WHAT IS YOUR DIAGNOSIS?

A 3½ year old male entire Boxer dog presented to the R(D)SVS Internal Medicine Service for investigation of sneezing and nasal discharge. Clinical signs of sneezing and mucopurulent right sided nasal discharge had first been noted 4 months prior to referral. Treatment with clavulanate potentiated amoxicillin had resulted in complete resolution of nasal discharge. However, a persistent lack of right-sided nasal airflow had prompted referral. The dog had been otherwise well, with excellent demeanour and appetite as usual.

On presentation, the dog was bright, alert and responsive. Body condition score was 7/9, at a weight of 36.65 kg. Oral mucous membranes were pink, with a capillary refill time of 1 second. Heart rate was 128 beats per minute, with synchronous femoral pulses of good quality, a regular rhythm, and no murmurs detected. The dog was panting, but there was no associated increase in effort. Thoracic auscultation and percussion were within normal limits. Abdominal palpation and peripheral lymph nodes were unremarkable. Rectal temperature was 38.8°C.

Nasal airflow was absent on the right side, but present on the left. Stertorous respiratory sounds were detected intermittently. There was no nasal discharge present, and no sneezing was observed. There was no nasal de-pigmentation and no facial pain or asymmetry. There was normal retropulsion of both globes. Oral examination revealed no evidence of a tooth root abscess or oronasal fistula.

1) **What are your main differentials for this case?**

2) **How would you evaluate the case further?**
1) Differential diagnosis

The main differentials for unilateral nasal discharge, sneezing, loss of airflow and stertor are:

a) Neoplasia e.g. adenocarcinoma, squamous cell carcinoma, chondrosarcoma, osteosarcoma, fibrosarcoma, lymphosarcoma
b) Foreign body
c) Inflammatory e.g. lymphoplasmacytic rhinitis, allergic rhinitis, nasopharyngeal stenosis, polypoid rhinitis
d) Infectious e.g. fungal rhinitis (aspergillosis), bacterial rhinitis (*Streptococcus equi subsp. zooepidemicus*)
e) Oral disease e.g. tooth root abscess, oronasal fistula

- The unilateral lack of nasal airflow in this case may be more consistent with a space occupying lesion (e.g. neoplastic mass), although nasal airflow can be hard to assess in the presence of thick, profuse nasal discharge.
- The presence of stertor is suggestive of nasopharyngeal involvement.

2) Evaluation

Clinical pathology (haematology, biochemistry, and urinalysis) is rarely helpful in determining the aetiology of nasal disease. However, investigation of nasal disease requires general anaesthesia, and these tests help to evaluate overall health status and may be useful for detecting systemic disease presenting with predominantly nasal signs e.g. vasculitis, hyperviscosity, hypertension, haemostatic disorders, infections of various causes.

- Tests of coagulation should be performed prior to nasal biopsy:
  - Buccal mucosal bleeding time
  - Coagulation times (PT and APTT) or PIVKA

In cases of epistaxis, these tests should be performed at the outset, as well as measurement of systolic blood pressure to rule out hypertension.

In general, investigation of nasal disease requires general anaesthesia for:

- Examination of the oral cavity
- Imaging:
  - Skull radiographs: standard views include right or left lateral, intraoral, dorsoventral, ventrodorsal open mouth, and rostrocaudal (for frontal sinus evaluation). Lateral oblique views are required to evaluate the dental arcades.
  - CT: advanced imaging of this form has the major advantage of obtaining detailed images of the nasal cavity and associated structures without the problem of superimposition.
- Rhinoscopy/nasopharyngoscopy
  - Diagnostic (e.g. visualisation of fungal plaques, foreign bodies, mass lesions)
  - Therapeutic (e.g. removal of foreign bodies or fungal plaques, flushing of excessive secretions)
- Nasal biopsy
- Rhinoscope-guided or blind biopsies from both nasal cavities, and from any nasopharyngeal lesions
- Biopsies should be submitted for histopathology and culture (bacterial and fungal)
- It should be remembered that even with obvious unilateral clinical signs, both sides of the nose should always be examined. Where disease is limited to the frontal sinus, trephination for sinuscopy and biopsy may be required.

In this case, investigations were carried out as follows:

- Routine haematology and serum biochemistry was unremarkable.
- A coagulation profile revealed reference range PT, APTT, and fibrinogen. Buccal mucosal bleeding time was within normal limits (1 minute 24 seconds).
- Pre and post contrast CT scans of the head were carried out under general anaesthesia. These revealed a non-contrast enhancing, fluid filled cyst-like structure arising from the right nasal cavity, at the level of the 105 root (figure 1) The structure was occupying most of the right rostral nasal cavity and a large part of the nasopharynx. It was surrounded by a well-defined, contrast-enhancing mineralised capsule. Moderated periosteal reaction and lysis of the maxillary bone was detected at the level of the roots of 105-106-107-108. There was no evidence of invasion of the left nasal cavity. Similar changes were visible at the level of 305-405/306-406, characterised by lysis/reabsorption of the mandibular bone at the tooth root and formation of cystic lesions. There were no abnormalities within the tympanic bullae. The mandibular and retropharyngeal lymph nodes appeared within normal limits. The CT findings were most consistent with multiple odontogenic cysts although nasal neoplasia could not be ruled out. A CT scan of the thorax was therefore carried out under the same anaesthetic. This revealed no significant abnormalities.

- Fine needle aspiration of the cystic structure was performed via a lateral approach through the gingiva at the level of the second premolar tooth. This yielded a watery serosanguineous fluid. Cytology of the fluid was consistent with a cyst. Culture of the fluid yielded no growth.
- Rhinoscopy was carried out under the same anaesthetic. Retroflexed examination revealed a proliferative, fleshy, non-ulcerated mass filling the right nasal cavity. Endoscopically guided biopsy was attempted, but the tissue proved to be relatively firm and slippery, and only small superficial samples were obtained. Normograde rhinoscopy revealed no significant abnormalities within the left nasal cavity. Within the right nasal cavity there appeared to be a reduction in space, despite the presence of fewer discrete turbinates, consistent with a space occupying lesion. Subjectively the mucosa appeared a little paler, and a definite tendency to haemorrhage was observed. There were no fungal plaques, foreign bodies or areas of ulceration identified. Nasal biopsies were collected from the left and right nasal cavities.
- Histopathology of nasal biopsies revealed mild to moderate, chronic lymphoplasmacytic rhinitis with polypoid hyperplasia in the right nasal cavity, and bilateral mild, bilateral mucopurulent exudate. There was no evidence of specific pathogens or neoplasia in any of the sections examined. Based on the CT findings, it was assumed that the main lesion had not been captured in these samples.
- Fungal culture of the biopsies was negative. Bacterial culture yielded a moderate and mixed bacterial growth with no predominant organism, therefore unlikely to be of clinical significance.
Discussion

The clinical signs and diagnostic findings in this case were most consistent with odontogenic cysts. Odontogenic cysts arise from tissues that give origin to the teeth. Reported odontogenic cysts include dentigerous cysts, odontogenic keratocysts (or canine odontogenic parakeratinized cysts), radicular cysts, or lateral periodontal cysts (D’Astous J. 2011, Verstraete F. J. M. et al. 2011).

Treatment options in this case included surgery, or conservative management. Surgery would involve dental extraction (including right maxillary PM2) combined with a ventral rhinotomy extending into the rostral nasopharynx to enable complete visualisation and curettage of the cyst, with the aim of creating a single large ventral meatus to permit nasal airflow. The potential risks of surgery, including likelihood of short term morbidity might be outweighed by the benefits of addressing the cyst, particularly given the possibility for continued cyst expansion, pressure-induced lysis of surrounding bone, and progressive clinical signs associated with an expanding nasopharyngeal mass. An alternative, conservative approach would be to do nothing, and simply monitor the dog for the development of clinical signs associated with the cyst.

The owner of this dog elected to proceed with debridement of the maxillary odontogenic cyst. Histopathology of the excised tissue was consistent with an odontogenic cyst. The dog experienced a low level of epistaxis from his right nostril for a few days following surgery, but no other adverse effects. The mandibular cysts were too small to address surgically. Close monitoring for cyst enlargement was therefore advised. Considering the risk of pathological fracture associated with mandibular cysts, the owners were advised that future surgery could be required.

Figure 1 : CT images of nasal cavity revealing a non-contrast enhancing, fluid filled cyst-like structure arising from the right nasal cavity
References
