Surgical Treatment for the Nasopharyngeal Polyp in a Young Cat with Clinical Signs of Respiratory Disturbance and Horner’s Syndrome

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Summary: An 18 month-old cat presented with sneezing, nasal congestion, nasal discharge and clinical signs of Horner’s syndrome. There was no improvement following medical treatment. A nasopharyngeal polyp was seen originating from the right tympanic bulla on a CT image. Resection of the polyp via soft-palate incision resolved the respiratory clinical signs, but the neurological signs remained. Based on MRI findings, inflammatory tissue was removed from the right tympanic bulla via ventral osteotomy one month after the first surgery. No further clinical signs were noted and many neurological signs were improved following surgery. The tissues resected from these surgeries were histologically diagnosed as an inflammatory polyp. The present case suggests that inflammatory polyps involving the bulla and nasopharynx may cause Horner’s syndrome and upper respiratory disturbance in cats, possibly requiring surgery at both sites. A sample for a PCR test, obtained from the nasopharyngeal area sixteen months following surgery, was positive for Mycoplasma felis, but it was not concluded that Feline mycoplasma infection caused the inflammatory nasopharyngeal polyp in the cat.

Key words: cat, feline mycoplasma infection, nasopharyngeal polyp

Introduction

Feline nasopharyngeal polyps are non-neoplastic, usually pedunculated growths arising from the mucosal surface of the nasopharynx, auditory canal, or tympanic bulla, typically in young animals17).
Histologically, polyps consist of edematous fibrous tissue covered by epithelium, depending on the tissue from which the polyp derived\(^\text{17}\). Clinical signs associated with polyps depend on the location of the polyp. Useful diagnostic procedures for nasopharyngeal polyps include history, clinical signs, endoscopic examination, histopathology of the polyps and, if available, computed tomography (CT) and/or magnetic resonance imaging (MRI) scans\(^\text{4, 7, 9, 11–13}\).

Treatments for feline nasopharyngeal polyp include simple traction avulsion\(^\text{4}\), lateral bulla osteotomy\(^\text{15}\), or ventral bulla osteotomy\(^\text{4, 15}\). To date, however, there have been limited reports on surgical outcomes of feline nasopharyngeal polyp with Horner’s syndrome\(^\text{1, 2}\). Here we report a feline case of nasopharyngeal polyp with Horner’s syndrome and respiratory disturbance, treated with two surgeries based on advanced diagnostic imaging.

**Case Report**

A castrated domestic short-hair cat presented with upper respiratory signs at approximately 18 months of age. The cat had been rescued about 6 months earlier. Right head tilt, Horner’s syndrome-like signs (i.e., protrusion of right third eyelid and mydriasis), conjunctivitis, and heavily labored breathing sound were found on examination when rescued. The initial tentative diagnosis was feline herpesvirus-1 (FHV-1) or/and feline calicivirus (FCV) infection. Thoracic radiographs revealed no remarkable change. Neutrophilia (18,900/\(\mu l\)) was found on complete blood count (CBC) examination. The cat was seronegative for feline leukemia virus and feline immunodeficiency virus. Over a two-month period, the upper respiratory clinical signs and labored breathing did not respond well to treatment with antibiotics and feline interferon omega.

Two months later, the cat presented with sneezing, labored respiration, nasal discharge, right torticollis and protrusion of the right nictitans. Results of CBC and serum chemistry screen were in the normal range. The next day, the cat had a fever (40.3°C). A repeat CBC showed a neutrophilia (20,920/\(\mu l\)). Thoracic radiographs again showed no remarkable change. Injection of prednisolone (1 mg/kg) relieved the clinical signs for 3 weeks, except for purulent discharge from the right external ear canal. Treatment with ofloxacin resolved the purulent discharge, but labored respiration and neutrophilia were still present.

A CT scanning of the head and neck was performed, which showed the presence of a mass extending from the nasopharynx through the middle ear and entering the external ear canal. Contrast medium (3 ml/kg iv, IOPAQUE 300 Injection, Fuji Pharma, Japan) was administered. The material with the density of soft tissue or fluid was seen dorsal to the soft palate in the nasopharynx, with no contrast enhancement, connecting to the right tympanic bulla. The material within both bulla tympanic bullae (CT value: 54–60) appeared to be liquid (CT value: blood 50–60, water 10–20) or soft tissue (CT value: 30–60). The wall of the right tympanic bulla was dense (Fig. 1).

**Removal of polyp in the nasopharynx and outcome**

An incision in the mid-line of the soft palate revealed a soft tissue structure in the nasopharynx with a stalk-like structure connecting to the orifice of the right auditory tube (Fig. 2a). The mass was slowly pulled from the orifice of the auditory tube. The nasopharyngeal mucous membrane, seen following removal of the polyp, looked normal with no postoperative inflammation or bleeding. The incision in the soft palate was closed by interrupted sutures with 4-0 PDS on the nasal epithelium of the soft palate and by Schmiden sutures with 4-0 Monocryl on the oral epithelial incision.

Histologically, the resected polyp consisted of fibrovascular tissue covered by pseudostratified ciliated epithelium with extensive surface ulceration. Lymphoid follicles and dilated gland-like structures filled with basophilic fluid were observed beneath the polyp surface (Fig. 2b). From these findings, diagnosis of an inflammatory polyp (i.e., nasopharyngeal polyp) was made.

Respiration improved and the cat had no further fever. However, right head tilt and the Horner’s syndrome signs (protrusion of right third eyelid and mydriasis) did not resolve, perhaps due to retention
Fig. 1. Contrast CT images before the surgical removal of nasopharyngeal polyp (asterisk).

a: The nasopharyngeal area was filled with the material of soft tissue density. The polyp hasn’t been enhanced; it is seen to connect to the tympanic bulla. 
b: Material of soft tissue or liquid density filled both tympanic bullae (arrowheads).

Fig. 2. Nasopharyngeal polyp. 

a: A polyp was found in the nasopharyngeal area after incising the soft palate. The polyp originated from the orifice of the right auditory tube, 
b: Histopathology of the nasopharyngeal polyp at low magnification. 
b-1 (black square in b): the surface of the polyp was covered by pseudostratified ciliated epithelium with extensive surface ulceration. 
b-2 (red square in b): Lymphoid follicles and dilated gland-like structures filled with basophilic fluid were observed beneath the surface (arrow). 
b-3 (white circle in b): Gland-like structures are made by lined Goblet cells.
of abnormal tissue in the tympanic bulla.

A T1-weighted (T1W), T2-weighted (T2W) MRI scan of the skull, and contrast-enhanced T1W after intravenous bolus administration of gadoteridol at 0.2 ml/kg of bodyweight (Prohance®, Brcco-Eisai, Inc., Japan) was performed 37 days after removal of the polyp. The right tympanic bulla was filled with material of an intermediate to high signal intensity on T1W and T2W images, with no contrast enhancement, suggesting that soft tissue and/or liquid filled the right tympanic bulla. The left tympanic bulla was almost completely air-filled, and no material was seen in the nasopharynx (Fig. 3). Based on these findings, a second surgery on the right tympanic bulla was performed.

Ventral bulla osteotomy and outcome

The right tympanic bulla was approached ventrally3), with the patient in dorsal recumbency under general anesthesia. Facial and lingual veins and arteries, as well as the digastric, styloglossus and hypoglossal muscles were retracted with Gelpi retractors10). A periosteal elevator was used to remove tissue overlying the ventral surface of the bulla, and a small hole was made in the ventral bone of the bulla using a sterilized long round burr (Stryker, USA) driven by an electric power drill (CORE Console, Stryker, USA), then the hole in the bone was widened using a round diamond burr cooled by sterile saline (Varios tip G62D, Nakanishi, Japan) (Fig. 4a). Tissues in the tympanic bulla were removed using an Adson forceps, avoiding the sympathetic nerve plexus in the bulla compartment. The hole in the bone was covered by overlying muscular tissues and the incision line was closed by 4-0 PDS interrupted sutures.

Histopathological diagnosis of the tissue removed from the right tympanic bulla was chronic inflammatory tissue (i.e., inflammatory polyp) covered by pseudostratified ciliated epithelium with erosion or ulceration. There was extensive lymphocytic infiltration and dilated gland-like structures filled with basophilic fluid were observed (Fig. 4b).

A CT scan was performed immediately after the osteotomy was completed. The right tympanic bulla was filled with tissue or liquid and left tympanic bulla was filled with air. The nasopharyngeal space was also clear (Fig. 5).

Following the osteotomy, enrofloxacin (5 mg/kg SID for 7 days) and cefovecin sodium (8 mg/kg twice every 2 weeks) were administered. Miosis of the right eye was observed 3 days after the osteotomy. No paralysis of the facial nerve was observed, and the patient was able to respond to sounds. The right torsion torticollis was no longer present 3 weeks after the osteotomy.

Sixteen months after the right bulla osteotomy, the cat was in good health, with a slight head tilt and slight mydriasis, and had no difficulty breathing. A
sample was taken from nasopharynx for virus PCR tests, which were negative for FHV-1 and FCV; however, a Mycoplasma felis test was positive (IDEXX lab, Tokyo, Japan).

Discussion

Nasopharyngeal polyps are well-recognized inflammatory pathologic lesions affecting predominantly young cats, with progressive increase in severity of clinical signs associated with pharyngeal obstruction and labored respiration1-4, 6, 8, 9, 11, 15, 16). Polyps originating from the tympanic bullae frequently extend into the nasopharynx or external ear canal1-4, 6, 8, 9, 11, 12, 16, 17).
CT scanning and histopathological exam are useful diagnostic tools. In a previous study, the tympanic bullae were severely affected in all 13 cats with nasopharyngeal polyps examined by CT scan and histopathology\(^{12}\). In another study of 22 cats with inflammatory polyps diagnosed by using CT and histopathology\(^{9}\), 15 of the 22 cats had polyps in the tympanic bullae; 9 of these also had extension of the polyp into the external ear canal, 3 cats had extension of the polyp into the nasopharynx, and 1 cat had a polyp that extended into both the nasopharynx and external ear canal. In 4 of these 22 cats, the polyps were observed on physical examination only in the nasopharynx and in 3 cats only in the external ear canal. Endoscopic examination is also useful, but is a limited diagnostic tool\(^{6}\). MRI scans are useful for the evaluation of the extent of the lesion and the appearance of adjacent structures that may indicate potentially life-threatening abnormalities, such as meningitis\(^{5}\). MRI allows differentiation between solids and fluids. However, we couldn’t differentiate soft tissue from fluid retention in MRI in our study, probably because both the inflammatory tissues and exudate filled the bulla, as was confirmed during intraoperative observation.

On the CT images of the presented case, the nasopharyngeal area and bilateral tympanic bullae were filled with soft tissue or fluid, with the nasopharyngeal polyp exiting from the pharyngeal orifice of the right auditory tube. The inflamed tissue within the right tympanic bulla extended to the right auditory meatus, resulting in ear discharge. The material filling the left tympanic bulla was assumed to be inflammatory fluid, as it had disappeared following removal of the polyp in the nasopharynx.

Histologically, the surface of the nasopharyngeal polyp and the inflammatory tissues from the right tympanic bulla were covered by eroded and/or ulcerated pseudostratified, ciliated columnar epithelium including goblet cells, with inflammatory cell infiltration\(^{8}\). Several reports have suggested that continued otitis media results in mucoperiosteal thickening due to folding of redundant loose, edematous stroma, with the in-folded epithelium of the polyp showing gland-like structures\(^{10,11,13}\). Histopathology of the present case showed severely inflamed cell infiltration in the sample from the bulla, gland-like structures in samples from both the bulla and the nasopharyngeal polyp, lymphoid follicle-like structures in the sample from the nasopharyngeal polyp, suggesting that inflammation may have occurred in the bulla and may become more severe without treatment, and polyp growth extending into the nasopharynx.

The hypothesized etiologies of these chronic inflammatory polyps include viral infection, such as FCV and FHV-1, and bacterial infections\(^{11}\). One study reported that mostly formalin-fixed polyp tissues assayed by RT-PCR and PCR methods were negative for viral nucleic acid\(^{16}\). The cat in the case presented here had chronic nasal discharge and was clinically suspected as having FCV and/or FHV-1 infection. However, the PCR test of the sample from the nasopharyngeal area sixteen months following bulla osteotomy was positive only for *Mycoplasma felis*. The cause of the nasopharyngeal polyp in our case is still unclear, as reported in previous studies\(^{4,8}\), but mycoplasma infection may have contributed to development or progression of the polyp.

Medical management for bacterial otitis with neurological signs, respiratory signs and thickened bulla wall not due to a nasopharyngeal polyp was reported to be sufficient to resolve clinical signs\(^{14}\), but medical management for the presented case did not resolve clinical signs. Post-operative complications after bulla osteotomy have been reported to include Horner’s syndrome, paralysis of the facial nerve and otitis interna\(^{15}\). However, the case presented here had shown clinical signs of Horner’s syndrome preoperatively, which partially resolved following surgery. A similar resolution of Horner’s syndrome after ventral bulla osteotomy has been reported in a cat with a nasopharyngeal polyp\(^{1}\). Therefore, early detection and surgical removal for inflammatory polyps in the bullae appear to be important in patients with Horner’s syndrome.

In the cat subject reported here, the pathology in the middle ear was not diagnosed from clinical signs in the early stage of the disease. As the cat did not respond to temporary medical treatments, severe inflammation in the middle ear became prolonged. The
lesions in the bulla and nasopharynx were identified by CT and MRI, resulting in the decision of perform aggressive surgeries at both sites in order to facilitate clinical resolution. Although the exact cause of the inflammatory polyp is unknown, advanced diagnostic imaging is recommended in young cats with Horner’s syndrome to identify the lesions causing clinical signs and to plan proper surgical treatments.

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