READER'S FORUM

Mihee Hong, Myung-Jin Kim, Hye Jung Shin, Heon Jae Cho, Seung-Hak Baek

Three-dimensional surgical accuracy between virtually planned and actual surgical movements of the maxilla in two-jaw orthognathic surgery.

- Korean J Orthod 2020;50:293-303

I was very impressed with this study that have measured the three-dimensional (3D) accuracy of the orthognathic surgery using virtual surgical planning.

Q1. Compared with the study of Choi et al.,[1] the present study showed higher precision percentage in maxillary setback and maxillary posterior impaction, but much lower precision percentage in maxillary advancement and maxillary anterior elongation. Authors explained that these differences might be attributable to the study design and methods as follows: First, the reference planes used in this study were different from those used by Choi et al.[1] Second, the distance between the virtually planned and actual landmarks in 3D cone-beam computed tomography images would be different from that in two-dimensional lateral cephalograms. I agree that these factors affected the measurements. There are difficult surgical movements, such as posterior impaction of the maxilla, which accurately achieved in this study. However, the amount of maxillary posterior impaction was not great. In my opinion, the severity and the difficulty of planned surgical movement, and surgeon's surgical style may have affected the results. I am curious about the author's opinion on this.

Q2. Table 3 showed that the most problematic movements was maxillary advancement and maxillary elongation. However, the sample was only 3, and 6 respectively, maybe due to the rare indication of maxillary advancement or elongation. What is the cause of the high inaccuracy in maxillary advancement and elongation?

Q3. I am curious about what kind of surgical movements other than maxillary advancement and maxillary elongation can be less accurate and problematic when using 3D virtual surgical planning.

Questioned by
Seo-Rin Jeong
Department of Orthodontics, College of Dentistry, Chosun University, Gwangju, Korea

A1. When compared to Choi et al.' study,[1] this study showed higher values of precision percentage {[number of patients with precise outcome/number of total patients] × 100 (%); Discrepancies less than 1 mm between virtual surgical simulation and post-surgery landmarks indicated a precise outcome} in maxillary setback (80.0% vs. 69.2%) and maxillary posterior impaction (75.0% vs. 69.0%), but lower precision percentage in maxillary advancement (33.3% vs. 87.5%) and maxillary anterior elongation (50.0% vs. 83.3%) (Table 3). In terms of the causes of difference in precision percentage between Choi et al's study[1] and this study, I totally agree with questioner's opinion. Several factors including the severity of skeletal discrepancy, the degree of difficulty in performing the planned surgical movement, and surgeon's skill are important for obtaining the successful surgical

outcome. Therefore, further studies are necessary to investigate the effects of surgeon on surgical accuracy with a larger sample size from diverse users for generalization.

A2. The precision analysis in this study could be used as an educational tool for surgeons. After they review data and refine surgical plane, they can provide better accurate surgical outcome in future surgery. However, the frequency of maxillary advancement and maxillary elongation in this study might be too low to draw a decisive conclusion. Therefore, it would be better to increase the sample size with multi-center study for validation of the results of this study in the future study.

A3. The purpose of this study was to investigate 3D surgical accuracy between virtually planned and actual surgical movements of the maxilla in two-jaw orthognathic surgery. The amounts of precision percentage (< 2.0 mm and < 1.0 mm) were as follows: 100% and 64.3% in anterior midline correction, 100% and 69.2% in posterior midline correction, 66.7% and 33.3% in maxillary advancement, 100% and 80% maxillary setback, 100% and 80% in maxillary total impaction, 83.3% and 50% in maxillary anterior elongation, and 91.7% and 75% in maxillary posterior impaction (Table 3). Therefore, there would be no specific surgical movement that can cause a significant problem in terms of accuracy except maxillary advancement and maxillary elongation. However, it is necessary to increase the sample size with multi-center study for interpreting the results with robust statistical significance.

Replied by
Mihee Hong[a] and Seung-Hak Baek[b]
[a]Department of Orthodontics, School of Dentistry, Kyungpook National University, Daegu, Korea
[b]Department of Orthodontics and Dental Research Institute, School of Dentistry, Seoul National University, Seoul, Korea

Reference
1. Choi JY, Choi JP, Baek SH. Surgical accuracy of maxillary repositioning according to type of surgical movement in two-jaw surgery. Angle Orthod 2009;79:306-11.

www.e-kjo.org