

심포지엄 1

Symposium 1

11월 5일(土) 11:00-11:30 / ICC 5F Tamna Hall A

Biologic and Histological Aspects of Mini-Implants



Dr. Teruko Takano-Yamamoto
Okayama University, Japan

Multi-bracket appliance such as an edgewise appliance has generally been used in orthodontic treatment for alignment of maxillary and mandibular teeth. During the treatment using such an appliance, anchorage control is a most important factor to hold the key to successful treatment. A new stationary anchorage using an osseointegrated implant that was implanted in the jaw was devised and has been used in orthodontic practice. Titanium screw and miniplate used for bone fixation have recently been used as stationary anchorage. Among them, miniature screw would increase more host sites available, and the surgery is relatively less traumatic, and the duration of the healing period prior to loading may be diminished or eliminated altogether.

There are only few studies that have been investigating the basic bone physiology of bone-mini-implant interface and the surrounding tissue of the moved tooth. We have been histomorphometrically analyzed the bone dynamics such as the rate of bone turnover and identified the quantity and quality of bone surrounding miniature titanium screws and the moving tooth in dogs. The rate of tooth movement was higher in the maxillae compared to the mandible and total amount of tooth movement was larger in distal direction than in apical direction. Analysis of histomorphometrical data indicated that miniature titanium screws were able to function as rigid osseous anchorage against orthodontic load for 3 months within a minimal healing period. We conclude that miniature implants successfully resisted the orthodontic load and could be placed in various locations within the alveolar process in both jaws.

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Next, we evaluated the clinical usefulness of mini-implant as orthodontic anchorage. We examined the success rates, analyzed factors associated with the stability of mini-screws, and evaluated the postoperative pain and discomfort using a retrospective questionnaire. In analysis of mini-screws with a 1.3 mm diameter, there was no significant correlation between the success rate and the following variables: age, gender, mandibular plane angle, anteroposterior jaw-based relationship, control of periodontitis, temporomandibular disorder symptoms, loading and screw length. Most patients receiving titanium screws or mini-plates with mucoperiosteal flap surgery reported severe pain for one week, however, half of the patients receiving mini-screws without flap surgery did not feel pain at any time after placement. In addition, patients with mini-screws reported low VAS assessment for discomfort due to swelling, speech difficulty and difficulty in chewing.

Based on basic and clinical research, we concluded that mini-screws have very suitable characteristics as orthodontic anchorage providing a high success rate with less pain and discomfort after placement surgery in addition to minimal anatomic limitation on placement and immediate loading.