[NM-177] High-frequency ventilation: Rescue during tracheo-esophageal fistula repair in the setting of congenital heart disease.

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Tracheo-esophageal fistula (TEF) repair poses unique challenges to the anesthesiologist, which are intensified by a multitude of comorbidities such as esophageal atresia (EA) and congenital heart defects. The introduction of thoracoscopic repair of TEF has underscored the need for optimal ventilation strategies.

A three day old female presented for thoracoscopic repair of TEF/EA. The baby was born at 38 weeks of gestation, weighing 2160 grams, with diagnosis of Trisomy 21 and TEF/EA. A post natal echocardiogram showed a large PDA with bidirectional flow, dextroposition with left sided aorta and a large PFO versus secundum ASD with left to right shunt. Laboratory values on day of life two were consistent with a transient myeloploriferative disorder. Upon presentation to the operating room the baby required O2 via nasal cannula. She underwent inhalation induction with sevoflurane and spontaneous ventilation. Rigid bronchoscopy revealed a very large fistula one centimeter proximal to the carina. The trachea was intubated via direct laryngoscopy, a right radial arterial line was inserted and pre & post ductal SpO2 monitors were placed. Upon entering the thorax, visualization of structures was poor despite a higher respiratory rate with lower tidal volumes. After continued efforts to optimize the view in the surgical field the oxygen saturation decreased. Ventilation and oxygenation were at odds with adequate surgical exposure. Ultimately, serial arterial blood gases demonstrated rising arterial carbon dioxide and the gap between pre and post-ductal saturations widened. The decision was made to convert to an open repair. However, ventilation and oxygenation remained inadequate with PaCO2 rising to >100 and PaO2 in the 40s with a SaO2 in the mid 70s to 80s. This was likely the result of shunt reversal through the atrial communication and the large PDA in the setting of respiratory acidosis.

To optimize ventilation and to improve surgical field exposure we initiated high frequency jet ventilation. The low tidal volume and rapid rate allowed the surgeons to continue the repair and within twenty minutes significant improvements in both oxygenation and ventilation were apparent. Following ligation of the fistula and primary anastomosis of the esophagus the baby was taken to the NICU. At the time of handoff the PaCO2 was 36, PaO2 87 with an oxygen saturation of 96%. The baby was extubated on post operative day six.

This case illustrates some of the challenges in ventilation during thoracoscopic procedures in the setting of congenital heart disease. Further research is needed on the benefits of intraoperative high frequency ventilation to aid pediatric anesthesiologists in these complex cases.

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