

A NOVEL APPROACH TO RE-ESTABLISHING NORMAL BLOOD FLOW IN A PATIENT WITH CORONARY ARTERY FISTULA WITH PDA AND PPHN WITH VAPOTHERM HIGH FLOW NASAL CANNULA.

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INTRODUCTION: A 3.0 Kg 36 week infant transported to Children's healthcare of Atlanta's CICU with the diagnosis of Coronary Artery Fistula and PDA. The patient arrived in normal sinus rhythm (NSR), mild respiratory distress, and moderately tachypneic with RR at 60 – 90 BPM. SpO₂ monitoring was at the pre-ductal level; the saturations were 100% on 1 LPM NC. The initial blood gas obtained from an umbilical artery catheter (UAC) revealed a mixed acidosis of a pH 7.27, PaCO₂ of 47, PaO₂ of 35, base deficit of -6 with a HCO₃ of 18, and a SaO₂ of 63%. Chest radiograph revealed a normal cardiac silhouette, eight ribs expanded, and otherwise unremarkable. Pre and post ductal SpO₂ measurements were instituted revealing a gradient of 13%. Nasal cannula flow was increased to 2 LPM without any change in the gradient. A 10cc/Kg 5% Albumin infusion was given over a fifteen minute time period without significant change in status.

CASE SUMMARY: The patient was placed on Vapotherm Nasal Cannula System (Vapotherm, Stevensville, MD, USA) for high flow nasal cannula (HFNC) strategy for respiratory distress and oxygenation difficulties. Coarctation was ruled out by cardiac echo. Initial Vapotherm settings were 100% and a flow of 6LPM per CPAP flow and hemodynamics. The pre and post ductal gradient resolved over a fifteen minute time frame and the initial blood gas revealed a pH of 7.34, PaCO₂ of 44, PaO₂ of 67, base deficit of -2 with a HCO₃ of 22, and a SaO₂ of 92%. The patient also received a transfusion of 45 cc of PRBC over a two-hour period. The pre and post-ductal SpO₂ remained 98% enabling weaning of FiO₂ to 40% over a two-hour period. A blood gas on 6 LPM and 40% was a pH of 7.32, PaCO₂ of 48, PaO₂ of 96, base deficit of -2 with a HCO₃ of 25, and a SaO₂ of 97%. Twenty-four hours post admission, the referring hospital divulged an untreated maternal beta hemolytic streptococcus infection, antibiotics were started on the patient.

DISCUSSION: The response to the HFNC strategy via the Vapotherm system enabled an improved pulmonary capillary bed-alveolar interface and improved pulmonary function. The ease of application of the HFNC system, the reduced risk of skin / nasal trauma-breakdown, and the ability to alter pulmonary function justifies this strategy for mild respiratory distress. The patient clearly had parenchymal lung disease as evidenced by poor CO₂ clearance and maternal history. Applications for HFNC strategies are becoming an acceptable modality of care in the neonatal arena. This modality is another tool that needs further study for a continued process improvement in neonatal medicine and science.

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