

## Case of the Month:

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Daisy is a 12 year old FS German Shepherd Dog. She was undergoing radiation therapy for a Squamous Cell Carcinoma of the caudal right maxilla (last treatment was 4 weeks prior to presentation). At the last recheck by the radiation oncologist—exposure of the tooth roots of the right maxillary 4<sup>th</sup> premolar and 1<sup>st</sup> molar were noted (108,109; respectively) as well as ulceration of the cheek adjacent to these exposed roots. Daisy was placed on clindamycin and tramadol, and then she was referred to Carolinas Animal Hospital & Dental Clinic for further dental treatments.

### Clinical pictures of the denuded areas of the right maxillary 4<sup>th</sup> premolar (108) and 1<sup>st</sup> molar (109):



**Buccal aspect of 107,108 & 109**

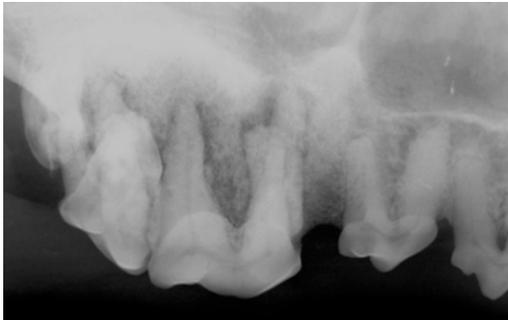


**Palatal aspect of 107,108,109 & 110**

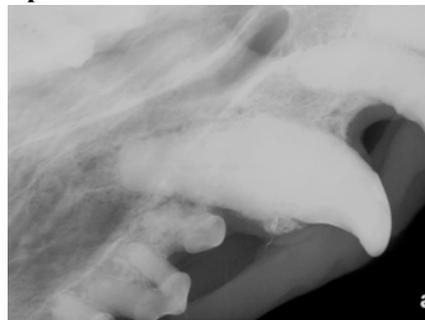
### What is your next step for Diagnostics or Treatment?

A complete blood count and serum biochemistry were performed prior to anesthesia and no significant findings were present. Daisy was placed under general anesthesia and full mouth radiographs were performed.

### Intraoral dental radiographs of 109 & 209:



**Distal root of 106, 107, 108, 109, 110**



**104, 105, 106**

Intraoral dental radiographs of the right maxilla revealed: ~ 85% vertical bone loss of the distal aspect of 104; 10% horizontal bone loss of 106; periapical lucencies of the mesial, palatal and distal roots of 108 with widened periodontal ligament spaces around each of these roots; and a periapical lucency of the palatal root of 109 with widened periodontal ligament spaces. The alveolar bone surrounding 108,109 and 110 has a ground glass appearance.

### Based on the clinical images and dental radiographs, what is your diagnosis?

**The diagnosis for Dozer is Osteonecrosis of the right maxillary bone with advanced periodontal disease of the teeth of the right maxilla, secondary to radiation therapy.**

**Radiation Therapy:**

Radiation therapy has cytotoxic effects on both normal cells and malignant cells. The total dose of radiation is generally given in partial incremental doses referred to as *fractionation*. This helps minimize the adverse effects of radiation while maximizing the death rate for the tumor cells<sup>1</sup>.

Radiation treatment induces an obliterative endarteritis that results in soft tissue ischemia and fibrosis while irradiated bone becomes hypovascular and hypoxic<sup>2</sup>. Adverse effects of head and neck radiation therapy include: dermatitis and mucositis of the irradiated area as well as muscle fibrosis and trismus, which may restrict access to the oral cavity<sup>3</sup>. Saliva production may be permanently impaired when salivary glands are located within the irradiated site (very common with oral masses—especially located caudally). Xerostomia (dry mouth) results in greater plaque accumulation and can lead to advanced periodontal disease, tooth loss and osteonecrosis<sup>4</sup>.

**What is the best treatment option for this pet?**

The best treatments for Daisy were surgical extractions of all affected teeth (those of the right maxilla), debridement of any non-vital maxillary bone, and release of a large enough mucogingival flap so that any ulcerated or necrotic areas could be removed to allow healthy tissue to heal. An area of the necrotic bone was also submitted for histopathology for confirmation of osteonecrosis.

**Intraoperative & postoperative clinical images of the right maxilla, before and after released mucogingival flap:**



**Right maxilla after extractions**



**Right maxilla after suturing gingival flap**

1. Fletcher F: The role of irradiation in the management of squamous-cell carcinomas of the mouth and throat, *Head and neck surg.* 1:441, 1979.
2. Marciani R, Ownby H: Osteoradionecrosis of the jaw, *J oral maxillofac surg* 44:218, 1986.
3. Rothwell B: Prevention and treatment of the orofacial complications of radiotherapy, *J am dent asoc* 114:316, 1987.
4. Newman, Takei, Klokkevold, Carranza. *The role of dental calculus and other predisposing factors* In: Carranza's clinical periodontology. 10<sup>th</sup> ed. Pg. 187. 2006.