Abstract:

Background and Objective: Various palliative or total corrective operations are done in children with congenital heart disease (CHD). Incomplete total correction or non adequate operations are the most common reason for postoperative complications. In patients with normal cardiopulmonary function, the end-tidal carbon dioxide tension (ETPCO2) accurately approximates the arterial carbon dioxide tension (PaCO2) and there is a small difference (3-5 mmHg) between PaCO2 and ETPCO2 (PaCO2- ETPCO2= DPCO2), but in most of children with CHD the DPCO2 is increased. We hypothesized that DPCO2 may be affected by the type of cardiac operation, and moves to normal values. There is not any study about the effect of kind of operation on post operative on DPCO2. Thus in a prospective study we tested this hypothesis.

Method and Material: In a prospective study, during a 9 months period 200 infants and children, 1 month up to 12 year candidate for corrective or palliative cardiac surgery were enrolled to this study. Sufferings from other organic disease were excluded from study. Patients were grouped in four G1 (decreased pulmonary blood flow (PBF) and right to left shunt), G2 (decreased PBF without any shunt), G3 (increased PBF and left to right shunt) and G4 (CHD with normal PBF without any intracardiac shunt). After anesthesia induction as routine practice an artery and central venous catheter were placed. Anesthesia was induced with ketamine 2 mg/kg, fentanyl, 3 μg/kg and cisatracurium 0.2 mg/kg, after preoxygenation. Using blood gas measurement (ABG) and a sidestream capnography simultaneously PaCO2 and PETCO2 were measured for each patient after induction of anesthesia, before skin incision, 10 minutes after CPB, at the end of surgery and before extubation. When CPB not be used, PCO2 was measured 10 minutes before and after procedure. Demographic and other data such as diagnosis and operation type needs to inotrope, the time of mechanical ventilation and ICU stay and mortality were recorded.

Results: 56, 5, 123 and 16 patients were enrolled in groups G1 (TOF, VSD/PS, ASD/PS, ASD/TS), G2 (TGA, TS, PS), G3 (VSD, ASD, PDA, AV canal defect) and G4 (MS, AS, Aortic coarctation), respectively. Total corrective and palliative

procedures were done in 154 and 46 patients, respectively. Mortality rate was 7%, 8 and 6 patients died in corrective and palliative procedures, respectively. Patient's demographic data were not different between four groups or between two operation types. Also DPCO2 was higher than normal values in all groups; however there was a good relation between ETPCO2 and PaCO2 in all times in every group. DPCO2 was comparable between all groups ($P<0.05$). During operative and post operative periods there was not any meaningful change in DPCO2 in any group ($P<0.05$). Also DPCO2 was higher in patients who were candidate for palliative procedures than others who were candidate for corrective procedures; we don't see any changes in DPCO2 in any of them. Also, needs to inotropic support was higher in corrective procedures ($p=0.019$), need to mechanical ventilation support was higher in palliative procedures ($p=0.011$); however mortality rate and ICU stay time were the same.

Conclusion: In pediatrics cardiac surgery, DPCO2 is higher than normal values that it will not be changed significantly after corrective or palliative procedures. Thus DPCO2 value is not important in monitoring of the corrective or palliative procedures efficacy. However there is a good relation between ETPCO2 and PaCO2 in all times and we still can use capnography in pediatrics cardiac surgery.

Key words: Congenital Heart Diseases, Corrective pediatric cardiac surgery, Palliative pediatric cardiac surgery, capnography, Arterial to End-tidal carbon dioxide pressure Difference