Comparative evaluation of different fixation techniques of the sagittal split ramus osteotomy in 10 mm advancements: Mechanical testing and screw insertion torque

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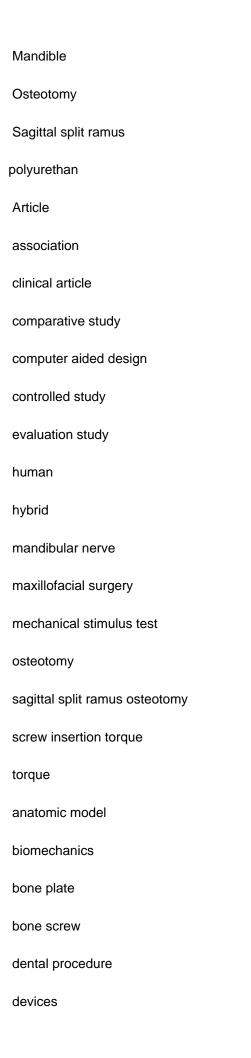
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Purpose: To compare the mechanical characteristics of five techniques for the functionally stable fixation of simulated sagittal split ramus osteotomy with 10 mm of advancement and to evaluate the screw insertion torque. Materials and methods: Fifty polyurethane hemimandibles with sagittal split ramus osteotomy and containing an advancement of 10 mm fixed and distributed as follows: Customized 3D Plate Group: 1 customized 3D miniplate; 4-Hole Plate Group: 2 miniplates with 4 holes; 6-Hole Plate Group: 2 miniplates with 6 holes; Hybrid Group: 1 flat miniplate with 4 holes and 1 bicortical screw; and Bicortical Screw Group: 3 bicortical screws. We conducted a mechanical test using vertical linear loading with a displacement velocity of 1 mm/min on a universal testing machine and assessed the screw insertion torque using a digital torque wrench. Results: The means of strength for the 1-, 3- and 5-mm displacements were determined by a one-way analysis of variance (ANOVA) followed by the post hoc Tukey test. Statistically significant differences were observed only for the 5-mm displacement (F = 3.36; p = 0.01). There was a difference between the 4-H2P and HG groups (p = 0.04). Conclusion: The customized miniplate, the fixation methods with three bicortical screws, or with two straight miniplates with either 4 or 6 holes, all offer a similar mechanical resistance suitable for fixation. © 2018 European Association for Cranio-Maxillo-Facial Surgery

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Mandible

Osteotomy

Sagittal split ramus

polyurethan

Article

association

clinical article

comparative study

computer aided design

controlled study

evaluation study

human

hybrid

mandibular nerve

maxillofacial surgery

mechanical stimulus test

osteotomy

sagittal split ramus osteotomy

screw insertion torque

torque

anatomic model

biomechanics

bone plate

bone screw

dental procedure

devices

equipment design

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oral surgery

sagittal split ramal osteotomy

torque

Biomechanical Phenomena

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Polyurethanes

Torque