Histological Evaluation of the Temporomandibular Joint After Bilateral Vertical Ramus Mandibular Distraction in a Canine Model

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Abstract

The aim of this pilot study was to histologically evaluate the effect of bilateral vertical mandibular distraction osteogenesis (DO) on the temporomandibular joint (TMJ) in a canine model. Eight male beagle dogs underwent DO, with the placement of single-vector internal distractors. One unoperated animal served as control. After a latency period of 7 days, distraction was performed at a rate of 1 mm a day for an average of 12 days. The animals were divided into two groups (n = 4) and sacrificed after one or two months of consolidation. Eighteen TMJs were prepared for histological evaluation. Control TMJs surfaces were smooth, with no irregularities and trabecular bone was thick and multiply connected. In the one-month group, thinning of the trabecular bone was evident. The trabeculae were long, not multiply-connected, parallel to each other and perpendicular to the articular surface. Although overall fibrous-cartilaginous tissues covering the TMJs were maintained with no signs of degenerative changes, one condyle from the one-month group had depressions and erosions of the fibro-cartilage layer and subcortical bone. In the two-month group, overall bone and cartilage architecture was more similar to the control specimens. This study indicates that, in the short term, gross changes can occur in the TMJ after bilateral mandibular vertical ramus distraction. These changes seem to be a process of biological adaptation to the pressure and functional changes secondary to surgery and distraction. However, long-term studies are needed to confirm whether the changes are completely reversible.

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