Case Report
J Vet Sci 2018, 19(4), 582-584 · https://doi.org/10.4142/jvs.2018.19.4.582

Unilateral rostral mandibulectomy for gingival vascular hamartoma in two calves

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A 2-month-old female Holstein calf and a 5-month-old female Japanese black calf presented with gingival vascular hamartoma located in the interdental space between the second and third mandibular incisors in the right and left mandibles, respectively. On radiographic or computed tomographic images, osteolytic changes appeared within the mandibular bones adjacent to the masses. The masses were removed along with affected mandibular bone by using unilateral rostral mandibulectomy. After surgery, both cases exhibited a normal appetite and grew normally, with no cosmetic changes or recurrences. Unilateral rostral mandibulectomy can be applied for invasive gingival vascular hamartomas associated with osteolytic changes.

Keywords: cattle, computed tomography, hamartoma, mandibular osteotomy, radiography

A vascular hamartoma is a neonatal malformation with a neoplasm-like structure composed of a large number of disorganized capillaries [3,5,9,10]. The rostral mandibular gingiva is one of the most common locations for such lesions in newborn calves [3-5,9,10]. For most gingival vascular hamartomas in calves, surgical resection results in a good prognosis without recurrence [3,9,10]. However, recurrence has been reported in some cases [5,9]. Osteolysis associated with deep invasion of the mass can be revealed in adjacent mandibular bones upon radiographic examination [4], and such osseous lesions may predict recurrence [4]. In small animal practice, mandibulectomy and maxillectomy are most commonly indicated for patients with bony involvement secondary to benign and malignant oral tumors and hamartoma, with radiographic images showing varying degrees of bone resorption [6,8]. The present report describes the use of radiography or computed tomography (CT) for preoperative planning, and the efficacy of unilateral rostral mandibulectomy for intact resection of the mass and prevention of recurrence in the two calves with gingival vascular hamartoma.

A 2-month-old female Holstein calf (Case 1) and a 5-month-old female Japanese black calf (Case 2) presented with acute heavy hemorrhage from the mouth and significant pain-related behavior. In Case 2, a mass was first detected when the calf was 2 months old. Case 2 experienced two-times recurrences (including hemorrhage and regrowth) at 1 month after first surgical resection, and soon after second thermocautery, which was applied at border of the resected site of the mass. At admission, Case 1 had a dark-reddish mass within the right gingival margin near the mandibular incisors (panel A in Fig. 1). The first incisors and the apex of the canine teeth were visible, while the second and third incisors were overlain by the enlarged mass. Use of CT (ECLOS; Hitachi Medical, Japan) under sedation with intravenous injection of xylazine hydrochloride (0.02 mg/kg, Selactar; Bayer Yakuhin, Japan) revealed that the mass had enlarged the space between the second and third incisors by dislocating the third incisor laterally, as well, there was upward proliferation of the mass intact, thereby covering the second and third incisors in the right mandible (panel B in Fig. 1). Osteolysis was evident within the rostral mandibular bone surrounding the roots of the incisor and canine. In Case 2, a dark-reddish mass extended from the rostral to caudal parts of the left gingival membrane within the interdental space between the second and third incisors (panel A

Received 7 Nov. 2017, Revised 27 Feb. 2018, Accepted 3 Mar. 2018
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pISSN 1229-845X
eISSN 1976-555X

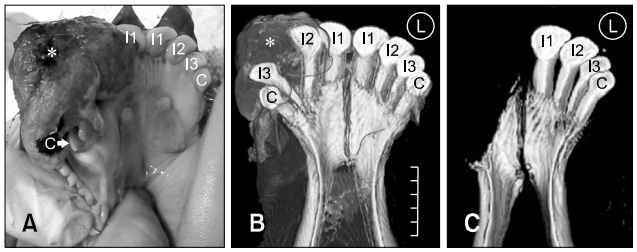

Fig. 1. Gross appearance (A) and computed tomographic (CT) image (B) of the right rostral aspect of the mandible, and postoperative CT image of the mandible (C) in Case 1. (B) The enlarged mass (*) overlaying the second (I2) and third incisors (I3) resulted in dislocation of the third incisor laterally within the right mandible. Osteolysis is evident within the rostral mandibular bone surrounding the roots of the incisor and canine. (C) After surgery, intact removal of the affected right mandible together with the mass and four teeth appears due to the oblique and straight cutting. I1, first incisor; I2, second incisor; I3, third incisor; C, canine teeth. Scale bar = 5 mm on CT images.

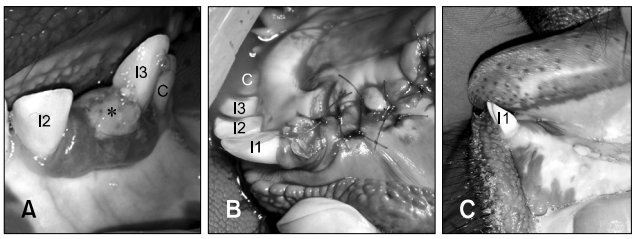

Fig. 2. Gross appearances of the left rostral aspect of the mandible at admission (A), soon after surgery (B), and at 6 months after surgery (C) in Case 2. A 2-cm diameter, dark-reddish mass (*) appears within the interdental space between the second (I2) and third incisors (I3), and there is a well-demarcated margin between mass and gingiva. The rostral and sublingual gingival mucosa are apposed over the cut surface of the bone with absorbable suture material. The surgical wound is intact and closed without recurrence (C). I1, first incisor; I2, second incisor; I3, third incisor; C, canine teeth.

in Fig. 2). Computed radiography (REGIUS Console CS-3, Konica Minolta Health Care, Japan) revealed decreased radiopacity of the rostral mandible surrounding the roots of the incisor and canine in the left mandible (panel A in Fig. 3). The mass had enlarged the space between the second and third incisors by dislocating the third incisor laterally.

Both animals were sedated separately with an intravenously injection (0.02 mg/kg) of xylazine hydrochloride (Selactar 2%; Bayer Yakuhin), and anesthesia was maintained with 2% isoflurane (Isofuru; DS Pharma Animal Health, Japan) and 3 to 5 L of oxygen through an endotracheal tube. Case 1 and 2 were placed in right and left lateral recumbent positions, respectively. In both animals, an incision with cautery was made 3 mm from

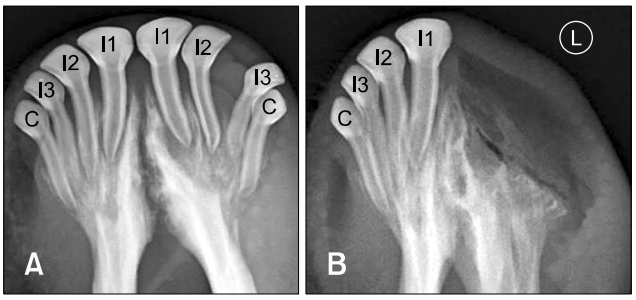

Fig. 3. Ventrodorsal intraoral radiographs of the mandible taken at admission (A) and the day after surgery (B) in Case 2. The interdental space between the second and third incisors was wider. Osteolysis was evident within the roots of the incisor and canine tooth. Most of the osteolytic region of the mandible bone was removed. I1, first incisor; I2, second incisor; I3, third incisor; C, canine teeth.

the border of the mass in the gingival mucosa on the buccal and lingual aspects of the canine tooth and the three incisors of the affected mandible. After blunt dissection of the gingival mucosa from the mandibular bone, the first cut was applied to the exposed mandibular bone on the rostral aspect of the affected region by using an oscillating saw, placed as far from the mass as possible. The second cut was made on the sublingual aspect of the mandibular bone, directed obliquely from the caudal region of the canine tooth to the apex of the mandibular symphysis. The bony segment including the mass and the teeth was removed from the mandibular bone by using a bone chisel. The rostral and sublingual gingival mucosae were opposed over the cut surface of the bone with absorbable suture material (MAXON; Davis & Geck, USA) (panel B in Fig. 2). Postoperative radiographs for Case 1 and CT for Case 2 revealed oblique and straight cutting lines running from the apex of the mandibular symphysis to the lateral region of the mandibular bone (panel C in Fig. 1 and panel B in Fig. 3). In both cases, the mandibular symphysis remained intact, and the left and right mandibular bodies were not separated.

Case 1 and 2 were treated with daily intramuscular administration of cefazolin (20 mg/kg; Meiji Seika Pharma, Japan) for 7 days and 10 days, respectively. One day after the surgical procedure, the owners offered hay, followed gradually by provision of concentrates. Both animals had a normal appetite without exhibiting mouth pain behavior and were not restricted from eating. One week after surgery, intact healings without suppuration were observed in the surgical wounds. The animals' cosmetic appearance did not change. At 2 years and 1 year after surgery, no recurrence was detected in Case 1 and 2, respectively, and both animals showed normal growth.

The resected masses were diagnosed as vascular hamartomas based on the following histological results: 1) homogeneous proliferation of vascular structures resembling capillaries and

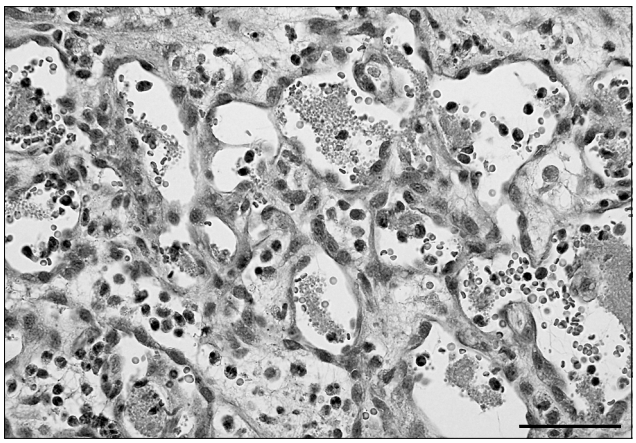

Fig. 4. Histopathological photomicrograph of the mass removed from Case 2. Hypertrophied endothelial cells have formed vascular lumens containing erythrocytes and fibrinous material. The interstitial tissue was edematous, with many eosinophils. H&E stain. 400×. Scale bar = 50 μm.

arterioles (Fig. 4), and 2) positive reactions of the endothelial cells with anti-von Willebrand factor antibody and of the cell walls with anti-actin antibody.

In the present cases, for both calves, unilateral rostral mandibulectomy was planned as the recommended surgical procedure based on preoperative application of radiography or CT, and the planned procedure allowed intact resection of the mass and prevention of the recurrence in both animals. Mandibular vascular hamartomas have healed without recurrence after surgical removal in many previous cases, and thermocautery has been reported to prevent recurrence (mainly hemorrhage) [3,9,10]. However, Case 2 experienced regrowth of the mass after these treatments; regrowth has also occurred after surgical resections in some previous cases [5,9]. In a previous case, there was difficulty in surgical removal of the entire mass because of its indistinct margin and deep extension into the submucosa, suggesting that gingival vascular hamartomas in calves may be invasive in nature [9]. In the two present cases, preoperative radiographic and CT examinations revealed osteolytic changes within the rostral mandibular bones at the affected side, indicating that the mass was highly invasive and had eroded the deep part of the bones. Because such bony involvements may predict recurrence, radiography and CT can be also beneficial during surgical planning for gingival vascular hamartomas in calves [4,7].

The two cases in this study received unilateral rostral mandibulectomy to remove the rostral and half region of the mandibular bone carrying the canine and incisor teeth. The patients' appetites returned soon after the procedure. Loss of the incisors and canine tooth may be structurally inefficient for biting and grazing but presents no great problem for rumination and digestive functions compared with loss of the premolars and molars, which function by grinding grass with side-to-side jaw motion during mastication [1]. Extensive rostral mandibulectomy (circumferential excision of both left and right mandibular bones, including the mandibular symphysis) may be applicable for lesions located on the mandibular gingiva surrounding the central incisors [2,3,5,10]. Previously, use of this technique resulted in no apparent reduction in growth in a heifer with bilateral ameloblastic fibro-odontoma [7]. In surgical treatments for the jaw that involve mandibulectomy in cattle, prognosis and quality of life are dependent on the maintenance of normal mastication, rumination, and digestive function after surgery.

Conflict of Interest

The authors declare no conflicts of interest.

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