

Does Skin Pigmentation Affect Readings of Cerebral Oximeter Devices while on Cardiopulmonary Support?

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Introduction

Cerebral oximetry is utilized as a non-invasive method to ensure adequate cerebral perfusion. In a review of our clinical experience, it was noted that there were consistent inaccurate values from normal utilizing relative (INVOS, Covidien, Mansfield, MA) cerebral oximetry as opposed to absolute (FORESIGHT, CAS medical, Branford, CT) cerebral oximetry in darker skin patients.

Cerebral Oximetry

Relative oximetry

INVOS
 Covidien, Mansfield, MA
 Normal Values: >40%
 Abnormal Values <40% or >25% drop from baseline value

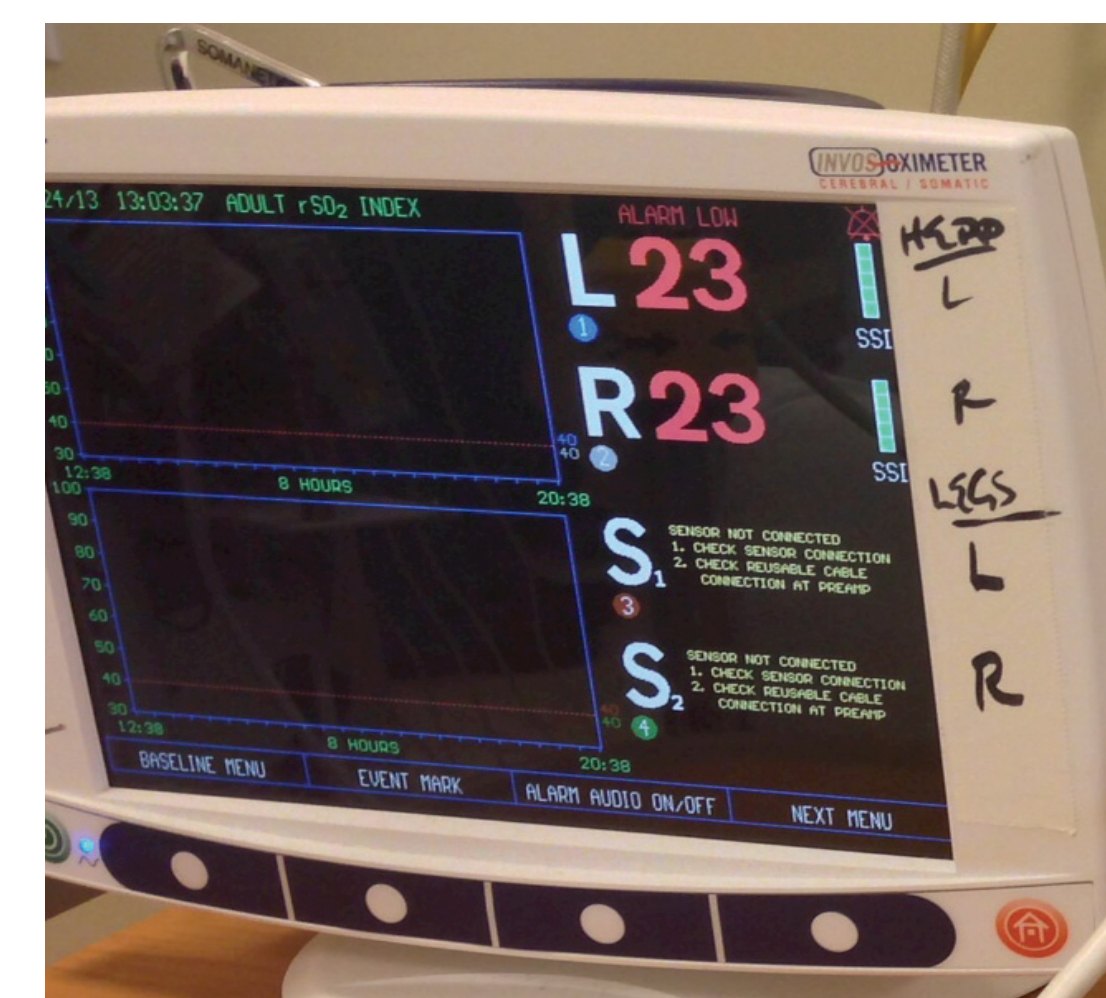
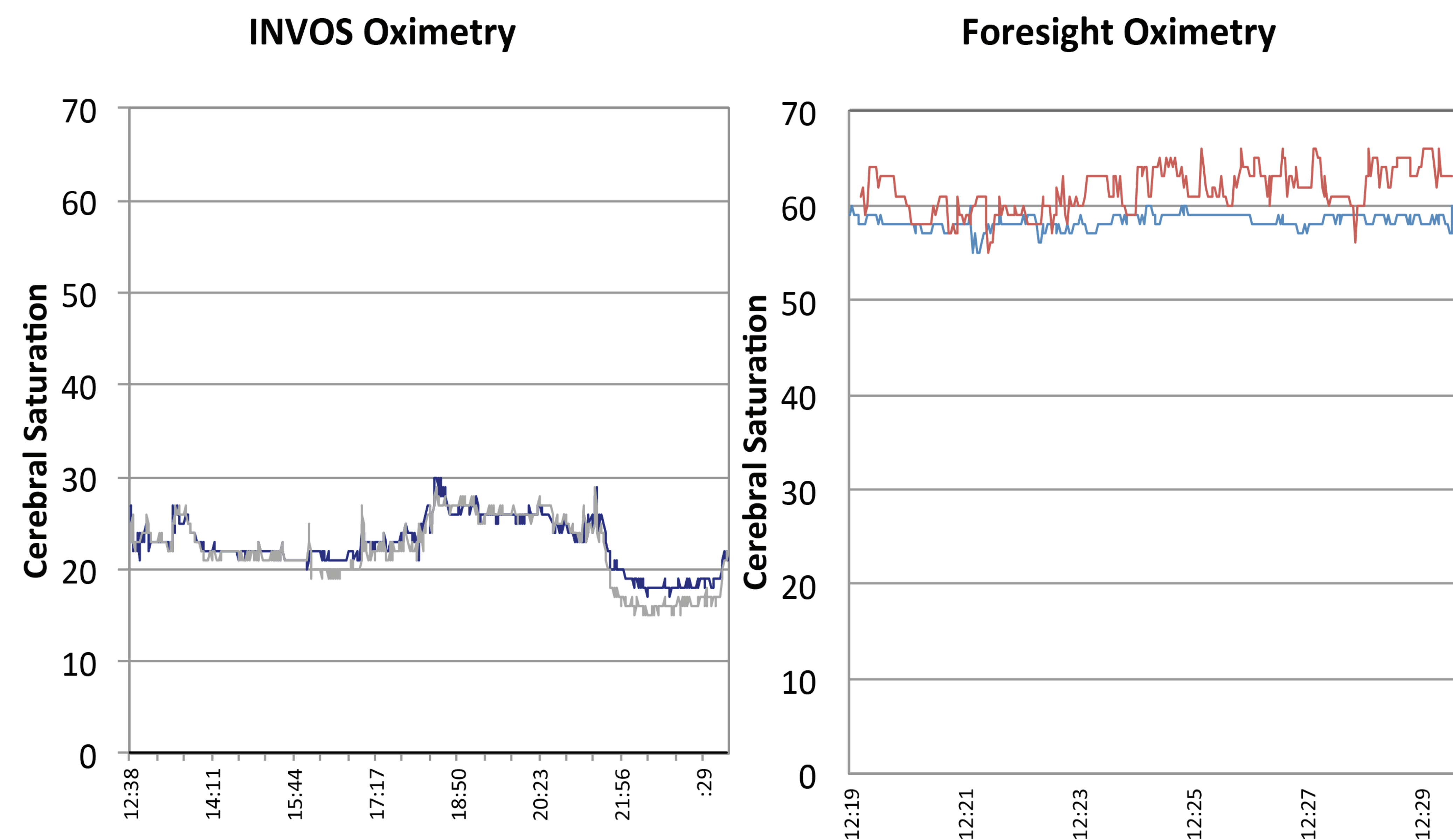
Absolute oximetry

FORESIGHT
 CAS medical, Branford, CT
 Normal Values: 50-80%
 Abnormal Values: <50%

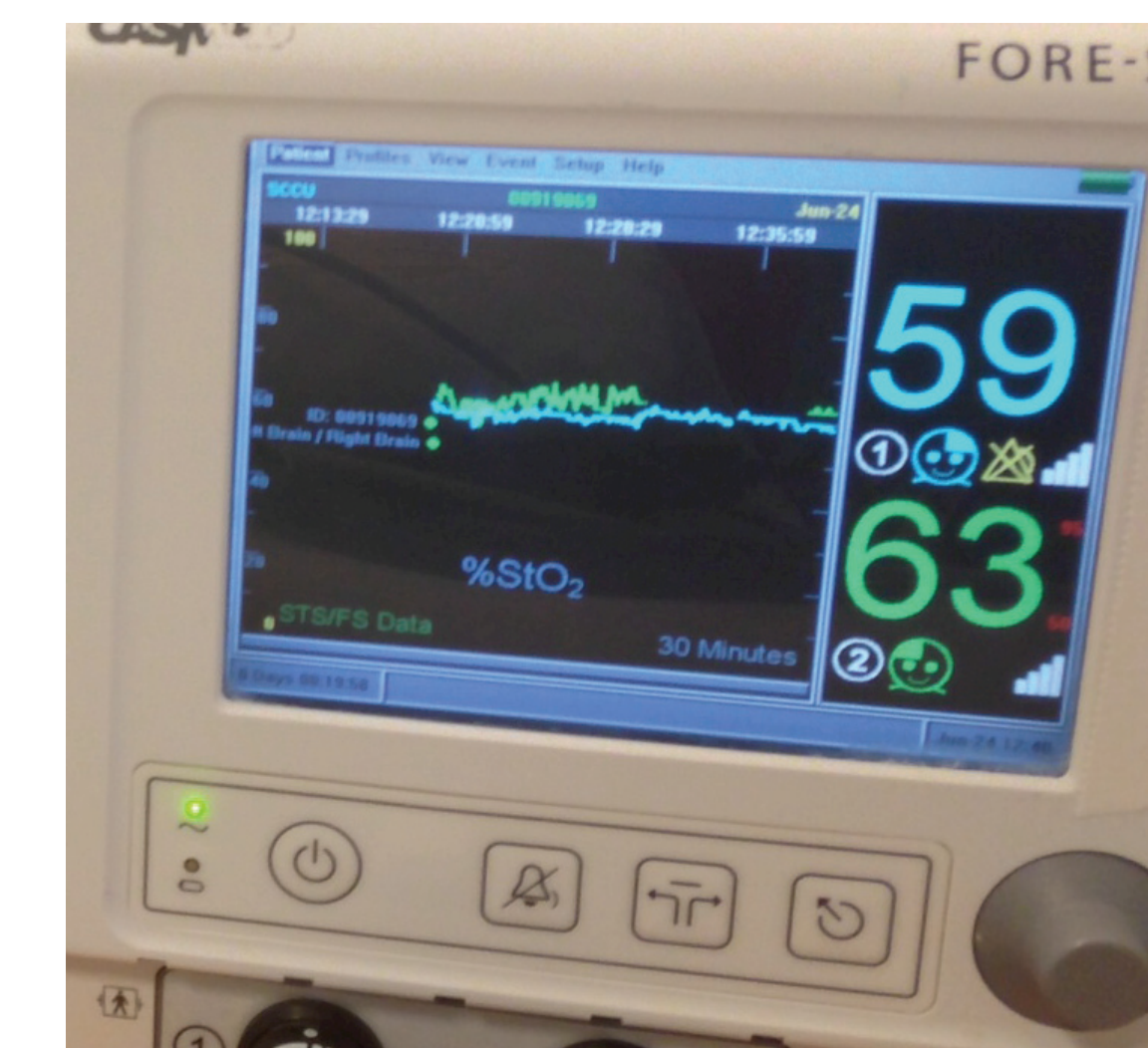
Case Presentation

A 71 year old African American patient undergoing CABG was noted to have consistently abnormal cerebral oximetry measurements utilizing the INVOS system. Increase of mean blood pressure, volume support and increase of oxygenation were not able to improve the INVOS cerebral oximetry. In the intensive care unit, FORESIGHT and INVOS were placed simultaneously. FORESIGHT demonstrated normal absolute cerebral saturation at a physiologic lower mean arterial pressure in contrast to the abnormal INVOS readings.

Relative vs Absolute Oximetry Tracings in a Dark Skinned Patient



INVOS



FORESIGHT

Simultaneously tracings of cerebral oximetries obtained from a dark skin patient.

Discussion

In complex cardiac surgery, continuous assessment of the cerebral perfusion is critical for optimum outcomes. Although the devices' readings are not comparable due to different technology, the cerebral oximetry discrepancies were consistently observed in all patients with dark pigmentation using relative oximetry. In dark skinned patients, background light absorbers interfere with the accuracy of relative but not absolute cerebral oximetry systems.

Conclusions

In monitoring cerebral perfusion in cardiac surgery patients, we have recognized a consistent differential between absolute and relative oximetry in dark skinned patients. The recognition that relative oximetry is artificially low in this specific population has allowed us to avoid unnecessary and potentially hazardous therapeutic interventions and management.

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