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Mandibular reconstruction after partial hemimandibulectomy in a dog using rhGDF 5

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INTRODUCTION
Our purpose is to describe a reconstruction of the mandible, after large complete excision of an achantomatous amelobastoma, with plates fixation and a synthetic graft substitute (recombinant human Growth Differentiation Factor 5) delivered in an absorbable collagen sponge impregnated with hydroxyapatite/tricalcium phosphate granules (Compressive Resistant Matrix).

CLINICAL REPORT
A five year old, 35kg, German wirehaired pointer was admitted with a right mandibular mass. A 2cm mass was localized between the fourth premolar (P4) and the first molar (M1) of the right mandible. Achantomatous amelobastoma was diagnosed by biopsy and histopathology. A partial right hemimandibulectomy was performed from cranial to P3 to caudal to M1. Histopathology confirmed the nature and complete excision of the tumor.

One year after mandibulectomy, there was no sign of recurrence on clinical and CT revaluation (Fig. 1).

Owners reported moderate malocclusion, ptyalism, and difficulty in eating. Because the dog of this report was a hunting dog, the owner chose mandibular reconstruction in effort to maintain function. After correct occlusion was obtained, a Veterinary Cuttable Plate (VCP) was contoured and secured to the ventral mandibular border with 2mm cortical screws. An additional VCP was contoured and secured to the lateral mandibular border with 2mm cortical screws (Fig. 2).

The defect (5*2.2*1.7) was filled with Compressive Resistant Matrix (CRM). CRM was soaked with recombinant human Growth Differentiation Factor 5 (rhGDF5) (Fig. 3). The tissues were closed routinely.

The dog was discharged 48 hours after surgery with instruction to continue Cephalexin and Meloxicam. Food intake was restricted to a soft diet for 8 weeks.

Four weeks after surgery, occlusion was satisfactory. Some subtle remodelling of the cranial resection border was noticed on radiographs (Fig. 5).
Eight weeks after reconstruction, most of bone defect was filled with subtle remodelling (Fig. 6). Revaluations are foreseen 12, 16, 20 and 52 weeks after mandibular reconstruction (not available at this date).

**DISCUSSION**

Other names used for Acanthomatous amelobastoma include acanthomatous epulis and adamantinoma. It is locally infiltrative but never metastasizes. Surgical excision with histological confirmation of free borders is the treatment of choice.

P3-M I resection is an accepted form of therapy for tumors of the mandible generally with good cosmetic and functional results. Yet despite such perceptions, and owners uniformly satisfied, almost 20% of the dogs have poorer quality of life and pain in jaw1.

We propose that reconstructive surgery is a more attractive surgical option. This reconstructive technique would be best used where there is a good long term prognosis.

Autogenous cancellous grafts historically have been considered the best method to fill bony defect. Limited availability of autogenous cancellous bone graft has stimulated development of other techniques to replace bone including graft substitutes.

GDF5 is a member of the bone morphogenetic protein family. Several studies suggest that GDF5 is essential for the normal development and formation of bones, joints, tendons and ligaments in the axial and appendicular skeleton.

GDF5 induces chondrogenesis and osteogenesis both in vitro and in vivo. Application of GDF5 in a variety of carrier systems increased/accelerated local bone formation, fracture healing, periodontal wound healing, cartilage, tendon and ligament formation.

GDF5 is being evaluated in preclinical (in vivo) studies using small and large animal platforms. Few preclinical studies have evaluated the effect of GDF5 on bone formation in a canine model2, 3, however, collectively these studies reported GDF5 enhances endosseous implant stability in trabecular bone, accelerates bone formation and osteointegration in mandibular alveolar defects. Application of GDF5 appears safe as it was associated with limited, if any, adverse effect2, 3. To the author knowledge, clinical application of GDF5 has never been reported in veterinary literature.

CRM is a matrix substitute: it stimulates osteoconduction and was used for its mechanical support and as delivery vehicles for osteoinductive factors.

CRM has been used previously in canine mandibular reconstruction reports4, 5.

**CONCLUSION**

To the author knowledge, the dog in the present report is the first dog with a clinical mandibular defect that has been reportedly treated with rhGDF5. Use of rhGDF5 appears to be a promising, viable and safe option for reconstruction of mandibular defects in dogs, however, clinical data are lacking.

**REFERENCES**

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