CENTRAL MESSAGE

Minimally invasive cardiac surgery requires distinctive surgical skills, and del Nido cardioplegia facilitates the procedure with single infusion.

Lee and colleagues⁷ examine the efficacy and safety of DN compared with HTK in a propensity-matched cohort of 228 patients undergoing MICS. The authors demonstrate similar clinical outcomes. However, peak levels of cardiac isoenzyme were significantly lower in patients receiving DN cardioplegia when ischemic times did not exceed 100 minutes. The enzyme levels were higher when ischemic times exceeded 100 minutes compared with HTK.

We congratulate the authors for their efforts and elegant study design. Nevertheless, definitive conclusions cannot be made as to the best method of myocardial protection for MICS because the study evaluated 2 cardioplegia solutions with limited sample size. Additionally, to further determine DN cardioplegia's effectiveness and safety in MICS, larger prospective clinical trials (with interventions using long aortic clamping periods) and basic science research in adult hearts will be required. Until then, we will have to rely on clinical reports to justify its continued use.

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