

Approaches to nasal disease in rabbits

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Kevin Eatwell discusses upper respiratory tract diseases, and the relevant physiology, diagnosis methods and treatment, including surgical intervention

CHRONIC upper respiratory disease is a commonly seen presentation in pet rabbits.

The diagnostic approach taken will be discussed, as well as newer diagnostic procedures and treatment options. To understand the significance of upper respiratory tract disease in rabbits, it is important to have some understanding of the relevant anatomy and physiology.

Nasal anatomy and physiology

Rabbits are near obligate nasal breathers, thus any impediment to clear airflow through the nares and nostrils can lead to marked dyspnoea. In other species, this would simply be resolved by mouth breathing. It is also very easy for infection to pass caudally and up the Eustachian tube to the middle ear-leading to otitis media, with extension to an otitis externa or interna, or to pass down the trachea, leading to pneumonia.

Air enters via the external nares, passes the alar folds and into the nasal chambers. These are divided by a vertical cartilaginous septum and separated from the oral cavity by the hard palate. Each cavity consists of the dorsal and ventral nasal conchae (turbinates) and, caudally, the endoturbinates. The recesses between these are called meatus. In rabbits, these are the dorsal, middle and lower meatus.

Ostia connect these to the paranasal sinuses – the conchal (ethmo) sinus dorsally and the

maxillary sinus laterally. These can be seen clearly in the computed tomography (CT) image ([Figure 1](#)). The drainage points are not on the most ventral aspect.

The incisor and pre-molar teeth roots are closely associated with the nasal chambers. Minimal bone separates the roots and the nasal chambers; so dental pathology can be linked to nasal pathology ([Figure 2](#)). The nasal cavity progresses caudally where the epiglottis is engaged over the soft palate, allowing unobstructed airflow into the larynx. This can be visualised from the ventral nasal meatus.

If approaching from the oral cavity, the soft palate can be visualised (and with an endoscope transilluminated) to reveal the epiglottis behind it. Advancing the endoscope flips the soft palate dorsally, allowing the epiglottis to fall ventrally and the glottis can be directly visualised.

Clinical signs

Nasal discharges, which can be clear to white or yellow, may be evident. Matted fur is often evident at the nares ([Figure 3](#)), but also on the medial aspect of the forepaws ([Figure 4](#)). In some cases, there may be no matting evident around the nares, but the matted fur on the forepaws would suggest the rabbit is highly efficient at cleaning its nose. As mentioned previously, rabbits are near obligate nasal breathers, so any partial obstruction of the nasal chambers can lead to marked dyspnoea. Audible breathing, sneezing and coughing may be heard. Open-mouth breathing is possible in severely affected cases, while many owners may report wheezing at home. Anorexia can be the result of severe disease and many rabbits find it difficult to eat and breathe at the same time.

A nasal foreign body is another possible alternative – this is typically hay that has become trapped behind the soft palate and leads to irritation and sneezing. Myxomatosis can also lead to rhinitis alongside other clinical signs. Trauma to the head can lead to upper respiratory tract obstruction. Allergic disease is highly unlikely and has not been clinically reported, although poor environmental air hygiene will predispose a rabbit to upper respiratory tract disease.

Evaluating the rabbit for dental disease, ear disease and pneumonia is of critical importance as these conditions can be seen together.

It is also useful to perform a tear duct flush on both sides to evaluate the level of dacryocystitis present as this will contribute to nasal discharge.

Pathogenesis of rhinitis

Pasteurella multocida is again implicated in this condition and rhinitis is reported to be the most common clinical presentation of pasteurellosis. In one study, 55 per cent of cases yielded *Pasteurella multocida*. However, identifying a *Pasteurella* on culture without evidence of an inflammatory response does not mean it is causing a problem or requires treatment. In fact, a wide

variety of bacteria can be involved in the condition (or not), including *Bordetella bronchiseptica* (52 per cent), *Pseudomonas* (28 per cent) or *Staphylococcus* (17 per cent) for example (Rougier et al).

These bacteria can lead to infection within the nasal chambers, conchal sinuses, and maxillary sinuses. Severe disease can lead to mucosal ulceration, osteomyelitis and nasal turbinate destruction. Thus, histopathology or cytology confirming an inflammatory response is important to confirm the bacteria isolates are clinically relevant.

Diagnosis of nasal cavity diseases

Radiography is often the first diagnostic procedure undertaken to evaluate the nasal chambers. Left and right lateral and oblique views should be taken, along with dorsoventral and ventrodorsal views. However, radiography is fairly insensitive at identifying disease unless it is severe. Close and detailed, high definition images are required. However, gross dental pathology is clearly evident.

CT examination is an extremely useful technique. Rabbits can undergo an examination under light sedation only ([Figure 5](#)). CT allows a detailed evaluation of the conchal sinuses, maxillary sinuses and nasal chambers. CT is highly sensitive for the evaluation of atrophy or presence of pus within the upper respiratory tract. [Figure 6](#) shows a lateral radiographic view of a rabbit, with severe unilateral disease clearly evident on the CT in [Figure 7](#). However, mild disease with minimal anatomical change and limited build-up of purulent material will not be detected. However, it is unlikely CT will be performed in mild cases, as these will respond to medical treatment.

Nasal endoscopy complements CT examination as it allows direct visualisation of the nasal chambers (but will not allow examination of the sinuses). Rabbits require a full anaesthetic and intubation to bypass the nasal chambers ([Figure 8](#)). Intranasal lidocaine has been used to provide analgesia in these cases as rabbits are highly sensitive to this procedure. Endoscopy is fast, less traumatic and more readily available in general practice.

In mild disease with minimal discharge, endoscopy can be performed without insufflation. A 2.7mm endoscope with a surgical sheath will just about fit through the external nares of a 2kg rabbit. For smaller rabbits, the 1.9mm endoscope should be used either with an integral surgical sheath or a separate unit ([Figure 9](#)). In very small patients, the 1.9mm endoscope can be used without a sheath, but this does not allow for biopsy or insufflation alongside the instrument. However, intermittent flushing with saline can be performed and blind biopsies can be taken with a laparoscopic instrument.

Once through, it is possible to obtain a deep swab or biopsy for culture under direct visualisation. This is preferred over a deep nasal swab as it is guarded in the sterile endoscope sheath and is only exposed to bacteria at the back of the nasal chambers. A deep nasal swab is contaminated as soon as it is passed into the external nares.

It is possible to get as far back as the entrance to the nasopharynx in large animals.

Haemorrhage is very likely, which will prevent further visualisation. This can be limited by passing the endoscope as medial as possible. Biopsies can be taken for histopathology, which is important as it can confirm chronic disease and identify pathogens that may not be evident on culture. Endoscopic biopsies are small (five French), but using larger forceps and taking biopsies blind can still yield positive results with diffuse disease. However, haemorrhage will be marked and further endoscopic evaluation will be impossible. It is also possible to use grasping forceps to reduce the amount of discharge present.

In more severe disease, saline insufflation can be used to remove pus and improve visualisation. The rabbit must be intubated and the oropharynx packed with gauze swabs. The rabbit should be placed on a towel to absorb saline and reduce the chilling effect of fluids on the rabbit. The nose should be positioned 10 to 20 degrees ventrally to allow fluid to drain cranially out of the mouth to reduce the risk of aspiration. A bag of warmed sterile saline is suspended above the patient and runs via a giving set on to the surgical sheath. This allows the operator fine control of the saline flow using the port. An egress line can be fitted on the other port and left open.

After any biopsy procedure, dyspnoea may deteriorate postoperatively. Thus the rabbit should remain intubated as much as possible and provided with supportive care (including oxygen) and treatment of the rhinitis while awaiting culture or biopsy results. For more details, see Divers (2011a).

Treatment of nasal cavity diseases

Any underlying dental pathology must be treated before more specific treatments for rhinitis.

• Medical therapy

Mild cases of upper respiratory infection may respond to medical treatment. This includes systemic antibiotics administered over a six-week period. Antibiotics should ideally be chosen based on culture, but typical presumptive treatments include parenteral penicillin, cephalexin, or oxytetracycline. Parenteral or oral enrofloxacin, metronidazole or trimethoprim sulphonamides are other options. If cultures are negative, gram-stained smears can be used to guide the selection of an appropriate antibiotic.

Nebulisation with a variety of antimicrobials is often used as adjunctive therapy, particularly if there are concerns of toxicity as with the aminoglycosides ([Figure 10](#)). Drug dosages commonly used for nebulisation can be found in [Table 1](#).

NSAIDs are also an important part of therapy, reducing inflammation and pain associated with the condition. Mucolytics, such as N-acetyl-cysteine, are often used as well by nebulisation.

Bromhexine can be given orally as an alternative.

An animal that fails to respond to medical therapy, or quickly recrudesces after treatment is completed, should undergo a repeat CT examination and surgical intervention should be considered.

• **Surgical intervention**

Large quantities of purulent material within the paranasal sinuses indicate surgical intervention (alongside ongoing medical treatment) should be considered. This allows an opportunity to physically remove purulent material, but also to obtain samples for histopathology and culture from otherwise inaccessible areas.

A dorsal or a lateral approach can be used to gain access to a specific area. Reviewing the local anatomy on a prepared skull is most useful prior to surgery ([Figure 11](#)).

The conchal sinus is accessed caudally just lateral to the mid line and, if the trephination is extended cranially, access into the nasal chambers proper is possible. To obtain access to the maxillary recess, this incision can be extended laterally or a lateral approach is possible to gain access just to this site. CT examination is used to guide the surgical approach.

The dorsal and lateral areas of the nose are shaved and surgically prepared. Lidocaine and bupivacaine are used to block the incision down to the periosteum. The skin is incised in the midline in a rostrocaudal fashion and then retracted. This provides access to either side of the nasal septum. The periosteum is then elevated.

Initial entry into the sinuses or nasal chambers is performed using a sterile, round-headed dental burr in a sterile hand piece. The motor is covered using a camera sheath that allows heat to be dissipated from the unit ([Figure 12](#)).

Typically, the entry point starts at the nasal bone. The burr and fine rongeurs are used to increase the size of the opening to facilitate the surgical procedure ([Figure 13](#)). Once sufficient access has been gained, Volkmann spoons and large cotton buds are used to physically remove all purulent material. Flushing is then performed until no purulent material or mucous is dislodged.

An endoscope is used to confirm this and, depending on the access point, can reach as far back as the soft palate and cranial into the nasal chambers, reducing the need for an extensive osteotomy. A 1.9mm, 30-degree endoscope is most useful and biopsies can be taken from deep within the nasal chambers and sinuses for culture and histopathology.

If there is a secure airway, flushing with saline infused with antibiotics is possible.

The surgical site can be left open for repeat flushing or a small irrigating catheter can be placed for ongoing topical therapy. It is important to only perform this with a fully conscious rabbit with its nose held downwards. Taking this slow and steady is important to avoid respiratory distress.

Closing the surgical wound postoperatively is another option ([Figure 14](#)). However, it is impossible to close the periosteum and, generally, a bone defect remains. In the immediate postoperative recovery period, there will be movement of the skin closure site over the surgical field associated with every breath. Generally, subcutaneous emphysema around the surgical site does not occur, as soft tissue dissection does not need to be broad. Eventually, the skin and periosteum surrounding the defect does heal and, once the fur has grown back, the movement becomes much less obvious.

There is no real need to keep any stoma open for more than one week and a constant rhinostomy is unnecessary. Divers (2011b) and Lennox (2011) have reviewed the procedure and presented individual cases.

Analgesia is important and fentanyl (or morphine), dexmedetomidine and meloxicam can be provided preoperatively with a local block. A continuous rate infusion of ketamine can be used during surgery. Postoperatively, morphine should be used in the initial period along with the ketamine constant rate infusion. This is followed by buprenorphine and further meloxicam. Typically, the rabbit should be off opioids within 48 hours and discharged on meloxicam.

Antibiotic therapy should ideally be based on culture and sensitivity taken from the surgical site at the time of surgery. Culture success rates can be poor. As a result, antibiotic therapy postoperatively can be empirical. My preferred choice is for enrofloxacin intravenously and parenterally in the immediate postoperative period, while the rabbit is an inpatient followed by parenteral procaine penicillin for six weeks administered by the owner.

Gastrointestinal motility agents should be used to stimulate bowel motility and at the University of Edinburgh Royal (Dick) School of Veterinary Studies, rantidine is routinely used as this has the added bonus of protecting against gastric ulceration. Assist feeding is performed using fibre-based critical care formulas intended for herbivores.

Conclusions

Chronic sinusitis is problematic to control and, even with extensive ongoing surgery, medical treatment will be required. CT is the most important imaging modality to identify the severity of disease, plan the surgical procedure and subsequently evaluate the effectiveness of any treatment protocol.

- Thanks to Tobias Schwarz for taking the CT images used in this article.

- Some of the drugs mentioned in this article are not licensed for rabbits.

References and further reading

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