



MONITORING OF EFFECT OF SUPPLEMENTAL OXYGEN ADMINISTRATION DURING LOCOREGIONAL ANESTHESIA ON CEREBRAL OXYGENATION AS MEASURED BY NIRS (FORE-SIGHT TECHNOLOGY)

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Introduction:

During surgical procedures under locoregional anesthesia, it is common practice to administer supplemental O₂ (by O₂-mask) to the patient.

The Fore-Sight cerebral oximeter uses 4 wavelengths to determine absolute cerebral oxygen saturation (SctO₂) at the microvascular level. Using this new technology, few data are available on the influence of supplemental O₂ administration on cerebral oxygenation.

Therefore, in this study we compared SctO₂ values with O₂ mask to SctO₂ values without O₂ mask.

Patients and Methods: (1)

With IRB approval, 25 (ASA I-II) patients scheduled for elective knee surgery under epidural anesthesia were included.

We performed an epidural puncture at the L3-4 or L4-5 level in sitting position and administered a test dose of 4ml lidocaine 2% with 1/100.000 adrenaline. Thereafter the patient was placed back supine and the epidural blockade was started with 10-15cc of a mixture of 8ml ropivacaine 0,2%, 8ml lidocaine 2% and 20µg sufentanil until a good sensory and motoric block was achieved.

Conscious propofol sedation was started with a maximum dose of 1,5µg/ml.

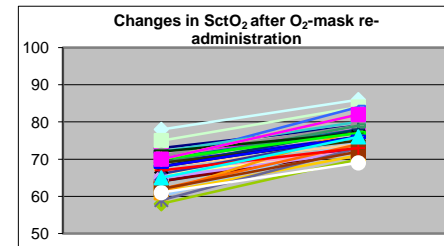
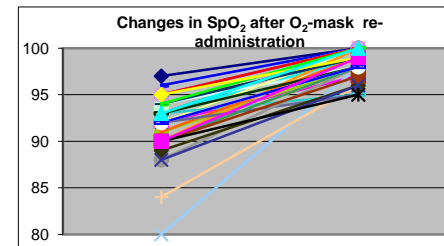
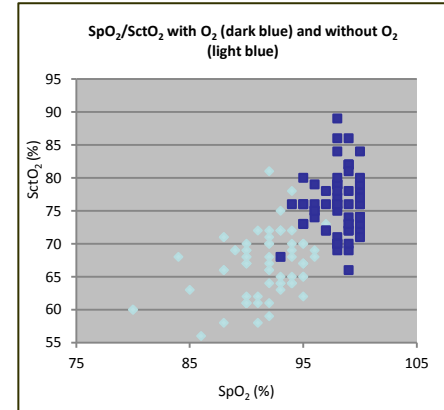
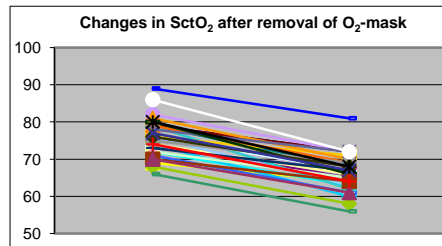
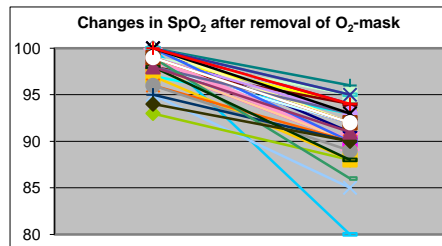
Patients and Methods: (2)

Bilateral SctO₂-monitoring was started after the installation of the patient in a supine position and 10 minutes after stable conditions were achieved (epidural analgesia and conscious sedation with propofol).

For the first 15 minutes, a O₂-mask (4L O₂/min) was applied. After 15 minutes, the O₂-mask was then removed. However if peripheral O₂-saturation (SpO₂) ever decreased below 90%, the O₂-mask was immediately re-applied.

Otherwise, after 15 minutes without O₂, O₂-mask was reinstalled.

All these observations occurred under stable conditions, without any surgical intervention. In all patients, hemodynamic and respiratory parameters were monitored.



Results:

Mean SpO₂ (with O₂) was 98.2% (96-100%) and decreased to m91.1% (80-96%) without O₂. Mean SctO₂ (with O₂) was 75.7% (66-89%) and decreased to m66.4% (56-81%) without O₂. Right to left difference in SctO₂ with O₂ was m3.8% (0-9%); without O₂ we observed a m4.3% difference (1-13%) between right and left side.

In 4 patients SpO₂ decreased below 90% and O₂ was immediately re-administered. In none of these 4 patients, SctO₂ decreased below 55% (= set as critical threshold for cerebral ischemia) (m61.2%, (57-69%)).

In the other 21 patients SpO₂ remained above 90%, without supplemental O₂ administration, and O₂-mask was re-installed after 15 minutes period, mSpO₂ increased to 98.4% (95-100%), while mSctO₂ increased to 76.1% (69-86%).

We did not observe any significant change in hemodynamic parameters (heart rate, bloodpressure) during the whole study period.

Discussion:

Supplemental O₂-administration during locoregional anesthesia (with sedation) is an effective intervention increasing as well peripheral as cerebral oxygen saturation.

In normal individuals, cerebral oxygen saturation reciprocally follows changes in peripheral oxygen saturation. If oxygen is immediately re-administered whenever SpO₂ drops below 90%, no critical decreases in cerebral oxygenation (SctO₂ below 55%) could be observed.