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Alveolar Bone Thickness and Height Changes after Maxillary Incisor Retraction and the Influencing Factors

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Abstract

Objectives: To evaluate the changes in alveolar bone after maxillary incisor (U1) retraction and factors influencing alveolar bone change.

Methods: A retrospective study was conducted in 95 adult patients (age 22.1±4.4 years) who required U1 retraction. Changes in U1 position were measured at the incisal edge (IE), cementoenamel junction (CEJ), and root apex (AX). Changes in labial and palatal alveolar bone thickness (LaBT, PaBT) and height (LaBH, PaBH) were evaluated. Paired t-tests and Wilcoxon signed-rank test were used to determine significant changes from pre- to post-treatment. Multiple linear mixed effect analysis was used to evaluate factors influencing alveolar bone thickness changes after U1 retraction.

Results: After U1 retraction, LaBT was maintained at all levels. PaBT thinned significantly at the crestal and mid-root levels. Significant bone height reduction occurred at LaBH and PaBH. Alveolar bone thickness changes on the palatal side were negatively proportional to alveolar bone thickness changes on the labial side. Alveolar bone thickness change was more conspicuous at the apical level compared to the crestal level. Alveolar bone thickness change was proportional to the amount of intrusion at the AX and was negatively proportional to bone height reduction.

Conclusions: LaBT was maintained, whereas PaBT, LaBH, and PaBH had significant loss after U1 retraction. Labial and palatal sides, levels of bone thickness measurements, amount of AX intrusion, and bone height reduction are significant factors that may influence alveolar bone thickness and height changes after U1 retraction.

Keywords: alveolar bone, lateral cephalometric radiograph, maxillary incisor retraction, root apex intrusion