Tracheal avulsion in a cat

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INTRODUCTION

Tracheal avulsion is a condition considered to be the result of a traumatic incident to the cervical or thoracic regions or in both. One of the probable causes of tracheal avulsion is hyperextension of the head and neck (BHANDAL & KUZMA, 2008 and NELSON, 1993). This condition presents a high mortality rate due to the risk of hypertensive pneumothorax, mediastinal and cervical emphysema, as well as stridor and respiratory distress. Teams who manage these cases are usually multidisciplinary, as they normally involve intensive care specialists, anesthesiologists and surgeons (COSTACHE et al., 2004). After rupture of the tracheal cartilage by avulsion, it is possible for the lumen to be maintained by the adventitious layer, if it remains intact. Another possible way for the tracheal lumen to be maintained could be through thickening of the mediastinal tissue, which may lead to the development of pseudotrachea (WHITE et al., 1995). The late development of respiratory clinical signs may be related to the degree of tracheal stenosis and lumen obstruction (BERKWITT & BERSON, 1895). It is important to consider that most veterinary patients are seen one to three...
weeks after the traumatic event. After this period, signs of pneumomediastinum, pneumothorax and soft tissue edema may be in the resolution phase (MACREADY et al., 2007). Cervicothoracic radiography is the auxiliary method for diagnosing this alteration. Radiographic signs that characterize tracheal avulsion may be associated with an area of well-defined focal dilatation, which is surrounded by a thin margin of soft radiopaque tissue, representing the intact tracheal adventitia (THRALL, 2014). Tracheoscopy has been described in medical studies as a reliable and frequently used method to locate the region of tracheal lesions (DANCER et al., 2018), and may even be confirmatory in some cases (BHANDAL & KUZMA, 2008). Here, we described a case of tracheal avulsion in a domestic cat using radiographic examinations in conjunction with tracheoscopy.

**Case report**

An eight month-old, undefined breed male cat, with access to the street was referred to a Veterinary Hospital, with a history of respiratory distress. During clinical examination, the patient presented severe inspiratory dyspnea and cyanosis. The patient was referred to the Intensive Care sector for stabilization. After clinical improvement, this patient was referred to the radiology sector to perform complementary exams. During radiographic examination, lateral right and left side projections of the thorax were performed. During the analysis of the images, alterations of the tracheal lumen at the 5th intercostal space were noticed. These alterations included a complete discontinuity of the tracheal circumference, with an area of localized focal dilatation also visible. This was seen radiographically as the formation of an air diverticulum surrounded by fine soft tissue radiopacity (Figure 1A). A tracheoscopy was requested for diagnostic clarification. The examination revealed severe tracheal stenosis in the pre-carina segment (Figure 1B). A tomographic examination was considered, but it was not available at the moment of the patient’s care. After performing the imaging tests, the patient quickly unbalanced and died, leaving clinicians and surgeons with no time to perform surgical interventions. The patient was referred to the Veterinary Pathology Sector for necropsy. Macroscopic examination revealed marked cyanosis. In the trachea, 3.5 cm cranial to carina, corresponding to the space between the 3rd and 5th ribs, there was an area of 1.5 cm with absence of the upper lateral portions of the cartilaginous semi rings. In the topographic region of the tracheal membrane, a diverticulum with a diameter of 0.2 cm was present (Figure 2A). When the lumen was injected with air, this area was visualized in a saccular format (Figure 2B). The tracheal lumen of this site was markedly stenosed, measuring 0.3 cm in diameter. The lumen of the cranial portion measured 0.8 cm in diameter and the caudal portion 0.7 cm in diameter. In the lung there was intense multifocal emphysema. Histopathological examination revealed no cartilaginous tissue in the wall of the trachea corresponding to the area of stenosis. The wall consisted of muscle cells in a thin, single layer of preexisting muscle fibers that disappeared in the central region of the stenosis area.

![Figure 1](image1.png)  
**Figure 1** - A: Right lateral radiographic image of the thorax of a domestic feline demonstrating tracheal sacculation (asterisk) anterior to the region of tracheal stenosis (arrow). B: Tracheoscopy image of a feline with marked tracheal stenosis (black arrow) and segmental sacculation anterior to carina (asterisk).
DISCUSSION

Radiographic findings commonly reported in cases of tracheal avulsion are usually associated with predisposing conditions, such as stenosis and tracheal diverticulum formation. These findings are similar to those reported in the present report, where there was narrowing of the tracheal lumen in both complementary exams. The findings from the trachea were similar to those described in the literature (WHITE, 2000). Radiographic signs that characterize avulsion may be associated with the discontinuity of the tracheal circumference about 1 to 4 cm cranial to carina, resulting in a well-defined focal dilation surrounded by a thin margin of radiopaque soft tissue. This change is called pseudo air way (MACREADY et al., 2007). In cases of clinical or radiological suspicion of tracheobronchial alteration, the additional evaluation with computed tomography (CT) is of great importance, since the appearance and location of the lesions appear more accurately on CT when compared to x-ray. Changes in the parenchyma and the correlation with clinical data may enable the differential diagnosis between diffuse tracheal alterations (MARCHIORI et al., 2008). Recent scientific articles have found CT to be the most advanced imaging method used to access tracheal disorders in felines (BARLETTA et al., 2015; SAYRE et al., 2016). However, this method was not available at the time of this case. Studies have shown that necropsy findings may include mucosal ulcers, inflammation, mucosal and submucosal edema, as well as hemorrhagic lesions. In the histopathological examination of some human patients it was possible to verify tracheal cartilage necrosis (STAUFFER et al., 1981); although, these findings were not observed in our case. The surgical management of the intrathoracic tracheal avulsion can be promptly performed through right lateral thoracotomy. Careful anesthesia should be considered for good surgical results. Intrathoracic tracheal resection and anastomosis may also be performed in an attempt to correct tracheal avulsion (WHITE, 2000). However, none of the surgical techniques were performed due to the patient’s critical clinical state.

CONCLUSION

Studies have reported advanced imaging techniques, such as computed tomography, as reliable diagnostic tests. In the present case, radiographic examination in conjunction with tracheoscopy was effective at diagnosing a case of tracheal avulsion in a cat, later confirmed by macroscopic and microscopic examinations.
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AUTHORS’ CONTRIBUTIONS

The authors contributed equally to the manuscript.

REFERENCES


