Maxillary Bone Epithelial Cyst in an Adult Miniature Schnauzer

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ABSTRACT. Maxillary bone epithelial cyst is rare in dogs. A 5-year-old, spayed female miniature schnauzer developed a swelling below the nasal canthus of left eye. Plain radiograph demonstrated a 1.5 cm diameter of radiolucent lesion on the maxillary bone anterolateral to the eye, and contrast dacryocystorhinography confirmed an obstructed nasolacrimal duct. The swelling showed poor response to antibiotic treatment but responded well to oral prednisolone. Exploratory surgery revealed a cyst-like structure filled with brown serous fluid. Histopathological examination of the removed cyst revealed a double cuboidal epithelial cyst. The dog recovered rapidly after surgery, and the swelling had not recurred for a 36-month follow-up. It is the first case of periorbital bone epithelial cyst reported in an adult miniature schnauzer.

KEY WORDS: bone epithelial cyst, miniature Schnauzer, periorbital swelling.

The periorbital swelling ventromedial to medial canthus is uncommon in the dog except for periorbital abscess or nasolacrimal diseases. The swelling in the dog may be associated with dacryocystitis [11], nasolacrimal duct obstruction and dilatation, or nasolacrimal neoplasms [7, 12]. Other differential diagnoses include subcutaneous abscess, zygomatic mucocele [5], cholesterol granuloma [10], epidermoid cyst [2], dacryops [1, 5], canaliculops [4] and congenital abnormalities.

The signalment and history of the patients are essential for deciding a correct direction of diagnosis approach. For example, the age of the patients is helpful to differentiate the likely causes of congenital abnormalities or neoplasm. The active outdoor dogs are prone to injury and traumatic abscess. Imaging examinations including regional radiograph, dacryocystorhinography and ultrasonography can detect anatomical abnormalities. Fine needle aspiration for cytology can confirm the contents of the cyst or cells of the mass.

The purpose of this paper was to describe the unique characteristics of an uncommon bone epithelial cyst in an adult miniature schnauzer.

Case history: A 5-year-old miniature schnauzer was referred to the ophthalmology clinic at the National Taiwan University Veterinary Hospital (NTUVH) because of a recurring swelling ventromedial to the left eye for 2 months. The swelling had been aspirated and surgically drained twice by local clinics, but the swelling relapsed a few days after surgery. No obvious improvement of the swelling was noted after medical treatment at local clinics.

Clinical examinations: The general health condition of the dog was good. Clinical examination revealed a firm swelling (1.5 cm in diameter) attached tightly beneath the left orbital bone, and no oral fistula was found during oral exploration. The pupillary light reflex (PLR) and menace of both eyes were normal. No other ocular abnormalities were found by slit-lamp biomicroscope and indirect ophthalmoscope. Fluorescein passage test showed no intact tear drainage through the left nasolacrimal duct. Cytology of the aspirated seromucoid fluid of the cyst revealed predominant macrophages and several neutrophils, without neoplastic cells. Bacterial and fungal cultures of the serous fluid were negative. Blood examinations including CBC (complete blood cells) and biochemistry were within normal range (data not shown). The swelling was poorly responsive to antibiotic (cephalexin 25 mg/kg twice daily and enrofloxacin 5 mg/kg once daily) treatment, thus further exploration was scheduled.

Radiology: Plain radiograph of the swelling region demonstrated a radiolucent lesion, about 1.5 cm in diameter, on the maxillary bone anterolateral to the left eye. No any osteolysis lesion was noted around the site of swelling. Contrast dacryocystorhinography was performed by placing 24-gauge catheter into the punctum with diluted iohexol contrast material (Omnipaque® 0.75 ml) which confirmed obstruction of the nasolacrimal duct (Figs. 1 and 2). The second cytology of the aspirated fluid revealed macrophages, neutrophils and erythrocytes again. The fluid inside the swelling kept production following aspiration, and the cyst formed obviously again 1 week later.

Surgery: Exploratory surgery was performed due to the swelling relapsed quickly after aspiration. The surface of the swelling was excised, and the capsule was exposed after removing the thin muscle layer above it (Fig. 3). The cyst collapsed after aspirating approximately 5 ml of brown intracapsular fluid. After incising the capsule, the normograde nasolacrimal duct fluorescein flush test was performed and revealed no physical communication between the cyst and nasolacrimal duct. The cyst was left open. The muscle and...
skin were closed as routinely. The cytology of cyst fluid showed many vacuole degenerative cells and some mucin-like materials. The swelling recurred after one week after surgery. Oral prednisolone 1 mg/kg was then given to the patient once daily and enrofloxacin 5 mg/kg once daily. The swelling was regressed since taking oral prednisolone. There had been no swelling for the 4-week period of taking oral prednisolone. However, the swelling recurred again 2 weeks after withdrawing of the oral prednisolone. We decided to perform an advanced surgery to remove the whole cyst including the capsule (Fig. 4). The surgery was performed by bluntly separating the cyst along its capsule. The inward part of the cyst extended deeply to presumably nasal cavity. The inward dorsal part of cyst touched to the left orbit closely, and there was a bone defect near the ventral orbit of the left eye.

**Histopathology:** The cyst wall lining cells consist of a low columnar to double layer of cuboidal epithelial cells (Fig. 5) with underlying marked vascularized fibrous stroma (Fig. 6). Lymphoplasmacytic cells and few neutrophils are
also plugging in the stroma. Multifocal residual skeletal muscle is diffused to the part of stroma near the epithelium. Granulomatous tissues with mild necrosis surrounded the cyst capsule. The pathological diagnosis was a periocular maxillary bone epithelial cyst, with chronic scar formation of the left orbit.

Facial bone epithelial cyst is rare in dogs. There have been only 2 reports in Labrador retriever and German Shepherd younger than one year old, and the other recent report in 4-year-old miniature dachshund [3, 6]. The special point of this case was a bone epithelial cyst formed in a 5-year-old adult miniature schnauzer. Rapid swelling formation with mild epiphora was the major clinical presentation of the case. The first consideration of the swelling in adult dogs was dacryocystitis or other disorders associated with nasolacrimal system based on the location of the lesion. The possible causes of swelling on the site include dacryocystitis [11] and nasolacrimal duct obstruction and dilatation [8, 12]. Others less common causes are periorbital subcutaneous abscess, cholesterol granuloma [10] and epidermoid cyst [2]. The inflammation of nasolacrimal duct resulting in epiphora was initially suspected to be the likely cause of the swelling.

Diagnostic tools helpful in this case included the fluorescein passage test, irrigation of nasolacrimal duct, and imaging studies with contrast radiography. Fluorescein dye was applied to check the patency of nasolacrimal duct, and revealed an obstructive nasolacrimal system. The cannulation of nasolacrimal duct performed by a 24-gauge catheter with saline normograde flushing proved the obstruction of nasolacrimal duct. The contrast radiography was performed to confirm the patency of the nasolacrimal duct and the exact site of obstruction. Although the evidences of obstruction of nasolacrimal duct were obvious, the relationship between cyst formation and nasolacrimal system was unclear by imaging and exploratory studies.

Facial bone epithelial cyst is rare and usually appears as a circumscribed, smooth contoured area of radiolucency [3]. Other differential diagnoses should also be taken into account. For example, the radiography of bone production and destruction may indicate the benign or malignant tumor [9]. A dermoid cyst requires advanced investigations including pathological analysis or exploratory surgery despite of the specific sign of hairs on the cyst.

At surgery, we explored the cyst beneath the panniculus muscle layer and found the bony defect on the maxillary bone after bluntly undermining the cyst. The concave defect of orbital bone made the cyst touch the globe closely. The cyst was situated on the maxillary bone and slowly expanded, and the overlying bony ‘roof’ of the lesion was thought to undergo progressive pressure atrophy, transforming into a fibrous membrane. The gross findings were similar to those reported in a young Labrador retriever [3]. We did not aggressively incise through the bottom of the capsule due to the risk of perforation to the nasal cavity.

Surgery was performed to control and prevent relapsed cyst swelling. One major purpose of surgery was to stimulate substantial granulation to fill the space of resected epithelial cyst and prevent recurrence. The defect caused by the cyst leaving a significant dead space after removing the cyst. Thus, abundant inflammation results in fibrosis and granulation tissue formation to fill the space up. In addition, capsule tissues were removed as much as we could, because capsule may contain secretory epithelia that make a higher risk of cyst recurrence. There are a few ways of stimulating granulation. One report describes the exposure of deep marrow with curette and aggressive removal of bony rim with rongeur [3]. Another report states excision and aggressive debridement of surrounding tissues to cover up with abundant granulation as described in this paper. Severe inflammation event stimulates intensive granulations which may inhibit the recurrence of cyst formation [5].

The pathological examination confirmed the diagnosis of this case as a bone epithelial cyst. Pathological diagnosis revealed general features of cystic structures including lining and contents. An epithelial cyst has a simple or cuboidal

Fig. 5. Histopathology of the cyst. The cyst wall lining cells are low columnar to double layer of cuboidal epithelial cells (H&E, 400 ×).

Fig. 6. Histopathology of the cyst. Marked vascularized fibrous tissue and lymphoplasmacytic cells with few neutrophils are present in the stroma of the cyst (H&E, 200 ×).
lining and contains low cellularity fluid usually with no inflammation. In contrast, the dermoid cyst and epidermoid cyst (cholesteratoma) were stratified or squamous epithelium with characteristic contents, such as hair and sebaceous glands, in which keratin and cholesterol are present as breakdown products of epithelial cells in epidermoid cyst [3].

The exact cause of the bone epithelial cyst in this case was unclear. The age of 5-year-old and no swelling history made congenital cause unlikely. It was hard to identify the original secretory tissues based on cytology and pathology of the cyst. The pathological evidences of double cuboidal epithelia and their secretory nature suspected that the cyst origin and ductal structures were from nasolacrimal duct. The cellular contents of the cyst showed predominant macrophages and few lymphocytes by aspiration cytology, indicating granulomatous but not neoplastic lesion.

Maxillary bone epithelial cyst is rare in dogs. Congenital maxillary bone epithelial cyst was reported only in large dog breeds at a young age [3, 5]. In this case, the cyst was recurred after repeated aspiration and surgical drainage. We tried to excise and debride the lesion aggressively to form granulation to fill the defect. The surgery worked well, and the swelling hasn’t recurred in a 36-month follow-up till today. The etiology of the cyst was considered to be associated with the nasolacrimal duct, although the exact origin of secretory tissues in this case remains to determine.

REFERENCES