

READER'S FORUM

Soungjun Yoon, Dong-Yul Lee, Seok-Ki Jung

Influence of changing various parameters in miniscrew-assisted rapid palatal expansion: A three-dimensional finite element analysis.

- *Korean J Orthod* 2019;49:150-160

We want to express our appreciation to the authors for this interesting as well as enlightening article. Miniscrew-assisted rapid palatal expander (MARPE) has been on the center stage of attention among orthodontic specialists for various well-deserved reasons, and this investigation has certainly provided answers to some of our curiosities. Having said so, we would also like to request the authors' expert opinions regarding the following aspects of the investigation:

Q1. The results of this study were based on the premise of physical properties summarized in Table 1. Though authors have listed related references concerning the choice of Young's modulus for periodontal ligament, the basis for some of other physical property factors were somewhat lacking. Thus, I feel it would be beneficial for authors to mention briefly how those property figures were determined especially when their variation exists depending on different publications.

Q2. How would the authors anticipate the present results to be modified by the factors, such as immature palatal sutures in growing patients, increasing or decreasing diameters of the miniscrew anchors, and less-than-rigid hook extension from MARPE to miniscrews?

Q3. As stated by the authors, reduced risk of dehiscence may be one of advantages of MARPE. We hope to ask the authors' opinion if such a statement is supported by the results of this study after considering effects of other combination of tooth- and bone-borne rapid palatal expander (RPE) models reported in the literature.

Q4. Comparisons of groups 3, 5, and 6 showed that, while anterior positioning of MARPE increased transverse expansion in the posterior region, positioning MARPE in the opposite direction resulted in reduction of expansion in the posterior region. This finding, to us, was somewhat counterintuitive since, if expansion force is applied closer to the hinge, more expansion may be expected to be produced away from the hinge, which is in the anterior region in group 6, given that greater resistance to RPE tends to come from posterior sections of the maxilla, such as pterygomaxillary sutures and surrounding structures. I would appreciate authors' comments in this area.

Questioned by

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We thank the reader for the interest in our paper, "Influence of changing various parameters in miniscrew-assisted rapid palatal expansion: A three-dimensional finite element analysis," published in the May 2019 issue of the Korean Journal of Orthodontics.¹

A1. We used the data from the most recent papers because we believed that using the numbers used in the previous papers would be advantageous for comparative studies with other papers.²⁻⁴

A2. If the above conditions are different, the results will be very different. This seems to need to be confirmed through experimentation, and we think it needs further research. However, the diameter of the miniscrew is expected to have less impact.

A3. The risk of dehiscence is thought to be increased if transversal tilting occurs in the cervical area of the tooth with a net increase of compressive force in that area. Examination of the existing papers shows that the conventional RPE shows higher stress in the cervical area than the bone-borne RPE.²

A4. One of the biggest disadvantages of the finite element method (FEM) method is that it does not take into account variables over time. In other words, what you can see through FEM is just the stress distribution around you at a certain time. If a given force causes a corrective movement, the anatomical state or the position of the force changes, and the FEM must be redone in that state for accurate results. This study only shows the initial state of the 1-turn, so there may be differences. However, the

results of this study suggest that the suture's opening can occur better when the force is applied in the proper place where it can be done better than the force near the hinge.

Replied by

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