Reviewer's report

**Title:** Midline shift in relation to thickness of traumatic acute subdural hematoma predicts mortality. A retrospective cohort study.

**Version:** 2  **Date:** 26 July 2015

**Reviewer:** Lucia M. Li

**Reviewer's report:**

This is a retrospective cohort study of a moderately sized group of TBI patients with aSDH. The authors found that having a midline shift greater than haematoma greater than 3mm (MLS>TH+3), as assessed with their specific parameters, resulted in an outcome of death in all cases. They conclude that this measurement should be included in future models of outcome prediction after TBI. This manuscript comes from a group of authors with highly relevant expertise in the field, and apply appropriate methodology, and make a very pertinent point about the need for standardisation of assessment in clinical studies. Their findings are also of interest to all specialties working in acute TBI. However, a more complete discussion of the potential relevance of their findings is warranted.

**Major Compulsory Revisions**

The authors draw a primary conclusion that a MLS>TH+3 should be included in future TBI prognostication models, because of its high specificity with mortality as an outcome. They also note that they did not perform multivariate correlations or comparisons with current prediction models because they did not wish to distract from this main message. Whilst I agree that their finding is compelling, it isn’t clear how this finding would be used clinically/ in a prognostic model. I think the authors should discuss/ analyse further:

- The findings highly suggest that MLS>TH+3 is an indicator of severity. Could the authors make a comment on how it adds to the other indicators of severity that are available e.g. the initial GCS, or the presence of fixed dilated pupils, or ICP? (After all, the initial GCS for all but one of the MLS>TH+3 patients was 3). Would this measure have a role in (withdrawal of) treatment decisions? How would it rank in comparison with, say, GCS or fixed dilated pupils, or ICP (especially since MLS>TH+3 is postulated to represent significant brain swelling and would presumably translate also to increased ICP)?

- If it’s to be used in a prognostication model, we need to know its additional predictive value (over and above other indicators of clinical severity/ predictors of outcome), so I’m not convinced by the authors’ assertion that confounders need not be addressed. Otherwise, it implies that the measure is to be considered as a standalone predictor, in which case, can the authors be confident enough about that?
The authors advocate its inclusion in prognostication scale. Could they comment on the potential added value? With such a high PPV, would it act as a ‘threshold’ marker i.e. any patient with MLS>TH+3 would be predicted to have 100% mortality – how would a model deal with that? Would it have any contribution to predicting outcome of survivors?

The authors should consider, at the very least, presenting the CRASH predictions of the patients to see how this prognostication may have fared without the inclusion of their measure.

Could the authors comment on why the PPVs were calculated per rater session? This seems a slightly odd approach given that a) if this measure were to be used clinically, there would only be one assessment, and b) good intra & inter-rater correlation is demonstrated for MLS>TH+3. With this in mind, perhaps it would be better to calculate the PPV for some sort of average of the two rating sessions (e.g. include them only if the scans are rated to be MLS>TH+3 on both occasions).

If my understanding of the CT assessment method is correct, the MLS and the TH was assessed on the same slice? If this was the case, could the authors comment on why the TH not taken at the widest point?

Minor Essential Revisions

The tables referred to in the text were in the Supplementary Materials section; any tables referred to in the text should be included in the main manuscript.

Please clarify which CT (presenting? Follow-up?) was used to make the measures.

Typo in the abstract: “0.38” not “038”

Methods:
Please spell out what “NCV” is

Results:
State numbers and % for all e.g. initial GCS<5 only has % stated
Please clarify the range stated for median survival (is it interquartile or total range?).

Discretionary Revisions:

Please state what mortality rates were for those with MLS>2mm? And 1mm?

Please clarify what is meant by “neurosurgery was considered” – a case being referred to neurosurgery based on clinical assessment by a non-neurosurgeon may be very different to one which the neurosurgeon considers possible for surgery.

Level of interest: An article of importance in its field
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