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Initial Clinical Experiences with Novel Diagonal ECLS System in Pediatric Cardiac Patients

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Purpose: Extracorporeal life support (ECLS) is a lifesaving mechanical circulatory support that has become an accepted therapeutic modality for neonates and children afflicted with respiratory and/or cardiac failure that is refractory to conventional management. The Deltastream® DP3 (Medos Medizintechnik AG, Stolberg, Germany) is a newly designed rotational pump with a diagonally streamed impeller that can be used in children of all ages. The aim of this study was to analyze the safety and feasibility of this novel diagonal ECLS System.
Methods: Between March, 2011 and May, 2015 89 patients underwent ECLS support. We switched to DP3 after November, 2012, and DP3 was used in a consecutive series of 64 patients (almost 5% of all children undergoing congenital heart surgery at same period). We retrospectively reviewed medical records of patients to study.
Results: ECLS with the DP3 was performed in 64 patients (30 females, 34 males). The patients' age was a median of 90 days (2—4320 days). The patients' weight was a median of 3.8 kg (2.1–40 kg). Indications for ECLS were failure to come off of cardiopulmonary bypass (n=19), postoperative low cardiac output syndrome (n=18), E-CPR (n=19), and respiratory failure (n=8). Nineteen (29.6%) children had single ventricle, while 45 (70.4%) children had two-ventricle pathology. ECMO indications, durations, and start times had no statistical significance on survival. Complications included cardiopulmonary (n=41,64%), neurologic (n= 18, %28), infectious (n= 27, 42%), pulmonary (n= 19, 29%), renal (n=34, 54%), hemorrhagic (n= 35, 54%) and mechanical (n=6, <10%). Median ECMO duration was 6.4 (range 4–41) days. ECMO was successfully weaned in 45 (70.3%) patients, 24(37.5%) patients survived to hospital discharge and 21 patients (32.8%) died after successful weaning. While the weaning success rate was 36% and the survival rate 20% before November 2012.
Conclusions:The combination of a DP3 pump and a Hilite 800LT oxygenator in pediatric ECMO circuits may improve durability and reduce circuit-induced complications. As a result of shift from DP2 to DP3, revision of ECMO protocol and increased ECMO experience, significant improvement was observed in our clinical results.