Reviewer's report

Title: Changes in cerebral oxygenation during early postnatal adaptation in newborns delivered by vacuum extraction measured by near-infrared spectroscopy

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Reviewer: Thomas Alderliesten

Reviewer's report:

Karen et al. report on the result of a small but elegant study in which they monitored cerebral tissue oxygenation (by NIRS) during postnatal adaptation. In this report THI, TOI, SaO2 and HR were found to be higher in neonates who were delivered by vacuum extraction.

In general the paper is well written, some sentences could benefit from additional punctuation (additional hard stops).

I have a few remarks/comments

Abstract:
There seems to be a word missing in the final line of the Background. Should this not be written as "....using near-infrared spectroscopy."?

Conclusion is rather generic, instead of stating possible implications.

Background:
"For instance, arterial blood pressure can remain normal in a situation of impaired cardiac output due to compensatory vasoconstriction".

Although what stated here is essentially true, there is a lot of controversy on what is "normal" blood pressure. Consider rephrasing using something as reference range / above treatment threshold.

Methods:
In general clear without needing additional explanation. However, some additional explanation could be given on why a path length and optical path-length factor were set. This reason for this might not be obvious to the reader who is not so familiar with the field of NIRS.

Patients:
Some clarification on patient numbers would be useful. Table 1 displays 2x n=15. Whereas the text reports 15 and 19, while actually these numbers should maybe be 11 (movement artifacts) and 19?

Statistics are sound.
Results:
Measurement at 12-24h was performed at a median age of 21 hours. Is 12-24 also the actual range? If not, please add range or IQR.
4 out of 15 measurements were omitted. Were these measurements omitted at all time points, or only at one of the four timepoints? If these neonates were excluded all timepoints, would it not be better to report this from start. (not mandatory, but a consideration).

Discussion:
Covers the most important aspects.
I possible overlooked this, but isn't the SaO2 a likely contributor to the observed difference in TOI both at 5 and 5-10 minutes.

I agree with the authors that there most likely is a hyperperfusion in neonates delivered by vacuum extraction. A fact that is often seen after distress/hypoxia. Interesting to see here (table 1) is that median apgar scores were identical between the two groups.

Starting "Approximately 70-75% of this haemoglobin is in the venous....."
Although I agree with the facts stated here, references would be useful.

"Although the infants of the vacuum group were born after fetal distress, this distress had only a short effect on cerebral hemodynamics lasting less than 24 hours when compared to healthy infants born after elective cesarean section."

I do not completely agree. Consider revising. The effect on TOI, SaO2 and HR is indeed temporarily. However, when you look at figure 1b, there is still an obvious difference in THI. Suggesting that there still might be an increased perfusion. Apparently it is not statistical significant, but only just i think..

Final section of discussion starting with "Since the light of NIRS penetrates the skin....." I understand what the authors are saying here. However, some revising could make things more clear. It is stated that THI and TOI are not influenced by superficial layers. I don't know if this i entirely true. With the beer lambert law there is obviously the problem that you do not know the contribution to attenuation caused by non-oxygen depended light losses (tissue), i assume this is what the authors are referring to. The diffusion theorem uses the fact that scatter becomes homogeneous at sufficiently large distances and determines the slope at multiple distances, which can be used to calculate an absolute value. So although this enables the calculation of an absolute value, isn't it so that the signal that is recorded arises from all tissue types underneath the probe? Thereby including the scalp (probably minimal contribution in neonates).

Conclusion:
As stated before. I find this a rather general conclusion.

 Altogether I would recommend the manuscript for publication and I would wish
the authors good luck in the further submission process.

**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 declare that I have no competing interests