

Odontogenic Cysts in Three Dogs: One Odontogenic Keratocyst and Two Dentigerous Cysts

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(Received 28 January 2004/Accepted 23 April 2004)

ABSTRACT. Odontogenic cysts, which showed cystic radiolucency in the jaw bone by radiographic examination and computed tomography, were enucleated by operation in 3 dogs. One dog had a odontogenic keratocyst in the incisive bone of the right maxilla and another 2 cases revealed dentigerous cysts in the mandible. These cyst walls were enucleated or transpired by semiconductor laser. Afterwards, osteogenesis was confirmed at the defective part of jaw bone by extirpation of the cyst in all cases, and no recurrence has been noted in any cases. Odontogenic cyst is a disease which should be treated by surgical extirpation or transpiration.

KEY WORDS: canine, dentigerous cyst, odontogenic keratocyst.

J. Vet. Med. Sci. 66(9): 1167–1170, 2004

The cyst is an unhealthy bursata structure forming a liquid filled cavity lined with epithelial cells. In the oral cavity, cysts are found mainly in the jaw bone [8]. Cysts concerned with the growth of the tooth are called odontogenic cysts [3, 9]. Although odontogenic cysts are common in human dentistry [8], there are few reports in the literature regarding them in dogs [1, 2, 7]. Extirpation and fenestration are common treatments for such cysts. We surgically treated odontogenic cysts (one odontogenic keratocyst and two dentigerous cysts) in 3 cases by extirpation and transpiration. The results are reported in this paper.

Case 1: Odontogenic Keratocyst

Case 1 was a 4-year-old spayed female Siberian husky (22 kg). Gingiva of the right maxilla swelled 3 weeks before. A practitioner of veterinary medicine had carried out drainage by puncture. However, the sign did not improve, and the dog was referred to the Hokkaido University Veterinary Teaching Hospital. Except for the oral cavity, there were no remarkable findings during physical examination at first admission. Gingiva of the right maxilla was slightly swollen, and the swelling of the labial jaw bone near the right maxillary third incisor and canine was recognized by palpation. Radiographic examination revealed cystic radiolucencies about 19 mm in diameter in the incisive bone near the third incisor and canine. The tooth roots of the right maxillary second and third incisors were dislocated by the oppression of the cyst (Fig. 1–1). Infiltrated inflammatory cells appeared in the punctured liquid of the cyst. But, there was no bacterial growth by aerobic and anaerobic cultures. One week after the first admission, part of the cyst wall, and the cortical bone of the circumference were removed for biopsy. Histopathologically, keratinous stratified squamous epithelium cells without heteromor-

phism had lined the cyst, and necrosis of the bone and proliferation of the granulation tissue were observed adjacent to the cyst. There was no impacted tooth in the bore of cyst. From these findings, the lesion was diagnosed as an odontogenic keratocyst. Four months after the first admission, there was an extension of the cyst found by radiographic examination. Hard palate swelling was observed at the affected site as confirmed by radiograph, and parchment crepitation was palpable. There was transposition of the right maxillary second and third incisor tooth crowns and discoloration of the third incisor tooth crown. Mobility was observed in the second (slight) and third (severity) incisors (Fig. 1–2). Four and half months after the first admission, the cyst was extirpated. A labial mucoperiosteal flap was formed from the right maxillary second incisor to the canine. There was a bone defect in the incisive bone. The bone on the labial side was taken using rongeur, and labial superficialis of the cyst wall was exposed (Fig. 1–3). It was confirmed that the tooth root of the third incisor was not included in the bore of the cyst, and the tooth was extracted. In addition, the cyst wall was exfoliated from the bone using a raspator, and the cyst was extirpated (Fig. 1–4). Afterwards, the flap was then returned to the original position, and sutured using an absorbable suture. At examination 1 month postoperatively, the boundary of the radioparency was obscure, and the ossification seemed to advance. The slight mobility of the right maxillary second incisor did not change. However, oral examination 14 months postoperatively revealed the affected jaw bone had hardened, and parchment crepitation had disappeared. And mobility of the right maxillary second incisor had disappeared. However, the tooth crown was discolored, and there was apparent necrosis of the tooth pulp (Fig. 1–5). Radiographic examination 14 months postoperatively showed progressive osteogenesis of the cyst area (Fig. 1–6). Computed tomography 3 years postoperatively showed sufficient bone for-

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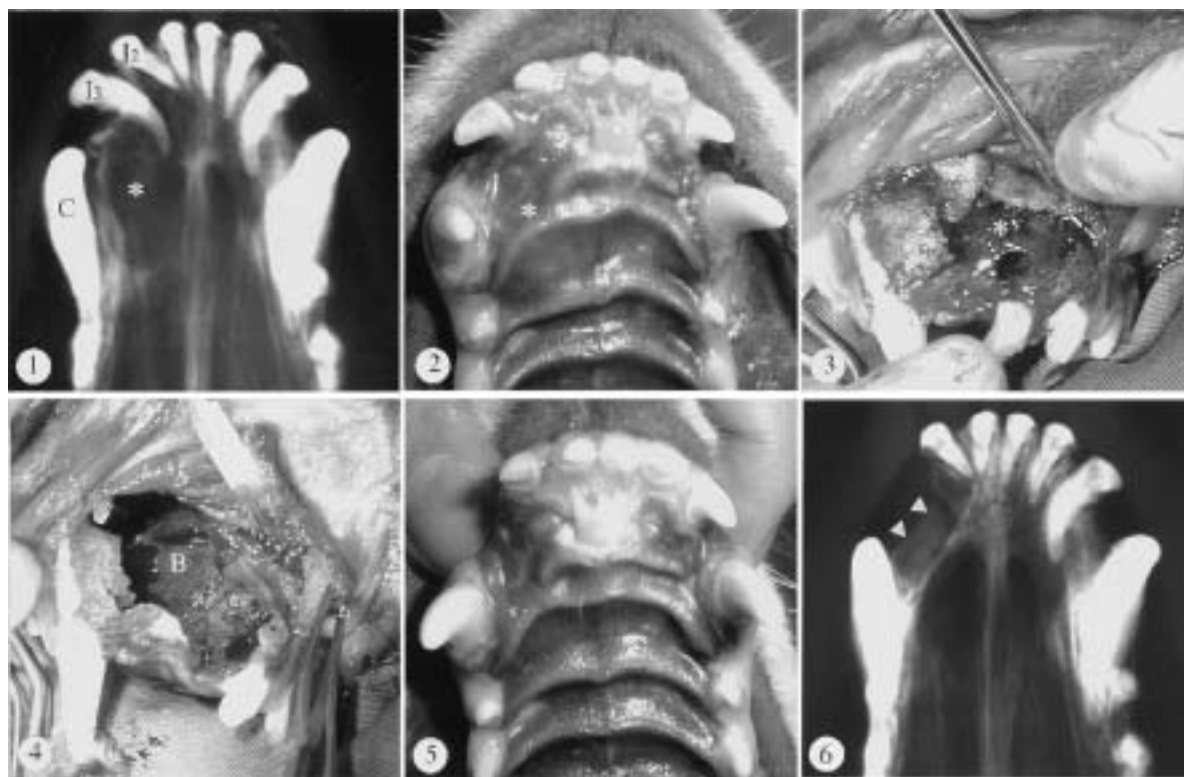


Fig. 1. Odontogenic Keratocyst (Case 1). (1) Radiograph at first admission: The cystic radiolucency (*) in the incisive bone near the right maxillary third incisor (I_3) and canine (C) is recognized. The tooth roots of the right maxillary second (I_2) and third incisors are dislocated by cyst oppression. (2) Preoperative photo of the oral cavity: Note swelling (*) of the hard palate. (3) Photograph of the superficialities of the cyst wall (in the operation): Labial superficialities of the cyst wall (*) is recognized. (4) Photograph after cyst extirpation (in the operation): Bone wall (B) in the nose side is recognized following extirpation of the cyst. (5) Photograph in the oral cavity 14 months postoperatively: No swelling of the hard palate in the preoperative is observed. (6) Radiograph 14 months postoperatively: Osteogenesis is recognized in the defective part of jaw bone after extirpation of the cyst (Δ).

mation and no recurrence.

Case 2: Dentigerous Cyst

Case 2 was a 2-year-old male Shih Tzu (6 kg). The swelling of the right mandibular gingiva was indicated by a practitioner of veterinary medicine 3 days before, and the dog was referred to our hospital. Except for the oral cavity, there were no remarkable findings from physical examination at first admission. It seemed that the right and left mandibular canines were un-erupted. The first premolar could not be recognized. There were swelling and parchment crepitation about 8 mm in diameter in the gingiva near the right mandibular canine (Fig. 2-1). Radiographic examination revealed the right and left mandibular canines were un-erupted and buried in the cystic radiolucency structure, and the right and left mandibular third incisors were dislocated by the oppression of this structure (Fig. 2-2). A cyst was suspected even from the computed tomography. Three months after the first admission, the cyst of the right mandible was extirpated. The cyst wall was exposed when the gingiva was incised from the distal side of the right mandibular third incisor to the second premolar mesial side, and the

mucoperiosteal flap was formed by a spatula, hand scaler and needle. The bone was exposed for about half the cyst circumference when the gingiva was further exfoliated. The crevice between the cyst wall and the bone was exfoliated as much as possible along the cyst wall. A canine tooth crown noted in the cyst when the bone was exposed by the incision of the cyst wall. The canine in the bore of cyst was located virtually beneath the roots of the first-third incisors. Therefore, it was impossible to extract the canine while the incisors were preserved. The canine was extracted after these incisors were extracted. The remaining lingual cyst wall was exfoliated from the bone, and the cyst wall was completely removed and histopathologically examined. Afterwards, the bone surface was curetted by a hand scaler, and the flap was returned to the original position and sutured using an absorbable suture. The cyst of the left side would be extirpated after the ossification of the right mandible because the mandible of the rostral side might fracture. Radiographic examination at 1 month postoperatively confirmed osteogenesis at the defective part of jaw bone following extirpation of the cyst. The possibility of a fracture was



Fig. 2 Dentigerous Cysts (Case 2 and 3). (1) Photograph in the oral cavity at first admission (Case 2): The right and left mandibular canines and first premolars can not be recognized, and there is swelling of gingiva near the right mandibular canine (*). (2) Radiograph at first admission (Case 2): The right and left mandibular canines (C) are un-erupted and buried in the cystic radiolucency structure (*), while the right and left mandibular third incisors (I₃) are dislocated by the oppression of this structure (*). (3) Radiograph 6 months after the second operation (left side) (Case 2): Osteogenesis is confirmed in the defective part of jaw bone after extirpation of the cyst (*). (4) Photograph in the oral cavity on first admission (Case 3): Gingiva of the right mandible is swollen (*), and the right mandibular third incisor and canine can not be recognized. (5) Radiograph on first admission (Case 3): The right mandibular canine (C) is un-erupted and buried in the cystic radiolucency structure (*), and the right mandibular first (I₁) and second (I₂) incisors are dislocated to the front. (6) Radiograph at 1 year postoperatively (Case 3): Osteogenesis is recognized in the defective part of jaw bone after extirpation of the cyst (*).

judged to be slight, and the cyst of the left side was similarly extracted with the right side. From histopathologic and clinical findings, the cystic lesions in the right and left mandible were diagnosed as dentigerous cysts. Radiographic examination 6 months after the second operation (left side) confirmed osteogenesis of the defective part of the jaw bone (Fig. 2–3), and there was no recurrence 1 year postoperatively.

Case 3: Dentigerous Cyst

Case 3 was a 6-year-old female Pug (9.3 kg). A deformation of the rostral mandible was recognized 1 month before. A tumor was suspected by a practitioner of veterinary medicine 3 days before and the dog was referred to our hospital. Except for the oral cavity, there were no remarkable findings during physical examination at first admission. The gingiva of the right mandible was swollen, and the right mandibular third incisor and canine could not be recognized (Fig. 2–4). Radiographic examination revealed that the right mandibular canine was un-erupted and buried in the

cystic radiolucency structure, and the right mandibular first and second incisors were dislocated to the front (Fig. 2–5). A canine tooth crown was observed in the bore of the cyst when a biopsy was performed under general inhalation anesthesia. This lesion was radiologically diagnosed as dentigerous cyst. One and half months after the first admission, the cyst was extirpated because computed tomography suggested that extirpation of the cyst was possible without fracturing the jaw bone. First, the right mandibular first and second incisors, which had been remarkably dislocated to the front, were extracted, and a mucoperiosteal flap was formed from the third incisor to the third premolar. The bore of the cyst and tooth crown of the canine in the cyst were exposed by biopsy, the cyst wall on the labial side was removed, and the first-third premolars were removed with the bone around the teeth using rongeur. The canine in the bore of the cyst was extracted, exposing the cyst wall on the lingual side. The cyst wall was completely transpired by semiconductor laser because it was difficult to separate the

cyst wall and bone. Afterwards, the flap was returned to the original position and sutured using an absorbable suture. Radiographic examination 1 month postoperatively confirmed the osteogenesis of the defective part of the jaw bone. The recurrence has not been recognized for one year (Fig. 2–6).

Although odontogenic cysts are a common in human dentistry [8], there are few reports in the literature of dogs [1, 2, 7]. There have been no case reports of the jaw bone being retained in instances of odontogenic keratocysts in Med Line. The diagnosis of a jaw cyst in dogs is carried out on the basis of the clinical record, general physical examination, radiography and histopathology [5]. A preoperative biopsy should be carried out when differential diagnosis between odontogenic cysts and ameloblastoma is clinically difficult. Odontogenic cyst of the dog is classified based on the human classification. In the classification of World Health Organization, human odontogenic cyst is classified into gingival cysts of infants, odontogenic keratocyst, dentigerous cyst, eruption cyst, gingival cyst of adults, and glandular odontogenic cyst [3]. However, there have been few such classifications in dogs.

Treatment for odontogenic cyst in dogs include resection of the jaw bone [6]. However, it is possible that the jaw bone is retained if the epithelial cells lining cyst wall can be completely removed [2, 4, 5]. For the complete removal of the cyst wall, a round bur is used after sufficient curettage [2, 4]. However, a round bur was not used this time. The cyst wall was macroscopically completely extirpated in cases 1 and 2. In case 3, the cyst wall was not completely extirpated, because the separation between the cyst wall and the bone was complicated by inflammation after the biopsy. Therefore, the cyst wall and the lining cells were transpired by semiconductor laser. There was no recurrence in all 3 cases. In treating odontogenic cysts, it is important that the cyst wall is prudently exfoliated as much as possible from the bone and completely enucleated. However, when complete extirpation of the cyst wall is difficult, the cells of the cyst wall can be killed by methods such as curettage and removal with a round bur, or transpiration with a laser. We experienced another case of dentigerous cyst in a Shih Tzu 8-year-old male afterwards, with diagnosis and treatment

similar to cases 2 and 3. Six months have passed, and there is no sign of recurrence.

The strength of the jaw bone has been reportedly maintained by placing bone prosthetic material in the tooth extraction wound [10], and freeze-dried bone [2] and calcium preparation [4] have also been placed in the defective part of the jaw bone after the cyst extirpation. In the present study, however, no such materials were used. Clinically and radiographically, osteogenesis was recognized in all 3 cases, and appeared to provide sufficient strength. Since the strength of the jaw bone can be regained by the complete removal of the odontogenic cyst, this is a disease which should be treated by aggressive surgical extirpation.

Odontogenic cysts recur easily in comparison with other cysts of the jaw in human [8]. For this reason, follow-up is needed in these patients. There is no sign even if an odontogenic cyst is present, and the cyst often reaches considerable size. Odontogenic cysts may be discovered incidentally, which indicates the importance of daily oral examination.

REFERENCES

1. Anderson, J. G. and Harvey, C. E. 1993. *J. Vet. Dent.* **10**: 5–9.
2. French, S. L. and Anthony, J. M. G. 1996. *J. Vet. Dent.* **13**: 149–151.
3. Kramer, I. R. H., Pindborg, J. J. and Shear, M. 1992. pp. 1–24. *In: Histological Typing of Odontogenic Tumours*, 2nd ed. (Kramer, I. R. H., Pindborg, J. J. and Shear, M. eds.), Springer-verlag, Berlin.
4. Lobprise, H. B. and Wiggs, R. B. 1996. *J. Vet. Dent.* **9**: 13–15.
5. Marretta, S. M. 1998. *Vet. Clin. North Am. Small Anim. Pract.* **28**: 1285–1296.
6. Nicoll, S. A., Sylvestre, A. M. and Remedios, A. M. 1994. *J. Am. Anim. Hosp. Assoc.* **30**: 286–289.
7. Poulet, F. M., Valentine, B. A. and Summers, B. A. 1992. *Vet. Pathol.* **29**: 369–380.
8. Regezi, J. A. and Sciubba, J. J. 1989. pp. 301–316. *In: Clinical and Pathologic Correlations*. W. B. Saunders, Philadelphia.
9. Shafer, W. G., Hine, M. K. and Levy, B. M. 1983. pp. 258–317. *In: A Textbook of Oral Pathology*, 4th ed. (Shafer, W. G., Hine, M. K. and Levy, B. M. eds.), W. B. Saunders, Philadelphia.
10. Wiggs, R. B., Lobprise, H. B. and Mitchell, P. Q. 1998. *Vet. Clin. North Am. Small Anim. Pract.* **28**: 1165–1188.