Reviewer’s report

Title: Experimentally induced incomplete burst fractures - A novel technique for calf and human specimens

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Reviewer: Sami Tarsuslugil

Reviewer’s report:

This paper describes a method of reliably creating incomplete burst fractures in human and bovine spinal tissue in an in vitro setting. In my opinion it is a good paper, attempting something that is particularly relevant when you consider the scarcity of human tissue, any attempt to improve the success rate of recreating clinically relevant burst fractures in the laboratory is worthwhile. The methods are clearly presented and the results will be of interest to researchers in this field.

My main comment is that it would be better to try and reduce the amount of vertebrae required to create a single fracture, this way you can use the tissue more efficiently (i.e. get two or three fractures from the spine rather than just one). This is not something that I would require or expect the author to go back and change but it is a suggestion for future work.

Specific comments are outlined below.

Minor essential revisions

Abstract:
1. Phrasing issue in the conclusion. ‘The presented set up presents’ consider rewording.

Background:
2. Third paragraph typing error: ‘how to treat this type of injuries’ consider either of the following – ‘These types of injuries’ or ‘This type of injury’.

3. Fourth paragraph: May wish to consider elaborating. How do the clinical studies and Panjabi studies reveal instability of burst fracture? One sentence will do for this I think.

4. Fifth paragraph: Try to avoid using the term ‘Hazy’ it is too informal, consider the word ‘ambiguous’ instead.

5. Last paragraph of this section: You talk about burst fracture treatment being controversial but I think this is due to the debate about mechanical and neurological stability of the injury and the conservative vs. invasive treatment debate. Therefore I suggest that you clarify what you mean by elaborating on why the treatment, in this case is considered controversial.
Methods:
6. Consider rewording the first line e.g. Ten fresh bovine spines aged between 3–6 months were obtained from the local abattoir (Name and details). Also you don’t mention what vertebral level you are removing the bovine tissue from.

7. First paragraph: It is confusing when you refer to the five-vertebra segments as ‘fragments’ as this is a term that is commonly used to describe the piece of bone that is retropulsed into the neural canal during the burst fracture process. I would prefer you use the term ‘segment’, also I think your use of the term ‘4 FSU’s’ to describe 5 vertebrae is incorrect (it suggests to me that you are talking about 8 vertebrae) or at the least slightly confusing. I do understand what you mean but it is superfluous to use both terms and you’d be better off just describing them as five-vertebra segments.

8. I feel a justification on why you are using five-vertebra segments to create the fractures might be necessary. Just a sentence or two would make it clear to the reader.

Human spine samples:
9. It might be worthwhile mentioning that burst fractures occur predominantly in the younger population and that ideally young human tissue would be better than older osteoporotic tissue, also, there are large differences between osteoporotic human tissue and young calf tissue so the fact that your technique appears to work on both might be something you want to mention as you could argue that the technique would work on everything in-between.

Discussion:
10. Calf spine samples: Did you notice any fracture propagation following the growth plates of the young bovine tissue? If so, it is important to mention it.

11. Human post-mortem samples: Not all drop mass techniques require repeating the mass impact until fracture is produced, it is important that you do not make this suggestion i.e. ‘Some authors have used a repeating dropping mass technique, a method that requires repeating the mass impact’.

12. Clarify the sentence where you describe a ‘20% vertical compression’. I understand what you mean but it would be better if you made it clearer.

Overall
As I stated earlier it is a good paper with a few minor comments that I would like to see changed. In my experience designing a reliable methodology of generating burst fractures in vitro is often very difficult so I commend the researchers on the work that they have done.

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