Author’s response to reviews

Title: Consecutive drilling combined with phaco chop for full thickness segmentation of very hard nucleus in coaxial microincisional cataract surgery

Authors:

Ding Chen (necoding@126.com)
Qunwu Tang (729559818@qq.com)
Fang Yu (357574103@qq.com)
Xueting Cai (247384991@qq.com)
Fan Lu (fanluzw@126.com)

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Young Joo Shin

BMC Ophthalmology Editorial Office
Email: princess.quitalan@biomedcentral.com

MS: BOPH-D-18-00592

Title: Consecutive drilling combined with phaco chop for full thickness segmentation of very hard nucleus in coaxial microincisional cataract surgery

Dear Editor,

My colleagues and I appreciate you and reviewers for the insightful and constructive comments on our manuscript entitled "Consecutive drilling combined with phaco chop for full thickness segmentation of very hard nucleus in coaxial microincisional cataract surgery". We have taken all comments seriously, and made significant revisions accordingly. Our responses to the reviewers’ comments are attached below.

We could not thank you and reviewers enough for precious comments that made our paper much improved. We hope that this revised manuscript is now acceptable for publication in BMC Ophthalmology.

Sincerely yours,
RESPONSES TO EDITOR AND REVIEWERS’ COMMENTS

We appreciate your favorable review and insightful comments. We have made significant revisions to our manuscript accordingly (see yellow color highlighted text in the revised manuscript).

I. RESPONSES TO EDITOR

Comments: Your manuscript "Consecutive drilling combined with phaco chop for full thickness segmentation of very hard nucleus in coaxial microincisional cataract surgery" (BOPH-D-18-00592) has been assessed by our reviewers. Based on these reports, and my own assessment as Editor, I am pleased to inform you that it is potentially acceptable for publication in BMC Ophthalmology, once you have carried out some essential revisions suggested by our reviewers.

Author Response:

We appreciate your favorable review and constructive comments. Those comments are all valuable and very helpful in improving our paper. We have studied the reviewers’ comments carefully and made extensive revisions accordingly. We also complied with the format requirements which we hope our manuscript now meets with approval.

II. RESPONSES TO REVIEWER #1

Comments: Kenichi Kimoto (Reviewer 1): This manuscript describes the new technique titled consecutive drilling combined with phaco chop for full thickness segmentation of very hard nucleus in coaxial MICS. Overall, the manuscript is very interesting and well written. I have a question.

1. In this technique, the phaco tip is used with "bevel down". Please describe the reasons why the "bevel up" style should not be done. I think this technique may be done in usual bevel up style.

Author Response:

Thank you for your favorable review. We agree that this technique can definitely been done in usual bevel up style. It depends on the surgeon’s preference of whether they would like to do the phaco with the phaco tip "bevel down" or “bevel up”. However, we suggest this technique is better done with "bevel down" than “bevel up”. First, "bevel down" style is more efficient because the tip is fully obstructed with high vacuum and almost all the ultrasound energy is delivered into the nucleus when drilling into the nucleus. Second, "bevel down" style may be
safer because the potential damage of cavitation effect of ultrasound to the endothelium is
minimized when the bevel is facing away from the endothelium.

So we add the description as follow (page 9, paragraph 1, line 22, and page 10, paragraph 1, line
1-6)

“Although this technique can be done with the phaco tip "bevel down" or “bevel up” depending on the surgeon’s preference, "bevel down" style is recommended when performing the consecutive drilling. First, "bevel down" is more efficient because the tip is fully obstructed with high vacuum and almost all the ultrasound energy is delivered into the nuclear when drilling. Second, "bevel down" may be safer because the potential damage of cavitation effect of ultrasound to the endothelium is minimized when the bevel is facing away from the endothelium.”

III. Responses to Reviewer #2

Comments: Hun Lee, MD (Reviewer 2): Please include all comments for the authors in this box rather than uploading your report as an attachment. Please only upload as attachments annotated versions of manuscripts, graphs, supporting materials or other aspects of your report which cannot be included in a text format.

Please overwrite this text when adding your comments to the authors.

Author Response:

We appreciate your favorable review and constructive comments in improving our paper. We have made significant revisions to our manuscript accordingly (see yellow color highlighted text in the revised manuscript).

1. Authors should define the pros and cons by comparison with already introduce surgical techniques. Although authors stated the advantages over conventional surgical techniques in Discussion section, more detail is needed. If possible, please provide the results regarding efficiency and safety from comparison of consecutive drilling combined with phaco chop for full thickness segmentation and other surgical techniques. endothelial count and zonular stability, etc

Author Response:

We appreciate your constructive and valuable comments. This paper is basically a brief report of a new surgical technique that delivering advantage of microincisional phacoemulsification for hard cataract. To our knowledge, this technique has not been previously described in the literature. We did do the clinical observation for its efficiency and safety. So we have added the results in the RESULTS part. (page 6, paragraph 2, line 4-13).
RESULTS

The consecutive drilling combined with phaco chop technique has been successfully performed in 80 eyes of 65 patients with cataract harder than nuclear opalescence 5 on the Lens Opacities Classification System III scale or hard cataract with white cortex in the past 12 months. In all cases, full thickness segmentation of the hard nuclear including the posterior plate was achieved in coaxial microincisional surgery. No intraoperative complication such as posterior capsule rupture or zonulysis occurred during surgery, and no postoperative complication such as fibrin formation, severe endothelial cell loss, or endophthalmitis was observed in any patient at 6 months postoperatively.

However, we did not do the comparative study by comparing the new technique with other surgical techniques in terms of endothelial count and zonular stability, etc. This is a limitation of our current report as we indicated in the Discussion section. (page 10, paragraph 2, line 13-14). We would like to adopt your valuable suggestion and perform further study to objectively compare this technique with other techniques for managing hard cataracts.

2. There should be some evidence supporting that consecutive drilling combined with phaco chop for full thickness segmentation definitely results in complete nuclear segmentation without failure, when compared with other surgical techniques.

Author Response:

Thank you for your professional comment. We did do the clinical observation for the efficiency and safety of the consecutive drilling combined with phaco chop technique. This technique has been successfully performed in 80 eyes of 65 patients with cataract harder than nuclear opalescence 5 on the Lens Opacities Classification System III scale or hard cataract with white cortex in the past 12 months. In all cases, full thickness segmentation of the hard nuclear including the posterior plate was achieved in coaxial microincisional surgery. So we have added these data and result in the RESULTS part. (page 6, paragraph 2, line 4-13). We also have showed two cases in video forms (Video 1&2) to demonstrate the complete nuclear segmentation with this technique without failure (page 6, paragraph 1, line 1-2). However, we did not do the comparative study by comparing the new technique with other surgical techniques which is a major limitation of the current report as we mentioned above. We are going to carry out comparative study on the comparison of this technique with other techniques for managing hard cataracts in the near future.

3. "mechanics structure" is right expression? Is "mechanics of structure" or "mechanical structure" right expression?

Author Response:

We apologize for the typing error. The correct expression should be "mechanical structure". We have corrected it (page 8, paragraph 2, line 14)
4. Authors need to demonstrate the case with very hard nucleus cataract surgery using drilling combined with phaco chop for full thickness segmentation technique.

Author Response:

We have demonstrated two cases with surgical videos. (page 6, paragraph 1, line 1-2). Both cases showed very hard nucleus cataract surgery using drilling combined with phaco chop for full thickness segmentation technique on two different phacoemulsification systems. (Video 1&2). (page 14, paragraph 1, line 1-20)

5. According to the mechanical rock excavation systems and Griffiths theory of brittle fracture, what kinds of difference do you find between brittle hard objects and very hard nucleus cataract?

Author Response:

This is a very good question. We think the hard nucleus cataract is very similar to brittle hard objects in terms of mechanical structure. It is difficult to segment these hard materials with compressive forces but relatively easier to crack and break, with inside-out dispersive mechanical forces. However, there are some difference between very hard nucleus cataract and brittle hard objects, especially in those cases of cataracts complicated by high myopia and diabetes. The dense bulky central nucleus of a hard cataract is more tenacious and unbreakable in these cases. In this new technique, a series of deep drilling into the endonucleus was first performed to disintegrate the mechanical structure of the dense bulky central nucleus. The weakening of the hardest central core will ease the further fracture of the nucleus during the following action of phaco chop. This is the major principle and advantage of our new technique.

This is the end of Author Response.

Thank you very much.