
ABSTRACT

Comparative analysis of rigid internal fixation techniques in three different bilateral sagittal split osteotomies - biomechanical study

Bilateral sagittal split osteotomy is widely used for the treatment of mandibular deformities. Since it was initially described, several modifications have been proposed to reduce risks and disadvantages, and with the introduction of internal fixation, different techniques have been studied to stabilize the distal and proximal segments. In the current literature, there is no consensus for the fixations to be used in the “Lingual short Split” and “Anterior Oblique Osteotomy”, thus, the objective of this study was to comparatively evaluate the mechanical resistance of 3 types of fixation for each of the osteotomies: “Lingual Short Split”, “Anterior Oblique Osteotomy” and “Conventional Sagittal Osteotomy” in 5 mm linear mandibular advancements. For the study, 90 replicas of hemimandibles were made with Sagittal Osteotomy based on synthetic polyurethane (Conventional, Lingual Short Split and Anterior Oblique). The hemimandibles belonging to each osteotomy design were equally divided into 3 osteosynthesis groups (n=10) Bicortical Screws; Plate; and Hybrid. The hemimandibles were submitted to compressive mechanical tests to simulate masticatory force in a universal testing machine. The equipment was programmed to check the resistance in Newtons (N) during progressive loading at a displacement speed of 1 mm/min until a maximum displacement of 10 mm of the distal segment, or until the rupture of the system sample. During the execution, it was observed that the first area of fragility and consequently the first region of failure was the area of fixation of the bicortical screws when performing the hybrid fixation. In fixation with 3 bicortical screws, the system evolves with greater force, but resisted a smaller displacement with fracture of the cortical bone above the screws in the proximal segment. The conventional osteotomy supported greater loads, and the hybrid fixation was those that supported the highest force values.

Keywords: Sagittal Split Ramus Osteotomy; Rigid Internal Fixation; Mandibular Advancement