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Case spotlight

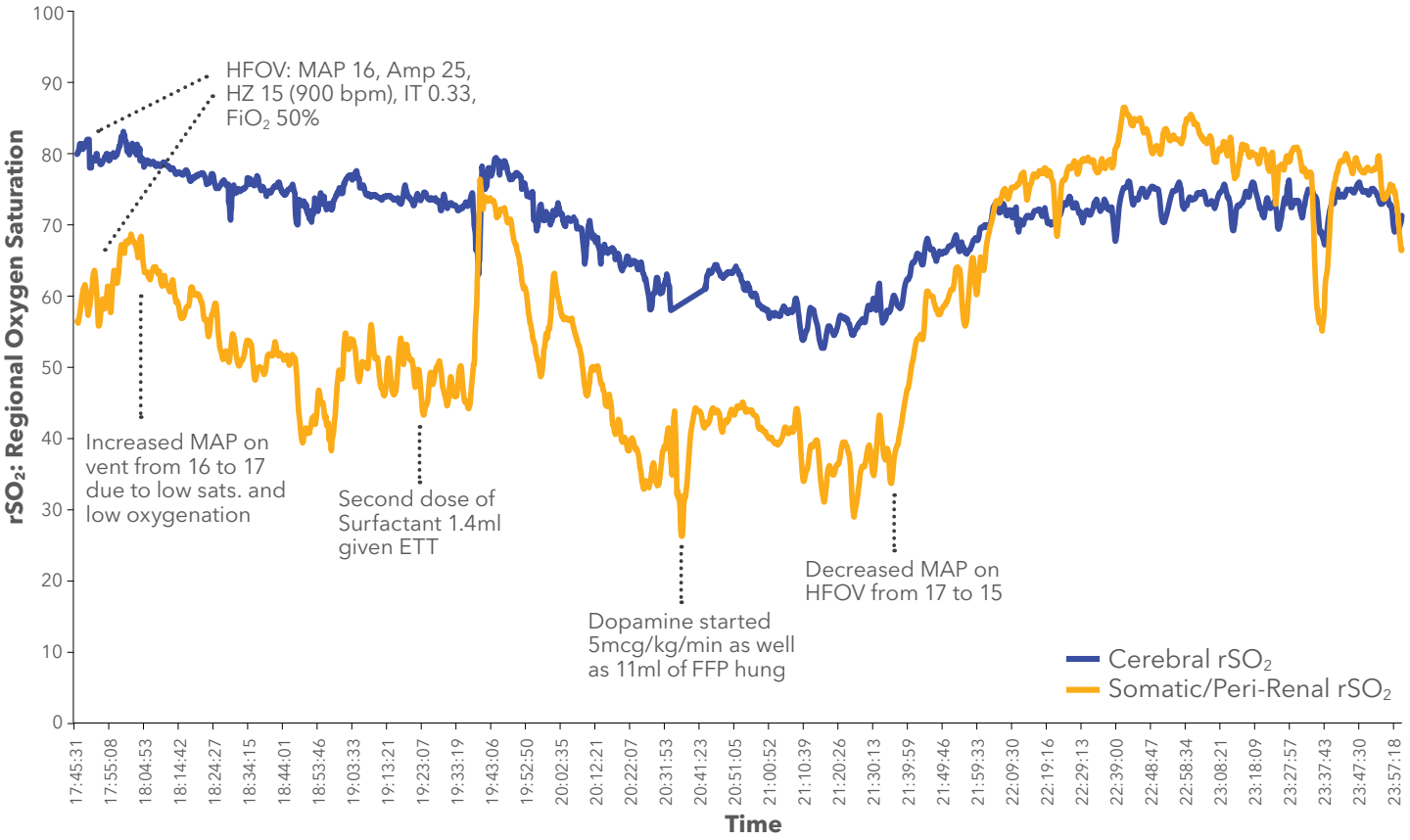
INVOS™ Cerebral/Somatic Oximetry

Correction of over-ventilation

Hemodynamic impact of mechanical ventilation in neonate

In this NICU case, we used non-infrared spectrospcopy (NIRS) monitoring via the INVOS™ cerebral/somatic oximeter as an adjunct monitor to access standard clinical interventions for hemodynamic management. This premature infant, born at 28 weeks gestation, was admitted to the NICU with a diagnosis of respiratory distress syndrome and rule out sepsis.

High-frequency oscillatory ventilation (HFOV) is used on infants to establish adequate CO_2 elimination and optimal oxygen delivery while minimizing the potential for lung injury that is often associated with conventional mechanical ventilation (CMV). HFOV differs from CMV by using a constant airway pressure (MAPv) to maintain optimal lung inflation with very small tidal volumes



delivered at 10 Hz to 15 Hz to promote gas exchange. This constant airway pressure and resulting constant lung inflation can impact the efficiency of cardiac function.

Upon admission to the NICU, the infant was placed on mechanical ventilation using HFOV and given surfactant. In addition to standard clinical monitoring used in the NICU, regional oximetry was used to monitor the cerebral and perirenal tissue beds. HFOV support was initiated with a mean airway pressure (MAPv) of 16 cmH_2O. Initial cerebral and somatic rSO_2 values were in the 60s and 80s respectively. Ventilator support was increased from a MAPv from 16 cmH_2O to 17 cmH_2O in response to a low PaO_2 from an arterial blood gas (ABG). The patient was also given a second dose of surfactant. Perirenal rSO_2 steadily declined over the first hour and a half to the 40s. The infant's mean arterial blood pressure was averaging approximately 25 mmHg. Dopamine was initiated to improve the arterial blood pressure. After a brief improvement in the perirenal rSO_2 value, the values declined to the 30s over the following hour. Considering the potential for lung over-inflation caused by the MAPv on HFOV and the impact this may have on hemodynamic function, the decision was made to decrease the MAPv from 17 cmH_2O to 15 cmH_2O. This decrease in MAPv was accompanied by an immediate rise in perirenal rSO_2 values to the 80s. This improvement in the perirenal rSO_2 surpassed the original rSO_2 baseline of 57. The mean arterial pressure remained steady averaging around 25 mmHg. An increase in dopamine was not necessary.

The INVOS™ cerebral/somatic oximeter provided insight into adequate local perfusion. Regional oxygenation saturation enabled the team to assess and maintain hemodynamic stability of the patient. With the additional information, the team was able to decrease the amount of ventilator support and avoid additional doses of vasopressors, while maintaining adequate oxygenation and perfusion of cerebral and somatic tissue beds.

The INVOS™ monitoring system should not be used as the sole basis for diagnosis or therapy and is intended only as an adjunct in patient assessment. Reliance on the INVOS™ system alone for detecting cerebral desaturation events is not recommended.

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