Reviewer's report

Title: Relative cerebral hyperperfusion during cardiopulmonary bypass is associated with risk for postoperative delirium: a cross-sectional cohort study

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Reviewer: Anselmo Caricato

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Main limit of the paper is the misunderstanding about flow velocity and hyperperfusion during cardiopulmonary by-pass.

Some paper questioned the correspondence between CBF and flow velocity measured by TCD during by-pass. They speculated that this observation could be explained by hypothermia or other mechanisms that can alter the diameter of cerebral basal arteries. If this is true, TCD is not very accurate as measure of CBF (Nuttall, Anesth Analg 1997). This is not the point of the problem.

Misunderstanding is about TCD and hyperperfusion. When hematocrit reduces, cerebral blood flow increases according with Poiseulle's law to maintain tissue perfusion (Thomas DJ, Lancet 1977). Experimental communication cited by authors in a very particular setting, that is in case of very narrow arteries as in newborn, is not sufficient to question this general physical principle (Paut O). TCD documents this increase, as an increase of cerebral blood flow velocity (Brass LM, Stroke 1988). This is not hyperperfusion, as authors state, but a compensatory mechanism that is of paramount importance to maintain the perfusion. The hypothesis that this is a pathologic hyperperfusion is not proven, and may led to a dangerous reduction of cerebral blood flow.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Unable to assess

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
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Not relevant to this manuscript

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Please indicate the quality of language in the manuscript:

Acceptable

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