Dear editors and reviewers,

Thank you very much for reviewing our manuscript entitled "***Clinical and radiological outcomes of Dynamic Cervical Implant arthroplasty: a 5 years follow-up***" (Manuscript NO: 62047). The comments are exceptionally valuable, inspiring, and constructive for our work. We rejoiced at your decision in the letter dated January 17, considering a minor revised version of our manuscript, addressing all the issues brought up by editors and the reviewers.

Below, I will detail how we revised our manuscript in order to address each of the comment (in italic) in the peer-review report(s). Changes made from the previous article file were tracked in the manuscript.

A. Response to comments of reviewer #1

Comments-1. The rate of heterotopic ossification, especially of higher grade, is also extremely low. To be honest, this does not correspond to my personal experience, but perhaps there is a difference here in the individual surgical technique or the individual patient prerequisites.

Author's response:

Thank you for your valuable and thoughtful comments.

The overall incidence of heterotopic ossification (HO) formation in our group at the final follow-up is 26.1% in 46 implanted segments. The Grade III and IV were according for 8.7% of the implanted segments. Our experience to diminish the HO formation could be summed up as four points. Firstly, the anterior osteophyte of the operated level which should be removed in C-ADR was free from burring in DCI implantation, thus decrease the bleeding and bone dust. Secondly, using of bone wax could reduce the bleeding of bony decompression area of the operated vertebrae. Thirdly, thoroughly washing the operated intervertebral space could reduce the bone dust and blood clot. Finally, the patient should take NSAIDS for 2 weeks to prevent the formation of HO postoperatively. There is no special about our patient prerequisites.

We have mentioned these in the **DISCUSSION** *in Page 12*.

Comments-2. However, it should be mentioned on the basis of which examination this detection was made. A CT examination is listed as an example in figure 3. If the CT was the standard examination, this should be mentioned and, above all, discussed again, as the figures for this are

extremely low.

Author's response:

Thanks very much for your kind suggestion.

We introduced CT as the standard examination to detect the HO formation at 1-, 12- and 60-month follow-up postoperatively. According to your advice, we added this in the Radiological evaluation in **MATERIALS AND METHODS** in *page 6*.

Comments-3. The classification of the HO according to McAffee is also not entirely correct, as lumbar prostheses form the basis here. This should also be mentioned or the modified grading should be used.

Author's response:

Thank you very much. We are greatly appreciated at this valuable proposal.

McAffee classification is the classic grading system for HO of the lumbar disc replacement. We applied the McAffee grading system according to previous literature on the cervical disc replacement [1, 2]. According to your suggestion, we found the Mehren/ Suchomel classification is specifically designed for HO for cervical disc replacement. This classification was modified from McAffee and more suitable for our study[3]. Hence the Radiograhphy and CT images in our study were read again and the HO data were collected according to the Mehren/ Suchomel classification. We modified this in **RESULTS** in *page 8*.

Comments-4. Unfortunately, there are still ambiguities regarding the percentage evaluation. Table 1 lists exactly 40 treated levels. This does not reflect the number of treated levels in the text (n=46). Here, absolutely transparent clarity should be provided to confirm the credibility of the figures.

Author's response:

We are extremely grateful and feelingly for this reminding. The reviewer is so rigorous and earnest that we admire him/her deeply. We feel so sorry for this mistake. We make a deep apologize for this inattention. There are 46 of implanted levels, and we have corrected the number

in Table 1 as below:

Table 1. Demographic data

Gender (Male: Female)	22:18
Age (years)	45.6 (26 – 66)
Symptoms	
Radiculopathy	18
Myelopathy	12
Both	10
Implanted level	
C3/4	4
C4/5	9
C5/6	23
C6/7	10
Blood loss(ml)	
single-level	97±18
double-level	120±26
Operation time(min)	
single-level	93±15
double-level	131±27
Hospital day(d)	10
Ambulation after operation	2th day
Alcohol	15(37.5%)
Smoking	10(25%)

Meanwhile, the whole context has been carefully reviewed by three authors in order to make sure the correct data and change the improper expressions.

Comments-5. Table 1 also indicates a hospitalization period of 10 days. Is there a specific reason for this, or is this due to the local healthcare system?

Author's response:

Thanks very much for your professional question.

Ten days was an average hospitalization period in our hospital, and it was similar in other

hospitals in our country. There may be some differences in healthcare system and national conditions among countries. The 10 days included: 3 days laboratory and imaging examination preoperatively to preclude contraindications and design surgical plan; 7 days medical observation and rehabilitation postoperatively. Because most regions of my country have no family doctors and our community hospitals have no experience to deal with the postoperative complications or to instruct their rehabilitation training, the patients had to stay a long time to be assessed safe enough to discharge from the hospital.

Comments-6. In principle, this work is clearly structured with very good clinical and radiological results. For the discussion I personally would also be interested in how you chose the indication for implantation of this implant. What is the difference between the indication and the conventional cervical total disc prosthesis?

Author's response:

Thanks a lot for your careful review and professional question.

The indications of DCI implantation included: patients aged from 18 to 70 years; presented with radiculopathy or myelopathy due to cervical degenerative disc disease between C3 to C7 level; refractory to non-operative therapy for more than 3 months.

The DCI implantation has more extensive indications than conventional cervical total disc prosthesis. First, DCI is a nonfusion prosthesis allowing controlled motion in flexion/extension while nearly blocking rotation and lateral bending. This spares the facet joint overload that has been observed with unconstrained C-CDR. Thus, the patients with facet joints disease or degeneration are indicated for DCI but contraindicated for C-CDR. Second, the "U" shaped design of DCI with anterior mouth higher than posterior part, when implanted in the intervertebral space, it can restore the alignment of surgical segment from kyphosis to lordosis, which is contraindicated for C-CDR.

We have added these in the **DISCUSSION** *in Page 12 and 13.*

B. Response to issues of Science editor

1. The authors need to provide the signed Conflict-of-Interest Disclosure Form and Copyright License Agreement.

Author's response:

Thanks for your reminding. All of the authors have assigned the Conflict-of-Interest Disclosure Form. The Conflict-of-Interest Disclosure Form and Copyright License Agreement have been uploaded in the system

2. The "Author Contributions" section is missing. Please provide the author contributions.

Author's response:

Thanks very much. We feel very sorry for missing the "Author Contributions" section. We have added the missed setion in the revision version in *Page 1*.

Author contributions: Li Zou and Xin Rong analyzed and interpreted the data and wrote the manuscript. Li Zou and Xijiao Liu collected the data. Hao Liu designed this study and revised the article.

3. The authors did not provide original pictures. Please provide the original figure documents. Please prepare and arrange the figures using PowerPoint to ensure that all graphs or arrows or text portions can be reprocessed by the editor.

Author's response:

According to your suggestion, we prepared the figure documented in the format of PPT, and all the pictures and marks can be reprocessed by the editor.

4. The "Article Highlights" section is missing. Please add the "Article Highlights" section at the end of the main text.

Author's response:

Thank you for your kind advice. The "Article Highlights" section was added after the "Conclusion" as below:

Research background

Dynamic Cervical Implant (DCI) stabilization has been reported having satisfactory clinical and radiological results with short- and mid-term follow-up in the treatment of cervical disc degenerative disease.

Research motivation

Few reports about the clinical and radiological outcome with more than 5 years follow-up existed.

Research objectives

This is a 5 years follow-up study to investigate the long-term clinical and radiological results of DCI arthroplasty.

Research methods

A total of 40 patients received DCI arthroplasty were consecutively reviewed from May 2010 to August 2015. The clinical results and radiological outcomes were retrospectively analyzed.

Research results

The patients' clinical results were significantly improved at the last follow-up. The FSU lateral bending was limited, the segmental flexion-extension ROM could be partially preserved and the ROM at adjacent level could be maintained after DCI arthroplasty. At the last follow-up, 12(26.1%) implanted segments developed heterotopic ossification.

Research conclusions

DCI arthroplasty is a safe and effective non-fusion technique to treat cervical DDD in long-term follow up.

Research perspectives

In the future, we hope to conduct multicenter randomized controlled trials to compare the DCI implantation and CDR in clinical and radiological results.

We would like to express our most sincere gratitude for the constructive comments. They are extremely helpful for our work. We have made substantial revisions according to these comments. We hope the above responses can address all of your questions properly. If you have any further questions, please do not hesitate to contact us.

Best regards,

Hao Liu

References

1. Tu TH, Wu JC, Huang WC, Guo WY, Wu CL, Shih YH, et al. Heterotopic ossification after cervical total disc replacement: determination by CT and effects on clinical outcomes. J Neurosurg

Spine. 2011;14(4):457-65. Epub 2011/02/08. doi: 10.3171/2010.11.SPINE10444. PubMed PMID: 21294610.

2. Brenke C, Scharf J, Schmieder K, Barth M. High prevalence of heterotopic ossification after cervical disc arthroplasty: outcome and intraoperative findings following explantation of 22 cervical disc prostheses. J Neurosurg Spine. 2012;17(2):141-6. Epub 2012/06/05. doi: 10.3171/2012.4.SPINE12223. PubMed PMID: 22657947.

3. Mehren C, Suchomel P, Grochulla F, Barsa P, Sourkova P, Hradil J, et al. Heterotopic ossification in total cervical artificial disc replacement. Spine (Phila Pa 1976). 2006;31(24):2802-6. Epub 2006/11/17. doi: 10.1097/01.brs.0000245852.70594.d5. PubMed PMID: 17108833.