Reviewer’s report

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

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Reviewer: Judith Hudetz

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RE: “Postoperative Cognitive Deficit after Cardiopulmonary Bypass with Preserved Cerebral Oxygenation: a prospective observational study”

Axel Fudickar, Sönke Peters, Claudia Stapelfeldt, Götz Serocki, Jörn Leiendecker, Patrick Meybohm, Markus Steinfath and Berthold Bein BMC Anesthesiology Research article

The aim of this prospective observational study was to investigate postoperative cognitive deficit (POCD) after cardiac surgery, provided that relevant decrease of cerebral oxygen saturation (cSO2) is avoided during cardiopulmonary bypass. The authors state that despite a relevant decrease of cSO2 was avoided in their study during cardiopulmonary bypass, incidence of POCD was comparable to that reported in patients without monitoring.

Major Compulsory Revisions

1. Methods: No power analysis was done prior to the study. How was it determined that 35 patients were sufficient for the present investigation?

2. Intraoperative procedures: The authors emphasize under the limitation of NIRS that NIRS does not reveal all mechanisms of central nervous system injury and may miss embolism if the afflicted area is far from the optode site. Therefore, it is unclear why the authors monitored cSO2 unilaterally. All relevant papers (including Murkin et al) published in this topic assessed bifrontal regional cortical oxygen saturation. It is true that hypoperfusion during CPB is expected to affect both hemispheres but the device used in this study only detected hypoperfusion in one half of the frontal lobe.

3. Background: Last sentence of first paragraph has inappropriate reference. Murkin et al determined the degree and duration of desaturation by examining the incidence of prolonged desaturation where the AUC of cSO2 values were <70% of baseline and >150% minute duration and not <80% of baseline or <55% during CPB how the authors stated.

Minor Essential Revisions

Throughout the manuscript:

1. Please clarify when cSO2 was kept above 55% (e.g., 55% during CPB).

2. English language correction is needed.
3. Abstract: Please define when was the second neurocognitive testing done.

4. Results: Table 2 lists only 32 procedures of the 35 included patients; please reconcile this discrepancy. The authors mention that no patients had focal neurologic deficit. How were neurologic deficits evaluated? No reference was made in the methods section that neurologic deficits were evaluated.

Discussion:

5. Cognitive testing: When was the postoperative testing performed? The methods section refers to 4th postoperative day but the discussion section refers to the 5th postoperative day.

6. POCD: Third sentence does not make sense: “cSO2 correlated significantly with the lowest value during CPB…”

7. Interventions: The last sentence of the first paragraph is incomplete.

**Level of interest:** An article of importance in its field

**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 declare that I have no competing interests.