Discussing feline tracheal disease

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ANDREW SPARKES aims to make the subject of tracheal problems easier to swallow with a guide to treatment.

TRACHEAL disease is most commonly manifested by inspiratory dyspnoea, as the majority of clinically significant conditions will cause obstruction to the flow of air.

However, coughing, stridor and other signs – such as gagging and dysphagia – may also be present depending on the disease process.

If the disease affects the intrathoracic trachea, expiratory dyspnoea may be seen, rather than inspiratory dyspnoea.

Infectious causes

Infectious tracheitis may occur in cats, usually as part of the acute upper respiratory tract disease complex, with agents such as feline herpesvirus and *Bordetella bronchisepetica* implicated. Typically, upper respiratory (nasal, ocular and nasopharyngeal) signs predominate, with tracheal inflammation often being a minor component.

Sometimes, tracheitis may be severe and may contribute significantly to the disease presentation. Occasional cases have been seen with severe tracheal inflammation or oedema that has caused significant respiratory compromise.
Foreign bodies

Foreign bodies are more likely to lodge in the trachea in cats due to the relatively small size of the airways, but smaller foreign bodies, such as grass seeds, may pass further down the respiratory tract. Respiratory noise and dyspnoea are the main features seen with tracheal foreign bodies, but in the case of bronchial foreign bodies, coughing may be the predominant sign.

The clinical signs are typically sudden in onset, may be progressive (especially with secondary infections) and may respond temporarily while the cat is receiving antibiotics. The radiographic changes are often highly suggestive of a foreign body, with a localised area of lung consolidation and/or a visible, radiodense foreign body. Pulmonary consolidation usually involves the cranial portion of the right caudal lung lobe, which is the predilection site for foreign bodies based on the anatomical configuration of the airways in cats.

It is often not possible to pass a bronchoscope beyond the mainstem bronchi in cats (unless a very narrow bronchoscope is available, such as one 3.5mm in diameter) and, therefore, direct visualisation of the foreign body may not be possible. Pus is frequently evident, arising from the right main bronchus – this may obscure the foreign body, even if it is within the visual range of the endoscope. If a foreign body is suspected, a course of antibiotics before bronchoscopy is undertaken may enable a clearer view.

Retrieval of the foreign body, using grabs in conjunction with bronchoscopy, is usually the first choice for treatment. This is often successful for tracheal foreign bodies, but this may be more difficult with bronchial foreign bodies in cats due to the restricted size of the airways. There may be a marked response with antibiotic therapy, often with complete resolution of the coughing – but this will almost invariably reoccur once antibiotic treatment is withdrawn. If endoscopy is unsuccessful in achieving a diagnosis and/or retrieving a foreign body, cases will require a more radical surgical approach. The surgical options are either lobectomy of the affected lung lobe, or bronchotomy to allow direct removal of the foreign body. The prognosis for such cases is good, provided that the necessary surgical and postoperative care can be provided.

Tracheal trauma

Significant tracheal trauma most often arises from a major external force, such as a road traffic accident or damage during endotracheal (ET) intubation.

• Tracheal rupture

Intrathoracic tracheal rupture has been reported in a number of studies and appears to occur mainly as a result of blunt trauma, such as an RTA, dog fight or fall, causing hyperextension of the neck. As the carina is relatively fixed, this often results in tracheal avulsion or rupture just cranial to the carina. In most cases, an airway is still maintained with a “pseudotrachea” formed, either from
adventitial tissue surrounding the trachea, or from the mediastinum. Over time, there is inflammation and narrowing of the airway, resulting in typical signs of dyspnoea, but these signs may not occur until five to 14 days after the trauma.

Radiographically, the most common finding is a loss of continuity of the trachea, often with a gas-filled diverticulum and hyperinflation of the lungs. Apparent narrowing of the trachea is also commonly observed; the narrowed region being where the rupture has occurred. The two sites most commonly affected are close to the carina, or at the thoracic inlet.

Although this is a relatively uncommon injury in cats because the clinical signs are often not immediately present, careful evaluation of thoracic radiographs in cases of chest trauma are warranted.

When diagnosed and treated appropriately, the prognosis for cases of tracheal rupture is excellent. Surgical correction is required, and general anaesthesia and maintenance of an adequate airway may require specialist facilities in some cases. However, excision of damaged tracheal rings and anastamosis of the two ends is generally completely successful. There are approximately 40 tracheal rings in cats – it has been reported in dogs that up to 25-50 per cent of the trachea can be removed with successful anastamosis of the ends (without dehiscence or stenosis) and it would be assumed that the same would be true in cats, although this has not been studied. Certainly, 20-25 per cent of the trachea has been removed without complications in some reported cases. Where there is any tension on the trachea, it is possible to suture some tape between the mandible and the manubrium of the cat for seven to 14 days postoperatively, to prevent over-extension of the neck (with the increased risk of dehiscence).

• Iatrogenic tracheal rupture and stenosis

Tracheal rupture, stenosis and necrosis are all potential iatrogenic injuries to the trachea that can occur following ET intubation for general anaesthesia.

Such complications are uncommon, but emphasise the need for careful anaesthetic protocols. Cats sustaining tracheal tears, as a result of ET intubation, often develop subcutaneous emphysema as the first clinical sign and this may occur within a few hours of anaesthesia, or take several days to develop. Dyspnoea may accompany the emphysema, but is not invariably seen (30 per cent of cases in one study). Radiography commonly reveals pneumomediastinum, along with the subcutaneous emphysema.

Typically in these cases, the tracheal tear is longitudinal and located at the thoracic inlet. In mild-to-moderate cases, the tear may heal spontaneously and, thus, conservative therapy is indicated. However, if emphysema and/or dyspnoea are worsening – despite conservative management (cage rest and oxygen therapy) – surgical exploration and repair are indicated.
A variety of events have been postulated to cause longitudinal tears of the trachea, including over-inflation of the cuff causing the tear, traumatic intubation, turning of the patient during anaesthesia without disconnecting the ET tube and removal of the ET tube without deflating the cuff. It has been postulated that the over-inflation of the cuff is the most likely and most common cause for the ruptures. However, in the absence of definitive knowledge about the origin of the tears, all these should be considered possibilities and care should be used to observe good practice during anaesthesia.

Cases of tracheal necrosis and tracheal stenosis have also been reported in cats, following overinflation of the cuff on ET tubes. Again, this is a rare occurrence, but can lead to life-threatening dyspnoea – typically up to one to three weeks post-anaesthesia. The rostral thoracic trachea is most commonly affected, with pressure necrosis occurring, rather than an acute tracheal tear. Over time, necrotic material may be sloughed into the trachea, causing intraluminal obstruction and there may be stenosis as a result of inflammation and fibrosis. Early diagnosis (radiography and endoscopy) and surgical intervention are indicated, and the prognosis depends largely on the extent of the lesion and whether surgical resection is feasible.

**Tracheal oedema and collapse**

Tracheal oedema, narrowing and collapse are all rare diagnoses in cats, but can occur and can result in significant respiratory compromise. All of these conditions result in narrowing of the tracheal lumen, although this may be a dynamic event with tracheal collapse, and can be detected with plain radiography, fluoroscopy and/or endoscopy.

Cases of “thickening” of the thoracic tracheal wall, presumably as a result of oedema and/or inflammation, have been occasionally described. Some cases have responded rapidly to treatment, but others have been more recalcitrant. The origin of this oedema and inflammation is uncertain but, when seen, it often appears to affect a large part of both the intrathoracic and extrathoracic trachea. Some cases may be associated with infectious agents, such as severe feline herpesvirus infection, and some may be associated with upper respiratory obstructive disease with secondary tracheal swelling, caused by the altered airway dynamics – for example, rostral tracheal, laryngeal or nasopharyngeal obstruction). In other cases, it is possible that acute oedema may occur as an allergic reaction.

Thorough investigations for a detectable underlying disease are indicated, along with supportive therapy. Endoscopy and mucosal biopsy may be indicated (with or without viral isolation and bacterial culture, to attempt to make a specific diagnosis.

True tracheal collapse is extremely uncommon in cats, but has been described as a result of congenital malformation, as well as an acquired disease (secondary to tracheal trauma, or secondary to severe obstructive upper respiratory disease), with typical signs of dyspnoea and gagging. The prognosis is guarded. The cough associated with narrowing of the trachea is typically
of a “honking” nature, as is characteristic of tracheal collapse in small dogs. The coughing is likely to be acute during the onset and dyspnoea may be a noticeable feature.

**Tracheal neoplasia**

Tracheal neoplasia is rare in cats. Lymphoma, adenocarcinoma and squamous cell carcinoma are the most commonly reported tumours, and the treatment of choice depends on the tumour, its location and the clinical signs. In general, surgical resection is recommended, as this will alleviate signs of severe dyspnoea and facilitate accurate diagnosis and prognosis.
Top: tracheal necrosis and narrowing following over-inflation of an endotracheal tube.

Above: necrotic tracheal epithelium removed endoscopically from the previous case.
A: tracheal rupture and stenosis (dorsal to the cranial border of the heart) following trauma.
B: tracheal rupture and stenosis (dorsal to the cranial border of the heart) following trauma.
C: Tracheal oedema and inflammation in a cat with feline herpesvirus.
D: radiographic appearance of cat with tracheal lymphoma. This was removed surgically, with follow-up chemotherapy producing excellent results. However, treatment is dependent on the location and clinical signs of the tumour.
Left: a narrow diameter (3.5-4mm) and flexible bronchoscope is ideal for feline bronchoscopy.
Middle: a radiograph demonstrating localised pneumonia in the right caudal lung lobe of a cat with a bronchial foreign body.
Right: a blade of grass removed via bronchoscopy from the same cat.