Reviewer's report

Title: Intraoperative cerebral oxygen saturation trend of values and its relationship with cognitive decline after total knee replacement

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Reviewer: Matthias Heringlake

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The present study entitled “Intraoperative cerebral oxygen saturation trend of values and its relationship with cognitive decline after total knee replacement” by Dr. Salazar and colleagues aims to determine the association between perioperative changes in cerebral oxygenation and postoperative cognitive decline (POCD) in orthopedic patients. This is a retrospective analysis of patients primarily enrolled in a trial analysing the effects of perioperative warming on cognitive dysfunction.

General comments:

The authors have to be congratulated for investigating the association between cerebral desaturation in a population of patients undergoing regional anesthesia, i.e. in patients that were awake during surgery. This approach is clearly different to most other studies analysing the association between the time course of cerebral oxygen saturation (ScO2) and POCD.

As the primary finding of the present study the authors observed that a left to right ScO2 difference may be associated with a postoperative decline in memory function. Again, this is an unique finding, since most other studies have largely ignored differences in ScO2 between hemispheres and have focussed on the mean or maximum of ScO2 desaturation, independend from side differences.

Major Compulsory Revisions:

1. Based on the findings of the primary study, perioperative warming may lead to a significant increase in POCD. Since the mechanism by which cerebral hyperthermia leads to POCD may include other factors than changes in cerebral oxygenation (i.e. increased cerebral inflammation; an issue supported by the trend towards higher CRP levels in patients with POCD in the present manuscript) I feel that the analyses need to be adjusted for the primary group assignment. Additionally, the reader needs to be informed more precisely about the objectives and results of the primary study (reference: 12).

2. The percentage of patients showing a reduction in a specific cognitive functions, i.e. the predefined groups, are rather small. Consequently is hard to imagine, that the respective differences in cerebral oxygen saturation in these small groups are robust if repeated prospectively. Thus it may be appropriate to additionally analyse the total group of patients with any kind of POCD in comparison with patients showing no cognitive decline. Otherwise the patterns in
cerebral oxygenation – even if highly interesting - may be regarded as merely
descriptive. Additionally, the reader might be especially interested to learn if the
association between side differences in cerebral oxygen saturation is
independently associated with POCD. This makes a logistic regression analysis -
including other factors potentially mediating POCD - mandatory.

3. Eight patients were excluded from analysis since they showed a combined
POCD pattern. Even it is understandable with respect to the analysis of specific
POCD patterns, it is difficult to understand why patients with a poor neurological
outcome (i.e. those with more than one postoperative deficit) are excluded from
the analyses.

**Level of interest:** An article whose findings are important to those with closely
related research interests

**Quality of written English:** Needs some language corrections before being
published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I have received and continue to receive honoraria for lectures by Covidien, the
manufacturer of the cerebral oxygen saturation monitor used in the present
study.