Reviewer's report

Title: Postoperative cognitive dysfunction after inhalational anesthesia in elderly patients undergoing major surgery: the influence of anesthetic technique, cerebral injury and systemic inflammation.

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Reviewer: Terrie Vasilopoulos

Reviewer's report:

I think this is a well written, easy to follow paper on an important topic. However, I do have some comments and concerns.

Major

1. My major concern is with the statistical approach. The current approach involves multiple t-tests (or ANOVAs) on related outcomes. However, there is no mention of correcting for multiple comparisons. Performing multiple related tests increases the probability for false positives. Thus, keeping the p-value threshold at p < 0.05 is not appropriate. These analyses need to address this concern some way. One way would be to do a more omnibus, repeated measures analysis that includes the multiple end points. I would recommend a mixed modeling approach because it can control for within-person correlations. Also, you could then directly control for covariates.

   a. At the very least, the present analyses need to have p-values corrected for multiple comparisons and the authors need to consult a statistician as to which type of correction is most appropriate. Though, using an omnibus approach as mentioned above would probably have more power. Also, I would prefer that raw p-values are reported, so that readers can assess the impact of the multiple comparisons adjustments themselves. Again, I think this paper would benefit from having a statistician review it.

2. Additionally, I think using a mixed modeling approach would better suit the analyses for the inflammatory factors. This way, interactions between group and inflammatory markers could be directly tested.

Discretionary

1. I think the discussion needs more commentary as to why methylprednisolone would be a good pre-treatment for POCD. Could it be due to its anti-inflammatory effects? Are there other studies that have found similar results?

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.
Declaration of competing interests:

I declare that I have no competing interests