Nasopharyngeal epidermal cyst in a dog

Gary W. Ellison, DVM, MS; Robert L. Donnell, DVM; Gregory B. Daniel, DVM, MS

- Epidermal cysts are epidermal-lined cavitated lesions that are not commonly reported in dogs. Their origin can be congenital or acquired.
- The terms epidermoid, cholesteroloma, dermoid, and cholesterol tumor are synonyms for epidermoid cyst in the veterinary literature.
- Most epidermal cysts reported in dogs have been congenital lesions located intracranially and are believed to be the result of inclusion of epithelial tissue during formation of the neural tube.
- Epidermal cysts may develop in the middle ear of dogs secondary to chronic otitis media.

A 12-year-old sexually intact male Miniature Poodle was admitted to the veterinary teaching hospital because of a 1-year history of progressive inspiratory stridor. Pertinent clinical history included severe bite wounds to the head and neck, which had occurred 4 years earlier. The dog also had suffered from chronic otitis externa of the right ear of 3 years’ duration. Bacteria and yeasts had been cultured from the ear, and the dog had been treated with topical antibacterial and antifungal agents. The owner reported that the dog tended to swallow after topical medications were applied to the ear. The dog had received prednisone (5 mg, q 24 h) for the past year in an effort to reduce the stertorous breathing.

On physical examination, the dog had a right head tilt and signs of pain on opening of the mouth. There were no ocular abnormalities or cranial nerve deficits. On examination of the oral cavity, a $2 \times 2 \times 1.5$-cm mass appeared to be originating from the nasopharynx and ventrally displacing the soft palate. Unrelated findings included a grade 3/5 mitral murmur and a 1-cm-diameter mass associated with the left testis. Results of CBC and serum biochemical analysis were within reference limits with the exception of a high activity of alkaline phosphatase (945 IU/L), which was believed to be attributable to glucocorticoid administration. Findings on thoracic and abdominal radiography were within normal limits with the exception of mild hepatomegaly, also believed to be attributable to chronic corticosteroid administration.

Survey radiography of the skull was performed with the dog under general anesthesia. A large mineralized mass was seen in the nasopharyngeal region, displacing the soft palate ventrally. The mass extended from the right tympanic bulla rostrally and toward the midline in the area ventral to the basisphenoid bone. The rostral aspect of the mass was spherical, with a thin outer rim of mineralization. The caudal aspect of the mass appeared more tubular, with a thicker mineralized outer wall. The right tympanic bulla was not completely observed, and there was expansile remodeling of the lateral aspect of the bulla immediately caudal to the retroauricular process of the right temporal bone (Fig 1).

Transverse and sagittal $T_1$-weighted magnetic resonance images and coronal $T_2$-weighted and proton-density magnetic resonance images of the head were obtained by using a 0.5-T magnetic resonance image scanner (spin echo, repetition time, 600 milliseconds; echo time, 20 milliseconds; pulse repetition, 4). A mass, seen in the nasopharyngeal region, had a mixed signal intensity on the $T_1$ images. The center and outer rim of the mass were void of signal intensity on all image sequences, which was consistent with a mineralized shell filled with air. The remainder of the mass was isodense to the brain on $T_1$ and proton-density images and of low signal intensity on $T_2$-weighted images. The caudal portion of the mass that extended into the tympanic bullae had a tubular appearance, with the rostral portion having the appearance of a thick-walled, cavitory, spherical mass (Fig 2).

The dog was prepared for surgery, and a tracheotomy tube was placed. A 3-cm midline staphylectomy incision, extending from the caudal edge of the palate bone to a point 1 cm cranial to the caudal border of the soft palate, was made. A $2 \times 2 \times 1.5$-cm mass was removed with bone rongeurs. The mass was cavitated, and internally lined by a grayish-white covering that contained loosely adherent gray-to-white cheesy material. After removal of the mass, dorsal nasopharyngeal epithelium was reapposed, and the staphylectomy was closed in 2 layers, using No. 3-0 monofilament suture material. Tissues were submitted for microbial culture and susceptibility testing, as well as for histologic evaluation.
The dog recovered from anesthesia and was maintained on cephalixin (250 mg, IV, q 6 h). There was minimal oropharyngeal swelling after surgery, and the tracheostomy tube was removed the next day. Inspiratory stridor was reduced within 24 hours after tracheostomy tube removal. The dog was released to its owner 4 days after surgery, and the owners were instructed to administer cephalixin (250 mg, PO, q 8 h) for an additional 7 days. In the weeks after surgery, the inspiratory stridor continued to decrease, but the chronic right-sided head tilt did not improve. The dog was examined 2 months after surgery and found to have no visible or palpable regrowth of the mass on oral examination.

Results of culture and susceptibility testing revealed no growth after 24 hours. Samples for histologic evaluation were fixed in 10% neutral-buffered formalin, decalcified, and processed for H&E staining. On microscopic examination, the mass was lined with stratified squamous epithelium with variable keratinization. Most of the epithelium was well-differentiated and supported by a thin-to-moderate fibrovascular tissue separating it from underlying woven bone (Fig 3). There was variable bone remodeling, evidenced by numerous reversal lines. Some sections had deeply scalloped invaginations of the bony shell covered by the epithelial and fibrovascular lining. Rare loci of epithelial dyskeratosis with loss of basal cell layer orientation were observed. One margin had a transition from squamous stratified to columnar respiratory epithelium. Inflammatory changes were minimal. A diagnosis of nasopharyngeal epidermal cyst was made. The lesion was considered benign and believed to represent a progressively expansile congenital cyst or extension of metaplastic/reactive changes from prior middle ear inflammation (otitis media).

Figure 2—Magnetic resonance coronal image of the head taken with a repetition time of 2,000 milliseconds and an echo time of 40 milliseconds. Image slice thickness was 30 mm. Notice the tubular appearance of the mass extending caudally into the right tympanic bulla. The air space within the right tympanic bullae was replaced with the same signal intensity material as the nasopharyngeal mass (arrows).

Figure 3—Histologic section of a portion of the wall of the cystic mass. The lumen (top) was lined by well-differentiated stratified squamous epithelium. A thin to moderate fibrovascular stroma separated the epithelium from a variable reactive rim of bone (bottom). H&E stain; bar = 200 μm.

Epidermal cysts are uncommonly reported in dogs.1-6 To our knowledge, they have not been reported in the nasopharyngeal region. Intracranial epidermoids, also called cholesteatomas, are believed to be the result of inclusion of epithelial tissues during the formation of the neural tube.5,10 These lesions may be congenital or acquired, the latter developing secondary to implantation of epidermal tissues, such as may result during CSF taps.11 The terminology for these masses is confusing because the terms epidermoid, cholesteatoma, dermoid, cholesterol granuloma, and pearly tumors have all been used in the veterinary literature.12 The term cholesteatoma also has been applied to a lesion usually arising in the third ventricle of horses.13 Histologically, cholesteatomas in horses consist of cholesterol crystals in a bed of granulation tissue and lack any epithelial components. It has been suggested that cholesteatomas in horses would be better defined as cholesterol granulomas, because these lesions may be a foreign body reaction to cholesterol crystals of unknown pathogenesis.12 In human medicine literature, the term cholesteatoma is histologically defined as a keratin or collagen matrix with multiple cholesterol clefts surrounded by epithelium.7-11 Cholesteatomas in people are further subdivided into dermoid or epidermoid on the basis of whether dermal tissue is evident. Cholesteatomas of the pharyngeal area are believed to arise from embryonic inclusion of squamous epithelium in the temporal bone and not as a result of an antecedent inflammation.11

Other reported cases of epidermal cysts or cholesteatomas in dogs have been confined to the middle ear1-4 or the intracranial area.1-6 The case reported here was different from other reported cases, because a separate nasopharyngeal mass causing airway obstruction accounted for the clinical signs. The histogenesis of the epidermal cyst described in this report is unclear. In human beings, metaplastic differentiation of respiratory epithelium into epidermoid epithelium has been suggested as a cause of pharyngeal epidermal cysts; however, most
investigators favor a theory of epidermal migration after otitis media. Although epidermal cysts reported in dogs and other domestic animals are believed to be congenital, it seems unlikely that the cyst in the dog of this report was congenital in origin because of the age of the dog and delayed onset of signs. Because there was concurrent otitis media, it is possible that the process originated in the middle ear and extended through the auditory tube or tympanic bulla into the nasopharyngeal region. This migration could have been secondary to otitis media or a result of the reported head trauma, which may have damaged the middle ear. An acquired lesion theory in this case is supported by a report in dogs describing inflammatory middle ear disease with secondary formation of cholesteatoma as a complication of otitis media. In that study, 7 of 62 dogs had cholesteatomas of the middle ear secondary to otitis media. These dogs also had radiographic signs of middle ear disease and a transient or permanent head tilt along with ataxia toward the affected side. The histologic changes reported were similar to those seen in the dog of this report, that is, there was squamous keratinizing epithelium in the lining of the middle ear mass.

The dog of this report had signs similar to those caused by nasopharyngeal polyps (eg, otopharyngeal polyps or inflammatory polypoid lesions), which are frequently reported in cats. These are benign pediculated polypoid masses arising from the otopharyngeal mucous membranes secondary to chronic inflammation. They may originate in the auditory tube, tympanic cavity of the middle ear, nasopharynx, or the external acoustic meatus. They often involve the middle ear and tympanic bulla and, at times, must be removed via a combined pharyngeal approach and bulla osteotomy. Nasopharyngeal polyps are rare in dogs but have been reported in a 7-month-old Chinese Shar-Pei. Surgical management was achieved through gentle traction after a transpalatal approach.

Treatment of cholesteatomas and epidermal cysts in human beings is controversial. Early radical mastoidectomy to exonerate the mass was once the treatment of choice. Less aggressive trans tympanic approaches have been performed, however, in an attempt to salvage hearing. In this case, surgical treatment was aimed at restoring normal airway function without attempting to reverse middle ear changes that were believed to be permanent. A radical bulla osteotomy was not performed because bony invasion of the cyst made reversal of the head tilt improbable, and permanent facial paralysis or entrance into the cranium were likely complications of that procedure. Although amelioration of clinical signs was achieved, the procedure performed in this dog may only be palliative, because any remaining epidermal tissue will continue to form keratin, and cyst reformation is possible.

References