Reviewer's report

Title: Postoperative Cognitive Deficit after Cardiopulmonary Bypass with Preserved Cerebral Oxygenation: a prospective observational study

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Reviewer: Manfred Seeberger

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The authors performed a prospective observational study in 35 patients undergoing cardiac surgery. The goal of the study was to investigate the incidence and severity of postoperative cognitive decline (POCD) in patients with cerebral oxygen saturation (cSO2) above 55% and above - 20% from baseline. Forebrain cSO2 was measured unilaterally by near infrared spectroscopy (NIRS). A second goal of the study was to analyze whether the lowest cSO2 is associated with cognitive decline even if cSO2 is in the range regarded as acceptable. The authors found that the incidence of POCD in the current study was comparable to that reported in patients without NIRS monitoring. Given the fact that a predefined "relevant" decrease of cSO2 was avoided, the authors conclude that the role of NIRS in avoiding POCD remains unclear.

GENERAL COMMENTS

The authors have performed a lot of work to perform a large battery of neurocognitive tests repeatedly in every study patient. I highly acknowledge this work. At the same time I fear that this work does not result in providing valid answers to the study questions. The problem is that the authors raise two questions at the end of the Introduction but do not state clear hypotheses and do not report corresponding sample size calculations. Therefore, the reader does not understand the reason for studying 35 patients, and how these patients were selected within a 9-month period. It seems obvious that the number of patients studied is insufficient to give valid answers to the study questions - the study may be used as a pilot study.

The low sample size contributes to the fact that the results given in Figures 2 and 3 do not look very convincing, although the authors have found statistical significances.

The authors discuss the problem of small sample size on page 8, and they adequately conclude in the final sentence that the role of NIRS for avoiding POCD has still to be defined (page 10). Unfortunately, the study gives some indications only but does not contribute to defining the potential role of NIRS for decreasing the problem of POCD.

SPECIFIC REMARKS

Subject enrollment: what were the reasons for needing 9 months for enrolling 35 patients?
Page 3, line 3. Dementia was an exclusion criterion OR Patients with dementia were not included
Was presence of unilateral or bilateral carotid stenosis excluded?
Significance of results: please see general comments
Discussion:
Reference 11 is a review, reference 25 an editorial. Please support your statements with original research.
Page 8, line 3: "showing that POCD is influenced by cSO2...". You did not prove a cause-effect relationship, it was just correlated.
ROC curve: please see general comments.
The paragraph "Interventions" is a repetition of information given in the Methods and is not needed in the Discussion.
Page 9: good discussion of potential mechanisms of brain injury contributing to POCD. The fact that NIRS monitoring was used unilaterally might also have contributed to missing a rare unilateral problem
It would be highly valuable if the authors could continue their work and analyze the potential role of NIRS in an adequately sized study.

Level of interest: An article of insufficient interest to warrant publication in a scientific/medical journal

Quality of written English: Acceptable

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

Declaration of competing interests:
I declare that I have no competing interests.
Manfred D. Seeberger