Ridge atrophy of the mandible in relation to prosthetic treatment

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**BACKGROUND and INTRODUCTION**

The mandibular posterior region is unique in the alveolar ridge, due to its crucial role in the stomatognathic system and the complexity of prosthetic therapies after tooth loss. The type of prosthetic treatment has a major impact on the further development of jawbone tissues, since the suprastructures absorb the forces and distribute them on all supporting tissues. Bone atrophy as a side effect of this pressure absorption is pictured by the model of Marxkors(1) in Figure 1. This model demonstrates that the lack of adequate support combined with an unbalanced distribution of force can lead to increased bone atrophy. The preservation of bone tissue is of high importance in order to maintain stomatognathic functions and keep sufficient bone volume for future implant treatment. Therefore the criteria for prosthoedonic restorations stated by McNeill in 2000(2) should always be followed:
- Restore anatomical form by restoring or replacing missing structure
- Establish structural stability by optimizing the force distribution
- Provide functional harmony for mastication, deglutition, speech and esthetics

The aim of this retrospective cohort study is to investigate the difference of the post-therapeutical alveolar ridge atrophy between implant-supported dentures and conventional dentures. Our findings should help making the best possible treatment decisions in regard to long-time bone preservation.

**METHODS**

This retrospective cohort study included patients with tooth loss in the posterior mandibular region, who received a prosthetic treatment and showed usable panoramic radiographs taken in the years 2001-2012. The data of the patients were collected from records of the Clinical Department of Prosthodontics at the Department of Dentistry and Maxillofacial Surgery of the Medical University of Graz, Austria. The patients were divided into groups according to their prosthodontic restauration. To determine bone atrophy two panoramic radiographs at time of prosthetic rehabilitation and after a minimum time lapse of 3 years were analysed and compared. To provide best comparability the classification of the American College of Prosthodontics was used to measure the mandibular bone height(3). The anatomical landmark was the least mandible height as shown in Figure 2. SPSS (IBM), Excel (Microsoft) and Sigmapipt for Windows v12.5 (Systat Software Inc.) were used to statistically analyse the measurements.

**RESULTS**

In total 479 patients, 284 females and 195 males fulfilled the inclusion criteria. The mean time difference between two measurements in all prosthetic treatments was 6.5 years. No significant alterations in the degree of atrophy in terms of age or gender distribution existed (Figure 4A, 4B).

**CONCLUSION**

Our study demonstrates that the degree of bone atrophy in the posterior region of the mandible is highly dependent on the prosthetic treatment. Fixed partial dentures and permanent implant-supported restorations ensured long-term bone preservation. In edentulous mandibles, the bar-retained dentures supported on 4 or more implants showed the lowest grade of atrophy. Therefore, removable restorations supported on implants should be preferred to removable conventional dentures in terms of preserving alveolar bone volume.