

# Mechanical stability of 2-plate versus 4-plate osteosynthesis in advancement Le Fort I osteotomy. An in vitro study

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Introduction Stability in orthognathic surgery is nowadays considered as efficient and adequate. The objective of this study was to determine and to compare the mechanical resistance to vertical load of a Le Fort I advancement osteotomy stabilized by mean of two different osteosynthesis techniques, one using two 10-hole pre-bent T-shaped plates, the other using four manually bent 4-hole L- and J-shaped plates. Materiel and methods Standardized Le Fort I advancement osteotomies have been made on polyurethane models. The maxillary advancement was 5 mm. Two groups of five models each were created. Group 1 was stabilized by mean of two 10-hole pre-bent T-shaped plates fixed by monocortical screws in the paranasal region. Group 2 was stabilized by mean of manually bent four 4-hole L-shaped plates fixed monocortical screws in the zygomatic and paranasal regions. A testing machine was used to load vertically the models at the range of 1 mm/min linear displacement until peak load and system failure. Statistical analysis was realized using ANOVA and t-test, considering P as significant if  $< 0.005$ . Results The maximal tolerated load was 15 N in group 1 and 42.71 N in group 2 ( $P = 0.003$ ). Discussion The use of two T-shaped 10-holes pre-bent plates allows for less resistance in vertical loading than the use of four 4-holes manually bent L-shaped plates. ©

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Internal fixation

Le Fort I

Pre-bend plate

adverse device effect

anatomic model

bone plate

bone screw

device failure

device failure analysis

devices

equipment design

human

in vitro study

Le Fort osteotomy

materials testing

mechanical stress

mechanics

osteosynthesis

procedures

Bone Plates

Bone Screws

Equipment Design

Equipment Failure

Equipment Failure Analysis

Fracture Fixation, Internal

Humans

In Vitro Techniques

Materials Testing

Mechanical Phenomena

Models, Anatomic

Osteotomy, Le Fort

Stress, Mechanical