

Branchial cyst in a dog

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Summary

A French bulldog was presented with a facial swelling. Histology revealed a branchial cleft cyst. The first attempt to treat by incision, aspiration and drainage was unsuccessful. A complete surgical excision of the mass using a CO2 Laser lead to a full recovery. The location, size and type of tissues were compatible with a first branchial cleft cyst Type II.

Keywords: branchial cleft cyst, sialocele, salivary gland, facial swelling, tumor

Kiemenspaltenzyste bei einem Hund

Ein Französischer Bulldogge mit einer Gesichtsschwellung wurde vorgestellt. Die Histologie ergab eine Kiemenspaltenzyste. Der erste Versuch, durch Schnitt, Punktion und Drainage zu behandeln, war erfolglos. Eine vollständige chirurgische Exzision der Masse mit einem CO2-Laser führte zu vollständiger Erholung. Die Lage, Grösse und Art des Gewebes sprachen für eine erste Kiemenspaltenzyste Typ II.

Schlüsselwörter: Kiemenspaltenzyste, Sialocele, Speicheldrüse, Gesichtsschwellung, Tumor

Introduction

A 7-year old male neutered French bulldog was presented for a recurrent episode of facial swelling on the left. At the first episode 6 months earlier, the veterinarian gave an antibiotic and an anti-inflammatory drug with good success. At the second episode, the owner was concerned about the recurrent swelling and increased salivation. Otherwise, the dog felt good, had no pain, no fever and was eating normally.

Clinical examination

The dog was in very good health. The mass was about 4 x 15 cm and extended subcutaneously above the upper left carnassial tooth, towards the angle of the mouth curving slightly towards the neck at the height of the mandibular lymph node and salivary gland continuing to a point below the left ear (Fig. 1). The process was well-circumscribed, slightly moveable, fluctuant and not painful. Mouth examination showed an increased salivation and moderate calculus and plaque. Differential diagnoses taken into account were a sialocele of the mandibular or the parotid gland, an abscess or a tumor of the lymph node or the salivary gland. Considering the recurrence of the disease, we decided to make a biopsy under general anaesthesia. Two incisions were made where we could aspirate a large amount of serosanguineous fluid. During this procedure, we did two x-rays with a non-ionic

positive contrast liquid (Omnipaque-300, Schering) injected in the cyst at the draining tract opening. The x-ray showed the size, location and extent of the cyst, originating distally from the ear base (Fig. 2). As the walls of this cystic mass completely collapsed, we placed a silicone drain (Silicone penrose drain, Global veterinary product Inc.) to enable a complete drainage of the cyst. The dog received antibiotic and anti-inflammatory drugs. One week later, the drain was removed and the histological result discussed with the owner. It was then decided not to make any surgery until the next recurrence.



Figure 1: Size and extent of the mass at the left side of the face.

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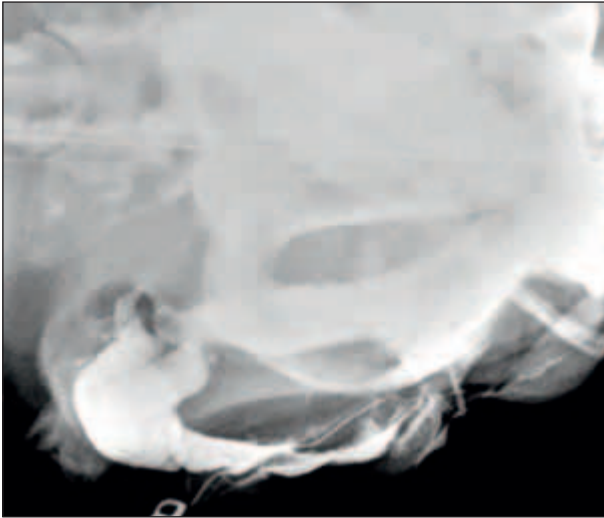


Figure 2: Ventro-dorsal x-ray of the left side of the face using a contrast liquid injected in the cyst showing the location, size and extent of the cyst.

Diagnosis

The aspirated tissue was fixed in 10% neutral buffered formalin, embedded in paraffin, cut at a thickness of 4 micrometer and stained with hematoxylin and eosin (HE). At histology the wall of the cyst was thin and lined by one to few layers of cuboidal to cylindrical epithelial cells sitting on a basement membrane. Among these cells, numerous mucus-producing goblet cells and ciliated cells were identified (Fig. 3). Surrounding the wall of the cyst, a chronic secondary inflammatory infiltrated with granulation tissue was present, composed mainly of lymphocytes and plasma cells with rare macrophages and neutrophils. Based on the localisation of the cyst and on the respiratory-type epithelium lining its wall, a diagnosis of branchial cyst was made.

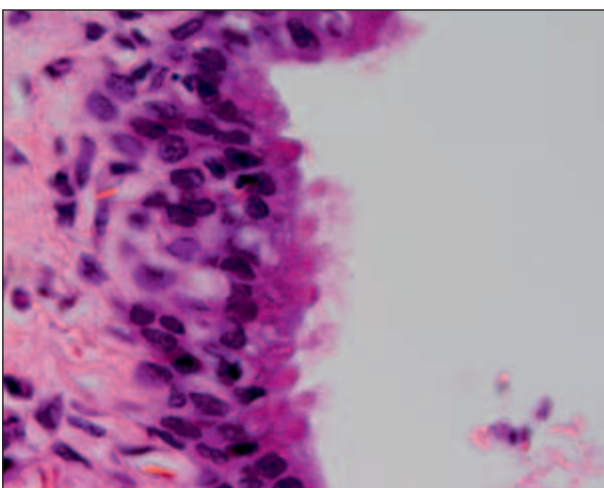


Figure 3: Branchial cleft cyst, HE stain, 1000x magnification. Note cilia on the surface of several cells, classifying as an epithelium of the respiratory type.

Treatment

Three months after the diagnosis, the swelling recurred and based on the histological findings, we decided to plan a total resection of the cyst. The dog was placed under general anesthesia using a mixture of medetomidin (Dorbene, Dr. E. Graeub AG) and butorphanol (Morphasol-4, Dr. E. Graeub AG) as premedication, followed by an induction with 4 mg/kg propofol (Propofol 1%, Fresenius). The dog was then intubated and maintained under gas anesthesia (O₂ and isoflurane 2%). The left side of the face was shaved and disinfected according to the sterility rules and the dog placed in a lateral recumbency.

A curved skin incision was made ventrally from the arcus zygomaticus to the base of the ear following the outline of the mass. Subcutaneous tissues were elevated and the mass isolated using a Metzenbaum scissor and a CO₂ Laser alternately. It was possible to isolate the main part of the mass that was seemingly not too adherent up to the base of the ear, where cartilaginous structures were present deep between muscle tissue (Fig. 3). It was decided to excise as much cartilaginous tissues as possible but some tissues were partially left in place. Several layers of stitches were used to close the wound and a silicone drain was placed for 5 days (Fig. 4). The dog received antibiotic (amoxicilline and clavulanic acid) (Clavubactin, Dr. E. Graeub AG) for 10 days, anti-inflammatory drugs (meloxicam) (Metacam, Boehringer Ingelheim) for 5 days and an Elizabethan collar was placed to prevent any self trauma. Two weeks after surgery, the dog showed a slight residual swelling of the surgical site, but felt good and healthy otherwise. After examination, 7 months post surgery, the dog showed no sign of recurrence and seemed to have completely recovered.



Figure 4: Blunt dissection of the cyst.



Figure 5: Post-surgical view of the dog. A penrose drain has been left in place during 5 days post surgery.

Discussion

During the embryonic stage, 4 well-defined pairs of arches (1, 2, 3, 4) and 2 rudimentary arches (5, 6) will develop. Each arch is separated by clefts externally and pouches internally (Karbe and Nielsen, 1966). In fish, these structures form gills, but in mammals the clefts and pouches are gradually obliterated by mesenchyme to form the mature head and neck structures. Branchial anomalies result from incomplete obliteration of the clefts and pouches (Acierno and Waldhausen, 2007).

Branchial cysts are classified in 4 types. First branchial cleft type I and II (located near the external auditory canal), second branchial cleft (the most common location in human and located along the anterior border of the sternocleidomastoid muscle) (Thomaidis et al., 2006) and the third/fourth branchial cleft (very rare and closely associated with the thyroid gland) (Mitroi et al., 2008). Branchial cysts are rarely described in dogs (Clark et al., 1989; Nelson et al., 2012). They are located lateral to the thyroid and parathyroid area, often near the base of the ear near the angle of the mandible, attached deeply to cervical structures. They are also found in the anterior mediastinum in the thymus (Liu et al., 1983). Branchial cysts are derived from remnants of the second fetal pharyngeal pouch and result from a failure of its obliteration in embryonic development (Little, Rickles, 1967). In animals, branchial cysts have been described in dogs (Clark et al., 1989), cats (Liu et al., 1983; Jofe, 1990), a heifer (Smith and Grunson, 1977) and parrots (Beaufrère et al., 2010). Branchial cysts can be lined either by columnar ciliated (respiratory-type) epithelium or by nonkeratinizing stratified squamous epithelium (Meuten, 2002). Other possible cysts also occurring in the same location are salivary mucoceles (synonym extravasated pseudocyst, sialocele) and salivary cysts. A salivary mucocele is a collection of saliva that has leaked from a damaged salivary gland or salivary duct, and has accumulated in the tissues. While

often inaccurately called a salivary cyst, mucoceles are lined by inflammatory tissue (called granulation tissue), which is secondary to the inflammation caused by the free saliva in the tissues, while a cyst is lined by epithelial (glandular) tissue which is itself responsible for the production of the fluid. The type of epithelium lining the cyst wall allows differentiating salivary cysts from branchial clefts cysts histologically. The epithelium lining of true salivary cysts, in contrast to branchial cysts, are neither of the respiratory nor of the squamous type. Thyroglossal duct cysts may also be lined with pseudostratified ciliated epithelium or squamous epithelium, but they are located in the midline cervical region, not in the lateral side of the neck and so they cannot be confused with branchial cleft cysts. Parathyroid cysts (Kürsteiner's cysts) are also distinguishable from branchial cysts by their epithelial lining and localisation. They are lined by multilayered thyrogenic epithelium that often has colloid-containing follicles and may be located near the midline from the base of the tongue caudally into the mediastinum (Meuten, 2002).

In the present case, the location of the attachment of the cystic structure just distal to the ear canal with a cartilaginous basement, the close proximity to the parotid and mandibular salivary glands and the histologic detection of an epithelium of the respiratory type lining its wall are compatible with a first branchial cleft cyst Type II. Surgical total excision of branchial cleft cyst is the first choice therapy. If the cyst is infected, it is recommended to first drain the pus combined with an antibiotherapy, wait for healing and then make the excision in a second attempt. Antibiotherapy alone, marsupialisation or incision and drainage show unsatisfactory healing and often recurrence. Recently the use of OK-432 (Picibanil) has been described to treat plunging ranula or other benign cystic lesion in human in Japan and Korea. The principle is intralesional injection of this mixture of lyophilized *Streptococcus pyogenes* incubated with benzylpenicillin. The effect is a sclerotherapy and the results are very promising (Rho et al., 2006).

The use of CO₂ Laser finds more and more indication in veterinary surgery. It can replace the scalpel and scissors to dissect soft tissues with less bleeding (seals small blood vessel), less pain (seals nerve endings and axons), less swelling (seals lymphatic vessels) and less infection (kill bacteria due to its photodermal effect) which leads to faster patient recovery (Yagüe-García et al., 2009).

Conclusion

This very rare and spectacular congenital disorder needs to be removed surgically to prevent any recurrence. If the cyst is infected, it must be drained and treated with antibiotics in a first session before being excised totally in a second session. Care must be taken due to the close proximity of large blood vessels and important nerves.

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