Post dental extraction animal model of radiogenic bone damage: A platform for defining advanced mandibular osteoradionecrosis

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ABSTRACT

Objective
1. To create an animal model for the study of osteoradionecrosis due to dental extractions.
2. To demonstrate the efficacy of using high dose rate (HDR) brachytherapy for radiogenic mandibular necrosis.

Method
Ten Sprague-Dawley male rats were used, in accordance with animal care guidelines. The animals were anesthetized and the left mandibular fourth molar was extracted unilaterally. The animals were sacrificed 28 days post-extraction. The extraction site was examined for exposed bone, using high-speed digital photography, microcomputed tomography (microCT), and fluorescent and basic microscope imaging. Evaluation of the microCT reconstructions of the rat mandibles did allow for complete mucosalization in non-radiated specimens, which indicated a reduction in bone growth of the dental socket as compared with controls.

Results
- The animals were sacrificed 28 days post-extraction.
- The extraction site was examined for exposed bone, using high-speed digital photography, microcomputed tomography (microCT), and fluorescent and basic microscope imaging.

Conclusions
- The HDR brachytherapy model incorporating post-extraction dental extractions and using a higher radiation dose have successfully demonstrated reproducible radiogenic mandibular bone damage. These modifications are analogous to the clinical scenario culminating in advanced mandibular ORN. The use of fluorochrome labeling in the dental extraction model suggests that this model may be a useful platform for future studies to define ORN and delineate its pathogenesis.

REFERENCES