Virtual modeling: a comparison between different internal rigid fixation techniques following BSO by finite element analysis

M.H. Set Titiari, Z.A. Abukhdeir

Universiti Malaya, Kuala Lumpur, Malaysia

Article Outline

1. Introduction

The aim of this study was to evaluate the biomechanical stress tolerance of different fixation methods after bilateral sagittal split ramus osteotomies to determine which configuration leads to lesser force load on the bvitoral bone at fixation points.

Materials and methods: A 3-dimensional computerized model of a human mandible with posterior teeth was generated. The bilateral sagittal split ramus osteotomy was virtually performed on the model. The separated model was assembled with different fixation methods: 2 screws one behind the other, 2 screws one below the other, 3 screws in linear configuration, 3 screws in an L configuration, 3 screws in an inverted backward L configuration, mini plate with 2 screws, mini plate with 4 screws, 2 parallel plates upper border, miniplates on upper or lower border with 1 bicortical screw on the lower/upper border, and L plates. Then, 75-, 135-, and 200-N vertical loads were applied on the posterior teeth of these models. The stress distribution on the screw site on the buccal cortex was measured by the finite element method.

Results: Because of osteotomy gap (7 mm), in this model NOT all of the fixation methods tolerated the forces. The results of this study indicated that the 3 bicortical screws in linear configuration was the most stable.

Conclusion: Since 7 mm of advancement has high risk of relapse, distraction osteogenesis should be considered as an alternative.

Conflict of Interest: None declared.

DOI: 10.10007/s10433-011-1554-1

Published by Elsevier Inc.

http://www.ijoms.com/article/S0901-5027(11)00-54-1/fulltext