

Clinical Experiences with a New Forehead Reflectance Pulse Oximetry Sensor in ASA III Patients during Surgery.

Hager H., Mandadi G., Reddy D., Pulley D., Kurz A. *Anesthesiology* 2004; 101: A564.

Introduction

Oximetry is an essential monitoring device during anesthesia. Unfortunately there are a number of clinical situations during which pulse oximetry is not accurate, delayed or does not work at all: this applies mostly to patients whose peripheral arterio-venous shunt in fingers or toes are vasoconstricted. Recently a new forehead pulse oximeter system (MaxFast, Nellcor®, Pleasanton, CA, USA) has been introduced. The measurement on the forehead may have some advantages: it is more central than the finger and should register changes in saturation faster. Also, the vascular bed of the forehead, unlike the fingers, is consisting of a capillary system rather than an arterio-venous shunt system. Thus it is less vulnerable to vasoconstriction. [1] We compared the Nellcor Forehead (MaxFast) to the Nellcor finger (MaxA) sensor, the Masimo® (Irvine, CA, USA) ear sensor and the Masimo® finger sensor (LNOPAdlt). The monitors were Nellcor N595 (v3.0.0) and Masimo Radical (v.3)

Methods

We enrolled 8 Patients, ASA III or IV, undergoing vascular surgery who were monitored with invasive blood pressure monitoring. After informed consent we recorded saturation values from the Nellcor forehead sensor, the Nellcor finger sensor, the Masimo ear sensor and the Masimo finger sensor with a computer every second (total of 23.5 hours). The Nellcor Forehead Sensor was mounted on the forehead using a disposable head band above the eye brow, as recommended by the manufacturer. In each patient we analyzed at least once the saturation in the blood and marked the time of the blood draw on the computer. We compared the blood saturation values with the simultaneous measured values from the pulse oximeters and looked at drop out times and reasons for drop outs.

Results

During all cases no desaturations occurred. Our preliminary results after 10 blood samples showed values between 96% and 100%. 5 patients were in supine position, 2 patients partly on the left side, 1 patient partly on the right side. When the patients were in side position and the Nellcor Forehead sensor was mounted on the bed side (dependent) eye brow, the sensor lost the signal after a decline of the values latest after 10 minutes. Also the ear sensor was challenged in the side dependent position showing higher accuracy on the cost of more dropouts.(Table)

Conclusion

The Nellcor Forehead sensors measures oxygen saturation comparably to other sensors as long as the patient is in supine position. In our limited patient population it was problematic to measure accurate saturation values from the forehead sensor on the dependent side of the forehead when the patient was positioned on the side. The reason for the compromised signal is probably venous pooling. However, we did not experience any events of desaturation and cannot conclude the proposed superiority of this device at this point.

[1] Lossius et al. *Microvasc Res*, 1995. 50(1): p. 94-104.

Comparison of 4 pulse oxymetry devices in correlation to the Art(SO₂), average relative dropout and average saturation

Pulse Oximeter	Correlation to Art(SO ₂)	p-value	avg dropout (%)	avg Sat(%)
Nellcor Forehead	0.097(side)/0.448(supine)	0.9647	0.32	98.12±2.81
Masimo Ear	0.525	0.741	1.06	97.63±7.11
Nellcor Finger	0.569	0.1085	0.96	98.67±2.1
Masimo Finger	0.525	0.0483	0.78	97.85±7.17