



Some considerations before the clinical application of the novel anatomical plate for oblique lumbar interbody fusion

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We sincerely thank Dr. Pu and his colleagues for their interest and constructive comments on our article. In that paper, novel and safe anatomical lateral plates (ALP) with an anatomical design based on the parameters acquired in our previous studies were developed (1,2). The initial design was introduced and its biomechanical performance was verified with the comparison of various internal fixations. Dr. Pu and his colleagues came up with valuable and inspiring advice with regard to further clinical application of ALP. We are glad to have received the comments and would like to take this opportunity to respond and further discuss on the issue.

Regarding the first comment, the length of the ALP was indeed an issue to be resolved for the future clinical application of the plates. However, manufacturing of cortical screw holes with satisfactory safety and accuracy might be difficult due to the limited surgical field. Designing ALP of different sizes is a simple and reasonable solution. Further, in the original design, the length of the plate was planned to be made adjustable. This might be a better option in dealing with the issue and our team is currently working on realizing the idea.

As for the second and third comments, in the study, we attempted to make the anatomical design fit the anterior-lateral side of the vertebral body. In the initial model introduced in this paper, the sagittal arc was 6° for the L2–3 plate and 15° for the L4–5 plate. A coronal curvature

of 0.6 cm⁻¹ was acquired based on our previous study. As Dr. Pu et al. pointed out, the endplate fracture would be a concern during the application of ALP. On the one hand, applying the ALP could help decrease the risk of cage subsidence as the construction could be contributive to the stress distribution. But on the other hand, if the endplate is injured during the procedure, which has been reported in previous literature, the risk of relevant complications would increase (3). This is why some surgeons opt not to use lateral plating anymore. Applying ALP could theoretically increase the whole immediate stability of oblique lumbar interbody fusion (OLIF) and decrease the risk of cage subsidence but the rigid construction would also increase the risk of endplate or vertebral fracture, especially in cases with poor bone density. Thus, this is a trade-off between the stability and risk of failure with regard to the individual condition of each patient. Therefore, in our method we applied more screws compared with conventional lateral plates to distribute the stress of the implant-bone interfaces. Strategies to improve the efficacy of using the ALP include: (I) proper intraoperative fluoroscopy to avoid injury to the endplates but this would increase the radiation exposure; (II) further exploration on the screw direction with the use of unlocking screw or semi-locking screw design for a more flexible construction.

The fixation option of OLIF for patients with osteoporosis requires further discussion. For osteoporosis

patients, according to current literature, the cage subsidence rate is higher if only the stand-alone technique is applied (4,5). If the bone quality is identified as osteoporosis, surgeons should think carefully whether to perform the OLIF surgery, and stand-alone OLIF in particular. Proper preoperative assessment should be done and whether the patient is indicated for OLIF is a primary issue to consider.

In short, as stated in the paper, this is the first verification step for the ALP concept and the design was based on our previously acquired anatomical parameters. For clinical application, subsequent research is required and we are currently endeavoring with different trials and errors. Thank you again for the kind suggestions and we appreciate the communication.

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Footnote

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of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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