Title: **PULSELESS OXIMETRY. The next generation?**
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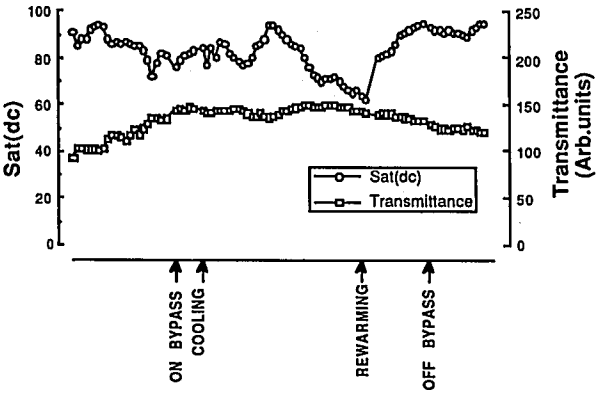
Introduction. Pulse oximetry, an important development in non-invasive patient monitoring suffers from being unreliable during situations when the need for this monitor is the highest. Because pulse oximetry depends on the presence of blood pulsations for its operation, it is unreliable when the peripheral pulse is feeble and is usually unusable during cardiopulmonary bypass.
We have investigated the feasibility of combining pulse oximetry with pulseless oximetry which would allow monitoring in all situations.
Methods. With institutional approval, six patients undergoing open heart surgery were monitored throughout the duration of their operations. In addition to the usual monitoring devices an extra pulse oximeter probe was attached to either the index finger or to the toe of the patient.Skin temperature was monitored at a site near the oxisensor. A battery powered experimental monitor was constructed to allow the observation and measurement of the AC and DC components of the red(R) and infrared(IR) signals obtained from the transilluminated tissue of each patient. An analog "transmittance" signal was also generated allowing the continuous monitoring of changes in blood volume or Hb concentration.The monitor was designed to provide a saturation reading derived from the ratio of the DC components [Sat(dc)] in addition to the usual saturation reading derived from the ratio of the DCcorrected AC components of the R and IR signals [Sat(ac)].[1]
Results and discussion. During periods of hemodynamic stability,Sat(dc) tracked the trend in oxygen saturation, even during hypothermic cardiac arrest. With large changes in Hb concentration or peripheral perfusion,however,the Sat(dc) failed to properly track saturation. Attempts to correct the readings using finger temperature, transmittance and other derived variables were only partially successful. A typical set of results obtained during cardiac surgery is shown on the diagram.
Pulseless oximetry may be useful in situations where no major changes in hemodynamics are anticipated. When good pulses are present,the Sat(ac) could be used to calibrate the Sat(dc), after which the Sat (dc) could track changes in saturation even in the absence of pulses.
Even if absolute accuracy may not be possible in all circumstances, Sat(dc) could still be useful to warn of sudden changes in oxygen saturation.
Reference: 1. Tremper KK et al,Anesthesiology 1989;70:98-108



A461

TITLE: INADVERTENT ENDOBRONCHIAL INTUBATION IN PEDIATRIC ANESTHESIA: A PROSPECTIVE STUDY
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Inadvertent endobronchial intubation is a well recognized yet often not detected complication of tracheal intubation. This study examines the incidence and method of diagnosis of inadvertent endobronchial intubation during pediatric anesthesia.

The data presented are abstracted from an institutionally approved, single blinded, prospective study on pulse oximetry and capnography. In half of the patients the pulse oximeter data was unavailable to the anesthesia team. An additional anesthesiologist was present to record any intranesthetic problem and to make a continuous strip chart recording of SpO_2, $ETCO_2$, ECG and to inform and interview the anesthesia team whenever the SpO_2 $\leq$ 95% for $\geq$ 60 sec.

191 patients who were managed by endotracheal intubation were included; in 100, the pulse oximeter data was available and in 91 it was unavailable to the anesthesia team. In 10 patients an endobronchial intubation occurred which led to 13 episodes of hypoxemia; 7 of these patients (9 of the hypoxemic episodes) were observed in the pulse oximeter unavailable group. In six of the 10 endobronchial intubations the related 8 episodes of hypoxemia were mild (SpO_2:85-95%). Six of the endobronchial intubations occurred after correct insertion of the endotracheal tube with the initial intubation due to re-positioning of the patient. All 10 endobronchial intubations were first diagnosed by the pulse oximeter; the capnograph did not contribute to their diagnosis.

The frequency of inadvertent endobronchial intubation was surprisingly high with a two-fold higher incidence in the pulse oximeter unavailable group; this difference did not reach statistical significance due to the small number of cases. The most important clinically relevant observation of this study is that a persistent, yet small, reduction in oxygen saturation may be a sign of secondary endobronchial intubation due to changes of the patient's position. Pulse oximetry appears to be a sensitive diagnostic means for detecting this potentially dangerous complication, particularly after the initial position of the endotracheal tube was felt to be appropriate.[1,2]

References:
1. Anesthesiology 68:184-188, 1988.
2. Can Anaesth Soc J 33:315-320, 1986.
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