PREVENTION OF LOW CARDIAC OUTPUT SYNDROME (LCOS) IN NEONATES UNDERGOING OPEN HEART SURGERY: A PILOT-PHASE II STUDY ABOUT THE EQUIVALENCE OF TWO INODILATORS (INDS)

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Background: Neonates are at particular risk of suffering surgery-related LCOS, characterized by impaired myocardial contractility and the peripheral effects of ischemia/reperfusion on endothelium. INDs are strongly recommended although based on suboptimal studies.

Aims: Systematic approach to dose-dependent haemodynamic effects of continuous i.v. infusion of Milrinone (MR) and Levosimendan (LEVO), starting before cardiopulmonary bypass .

Methods: Intervention (first 48h, blinded): step- increase in INDs dose (D_1 : intraoperatively; D_2 : on NICU admission; D_3 : 2h - 48 h from admission). INDs withdrawal: LEVO at 48 h ; MR beyond 48h as per attending physician criteria. Continuous, time-locked physiological and near-infrared spectroscopy (cerebral-NIRSc/thigh-NIRSp) data recording during the first 24h (T-1), at 48h (T-2) and 96h (T-3) post-surgery. Blood samples for biochemistry and pharmacokinetics (PKs). Serial echocardiography and cranial-Doppler ultrasound studies.

Results: 20 infants [postnatal age: MR, 13 (10) days; LEVO, 15 (9) days] were randomized [(MR=9; D_1 0.5- D_2 0.75- D_3 1mg/k/min); (LEVO=11; D_1 0.1- D_2 0.15- D_3 0.2mg/k/min)]. MR showed lower pH and higher glycemia and more need for other inotropes during the first hours post-surgery. MR and LEVO showed no differences in time-related changes on NIRSc (increased tissue oxygenation) or blood pressure (decreased diastolic pressure) in T-1. However, groups differed in NIRSc-derived variables from T-1 to T-3. INDs withdrawal at T-3 was 37% in MR vs 91% in LEVO. PKs (LEVO and metabolites) were successfully analyzed.

Conclusions: LEVO is well tolerated in critically ill neonates. Potential advantages of LEVO related to dose regimen.