

# Comparative evaluation of different fixation techniques for sagittal split ramus osteotomy in 10 mm advancements. Part two: Finite element analysis

Sigua-Rodriguez E.A.

Caldas R.A.

Goulart D.R.

Hemerson de Moraes P.

Olate S.

Ricardo Barão V.A.

Ricardo de Albergaria-Barbosa J.

**Purpose:** To evaluate three rigid, stable fixation methods for sagittal split ramus osteotomy (SSRO), using finite element analysis. The hypothesis is that a customized miniplate presents better stress concentration and distribution. **Materials and methods:** A 3D model of a hemimandible was created, and a 10-mm-advancement SSRO was simulated and fixed as follows: 3-DCP group ? one custom miniplate fixed by eight screws; 4-H2P group ? two miniplates of four holes each, fixed by eight screws; and 6-H2P group ? two miniplates of six holes each fixed by 12 screws. After a vertical loading of 100 N, the values for von Mises stress, modified von Mises stress, and maximum and minimum principal stresses were measured. **Results:** The area of maximum principal stress was similar for the three groups ? located in the upper miniplate, in the screw near the proximal segment osteotomy. The maximum von Mises stresses were 1580.4 MPa, 1005 MPa, and 977.56 MPa for the 3DCP, 4-H2P, and 6-H2P groups, respectively, showing an allowable displacement of 2.57 mm, 1.62 mm, and 1.52 mm for the 3DCP, 4-H2P, and 6-H2P groups, respectively. **Conclusion:** The customized miniplate did not present better stress distribution than two commonly used types of fixation. Fixation with two straight miniplates, either with four or six holes, offers adequate resistance for 10 mm linear advancements. © 2019 European Association for Cranio-Maxillo-Facial Surgery

Computer-aided design

Finite element analysis

Mandible

Sagittal split ramus osteotomy

article

computer aided design

controlled study

finite element analysis

mandible

osteotomy

simulation

stress

biomechanics

bone plate

finite element analysis

mandible

mechanical stress

oral surgery

sagittal split ramal osteotomy

Biomechanical Phenomena

Bone Plates

Finite Element Analysis

Jaw Fixation Techniques

Mandible

Osteotomy, Sagittal Split Ramus

Stress, Mechanical