

Left Heart Hypoplasia: Baby Saved By Masimo SET® Pulse Oximetry

A spontaneous, vaginal delivery of a 3.5 Kg male occurred at term to a primigravida mother with an unremarkable prenatal history. Apgars were 9/9 and he was discharged at one day of age. Nine days later he was brought to the clinic for evaluation due to reduced intake. The child appeared pink and well perfused; mother was advised to increase his intake of clear liquids. The following morning, the infant was brought to the emergency room with the parent's observation of labored breathing.

Salient Findings and Outcome: The dyspneic child was profoundly pale with circumoral cyanosis. CBC, electrolytes, and spinal tap were essentially normal. The ER staff was unable to obtain a blood gas or saturation reading on pulse oximetry. The in-house neonatologist was summoned. He too attempted to get several conventional pulse oximeters to read but without success. He decided to try an investigational Masimo SET pulse oximeter. The Masimo SET device revealed a saturation of 30% with a pulse rate in the 40's. The first blood gas was drawn which confirmed the Masimo %SpO₂ value. The baby was intubated and moved to the NICU while hand ventilated with 100% oxygen. The Masimo SET device continued to display during the next two critical hours of resuscitation and stabilization with the readings continuing to corroborate the periodic blood gases. The base deficit values for the first two blood gases were off scale but a steady improvement occurred over the next five hours (see table below). An echocardiogram revealed a hypoplastic left heart with retrograde aortic flow. The child was placed on a ventilator and a PGE1 and Dobutamine infusion was started. The plan was to wean mechanical ventilation as tolerated and keep the %SpO₂ in the 85% range to discourage excessive pulmonary blood flow. The child was further stabilized and after consultation transferred to a pediatric heart center. Eight days later he received a cardiac transplant and is healthy today.

Sequential History of the First Six Blood Gases

| Time | pHa | PaCO ₂ | PaO ₂ | BE |
|------|------|-------------------|------------------|-----------|
| 0520 | 6.56 | 88 | 29 | off scale |
| 0542 | 6.73 | 98 | 36 | off scale |
| 0730 | 6.88 | 61 | 23 | -26.2 |
| 0830 | 7.07 | 35 | 65 | -20.6 |
| 0930 | 7.24 | 31 | 54 | -13.2 |
| 1030 | 7.42 | 36 | 43 | -0.6 |

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Discussion: Infants with a hypoplastic left heart can go undiagnosed, therefore a rapid response to their inevitable decompensation is vital. In this condition, the circulating blood volume and pulse pressure are so low as to make percutaneous vascular access impossible and an arterial cut-down is required. This makes even the assessment of pulse rate by palpation difficult. Conventional pulse oximetry does not work in such conditions. The Masimo SET oximeter acquired and displayed the %SpO₂ and pulse rate in this low perfusion state making assessment of the patient's cardiopulmonary status during resuscitation possible. Were it not for the steady rise in %SpO₂ values, the resuscitative efforts for this baby would have been aborted. This newborn's life was likely saved by Masimo SET pulse oximetry.

