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Case Report
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A case report and review of the literature on swine hemorrhagic tracheitis syndrome in a Portuguese farm

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Abstract

Background: Respiratory diseases, including the multifactorial "swine respiratory disease complex," have a significant impact on swine production. Recently, a condition manifesting primarily in the trachea, known as hemorrhagic tracheitis syndrome (HTS), has been described in pigs. HTS is characterized by severe coughing and high mortality in finishing pigs.

Case Description: This report presents the first case of HTS in an adult male pig from a Portuguese farm. The animal died without any previous clinical signs. Necropsy revealed significant thickening of the trachea. Fibrinous necrotic hemorrhagic tracheitis was identified through histopathological analysis, but no bacterial infectious agents were detected during microbiological examination.

Conclusion: This case underscores the need for comprehensive research, including systematic necropsies and histopathological assessments, to understand the actual prevalence of the disease, elucidate the etiology, and develop effective interventions for HTS in swine productions.

Keywords: Swine, Hemorrhagic tracheitis syndrome, Respiratory, Cough.

Introduction

Respiratory diseases are important causes of losses in swine production. The main etiology is infectious, referred to "swine respiratory disease complex," and includes agents such as *Mycoplasma hyopneumoniae*, *Pasteurella multocida*, and a variety of viruses such as swine influenza virus, porcine reproductive and respiratory syndrome virus, porcine circovirus type 2, pseudorabies virus, and porcine respiratory coronavirus. Bacterial infections with *Streptococcus suis* and *Actinobacillus pleuropneumoniae* also occur, although less frequently. Other factors that play a role in respiratory diseases in pigs are parasites, environmental stressors, farm management practices, and factors specific to the animals (Piva *et al.*, 2020; Sarli *et al.*, 2021; Kristianingrum *et al.*, 2023).

Apart from rhinitis, upper respiratory tract diseases in swine are commonly linked to infections that affect the lungs, namely bronchopneumonia. Tracheitis without concurrent lung involvement is unusual (Sarli *et al.*, 2021). However, in the last years, hemorrhagic tracheitis syndrome (HTS) was diagnosed, initially in Canada, and reported later in the US as an emergent disease. This condition affects finishing pigs and is characterized by clinical signs that include a significant decrease in water intake and a loud cough similar to the sound of a goose honk or a high-pitched squeak. The cough can quickly spread throughout the farm. HTS is typically seen in pigs older than 10 weeks, with more mature pigs suffering more severe effects (Ertl, 2020; Yazel, 2022). A similar syndrome, featuring acute tracheal edema and hemorrhage with fibrin necrotic tracheitis, was described in Hungary in 2015 (Szeredi *et al.*, 2015).

Here, the authors report a case that resembles HTS in a Portuguese farm, which, as far as the authors are aware, is the first case documented in Portugal.

Case Details

A fattening male pig was discovered dead in the morning without any preceding clinical signs in May 2023. The necropsy examination revealed nasal bleeding with blood clots (Fig. 1), massive

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subconjunctival hemorrhage (Fig. 2), and multiple petechiae in the subcutaneous tissue and surrounding muscles of the neck. A focal linear and bilateral thickening was observed in the trachea, protruding into the lumen, displaying a brown color and a spongy consistency (Fig. 3). The transverse cut revealed a reddish color resembling a hemorrhage or blood clots (Fig. 4). No macroscopic changes were observed in the larynx. The lungs presented a marbled appearance with red, hemorrhagic areas. Hydropericardium was also observed, along with petechiae on the epicardial surface and subendocardial hemorrhages. The lymph nodes were exudative.

Microscopic examination led to the diagnosis of fibrinous hemorrhagic tracheitis, with hemorrhage, a fibrinous exudate, and infiltration of leukocytes within the mucosal and submucosal layers. The inflammation extended to tracheal musculature and submucosal glands. In addition, fibrin thrombi were identified (Figs. 5 and 6). The lungs present congestion and hemorrhage but no evidence of pneumonia.

No bacterial agents were isolated in the general bacteriological examination in trachea or lung samples.

Discussion

Reports of tracheitis without coexisting lung involvement are uncommon in pigs, as tracheitis is typically associated with pneumonia. However, in recent years, HTS, an emerging respiratory disease coursing with tracheitis as its major lesion, has been identified in swine and is worrying producers in the US. Due to respiratory tract obstruction, the condition can result in severe coughing, breathing difficulties, and variable mortality rates. HTS presents typical trachea lesions in the necropsy (Ertl, 2020), similar to those the authors identified in the case described here.

The mechanisms involved in this disease could be similar to those described in humans and in bovine "Honker syndrome," also called "Tracheal Stenosis Syndrome of Feeder Cattle" (Molossi *et al.*, 2020).

Fig. 1. Fattening pig, nasal bleeding partially clotted.

Fig. 2. Fattening pig, massive subconjunctival hemorrhage.

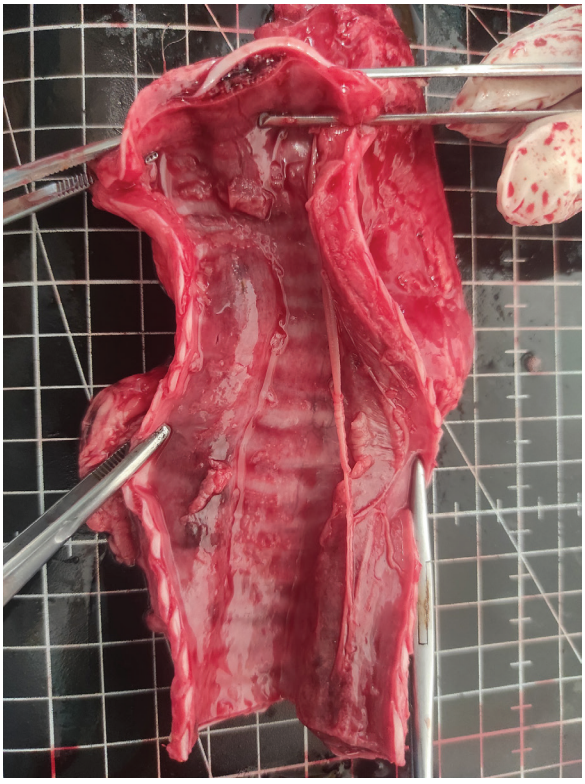

Fig. 3. Fattening pig, macroscopic appearance of the trachea that exhibits a focal linear and bilateral thickening, protruding into the lumen.

Stress conditions such as intense breathing activities or coughing can cause strain on the underlying layers of the trachea, which may lead to inflammation, bleeding, and a constricted tracheal passage. Indeed, a cough can exacerbate the effects of the respiratory movements on the trachea. Typically, breathing out causes an expansion of the trachea due to positive chest pressure, and during the breathe-in, the trachea widens and takes a more rounded shape (Erickson and

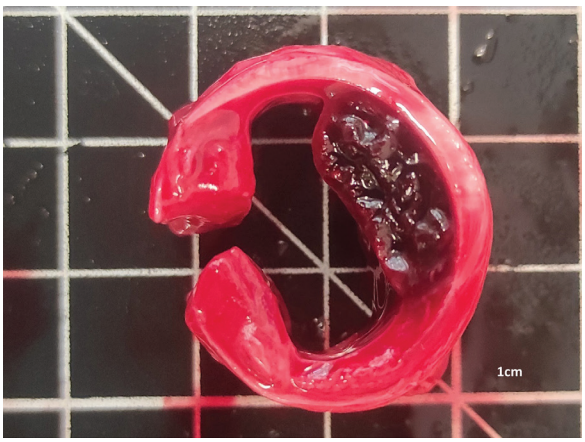

Fig. 4. Fattening pig, macroscopic appearance of the trachea. The transverse cut revealed thickened mucosa and submucosa with fibrin and hemorrhage.

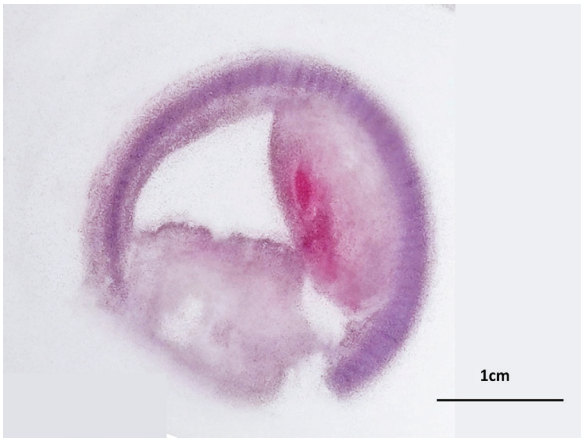

Fig. 5. Fattening pig, fibrinohemorrhagic tracheitis. HE.

Doster, 1993; Hara *et al.*, 2008; Szeredi *et al.*, 2015). On the other hand, it cannot be ruled out that there may be traumatic injuries, e.g., associated with possible drooling at feeding stations, which could compress the trachea. Compression of the front of the chest can press the trachea against the spine, causing tears or ischemia in the trachea (Fingland *et al.*, 1990).

Despite the sparse literature suggesting that the disease can spread rapidly on the farm, there were no other cases identified in the herd. In fact, on the farm to which this animal belongs, all the pigs that die are necropsied, so we can state that this was the only case observed in the last 10 years.

In this case, the cause of death is compatible with asphyxia, according to the history and the lesions observed, such as sudden death and ocular hemorrhage, similar to what is described in bovine cases (Molossi *et al.*, 2020).

No bacterial agent was detected in this case and unfortunately, viral tests were impossible to perform. Usually, typical respiratory pathogens of pigs, such as

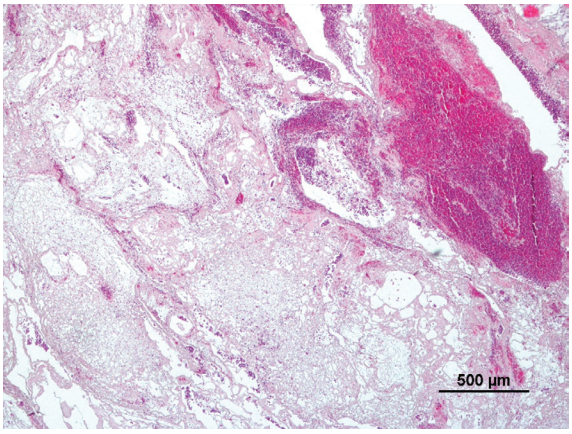

Fig. 6. Fattening pig, Fibrinohemorrhagic tracheitis. Hemorrhage and a fibrinous exudate in mucosa and submucosa.

the influenza virus, PRRS, and *M. hyopneumoniae,* are the most commonly identified. However, Szeredi *et al.* (2015) did not detect any agents in approximately half of the reported cases. Although no definitive or consistently associated etiological agent has been recognized for this syndrome, it is possible that a new infectious agent or a new strain of a known pathogen could be responsible for severe tracheitis. In addition, the etiology might involve physical damage from coughing as a contributing factor (Szeredi *et al.*, 2015). No singular treatment has been identified as particularly effective against HTS. Management efforts are centered on mitigating the cough, if present, and addressing secondary health issues, with anti-inflammatory medications and antibiotics offering some benefit. The most effective methods are treating pigs individually and isolating those affected (Szeredi *et al.*, 2015; Yazel, 2022).

A collaborative effort involving multiple diagnostic laboratories is underway to investigate the etiology of HTS by developing standardized diagnostic tests and creating a tissue bank for future research. This research aims to identify novel or emergent pathogens in cases where a diagnosis has not been identified (Yazel, 2022). The true impact of HTS has yet to be fully understood, and it is undoubtedly an emerging disease that is very likely to be underdiagnosed. Therefore, it is critical to perform necropsies on all pigs that die suddenly or exhibit acute and sudden coughing, with particular focus on a detailed examination of the trachea, including a transverse cut, which is not typically part of routine necropsy examinations (Szeredi *et al.*, 2015; Piva *et al.*, 2020).

Conclusion

In conclusion, for a more comprehensive understanding, further research is necessary. Future protocols in pig herds should systematically include necropsy of all

animals and collecting samples for histopathological and microbiological examination.

Acknowledgment

None.

Conflict of interest

The authors declare that they have no conflict of interest

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Author contributions

This work was carried out in collaboration between all authors. FS established the diagnosis and wrote the initial draft of the manuscript. IP conducted the necropsy and histopathological analysis. AG searched the literature and also contributed to writing the initial draft. PF, DM, and JLM assisted in finalizing the diagnosis and played a significant role in reviewing and editing the manuscript. All authors have read and approved the final manuscript.

Data availability

All data supporting the findings of this study are available within the manuscript. Any extra data needed are available from the corresponding author upon reasonable request.

References

Erickson, E.D. and Doster, A.R. 1993. Tracheal stenosis in feedlot cattle. J. Vet. Diagn. Invest. 5, 449–451.

Ertl, J. 2020. Emerging swine issues—increased reports of hemorrhagic tracheitis syndrome. Sioux Falls, SD: Sioux Nation Ag. Available via https://www.siouxnationag.com/emerging-swine-issues-increased-reports-of-hemorrhagic-tracheitis-syndrome/ (Accessed 17 November 2023).

Fingland, R.B., Rings, D.M. and Vestweber, J.G. 1990. The etiology and surgical management of tracheal collapse in calves. Vet. Surg. 19, 371–379.

Hara, J., Fujimura, M., Ueda, A., Myou, S., Oribe, Y., Ohkura, N., Kita, T., Yasui, M. and Kasahara, K. 2008. Effect of pressure stress applied to the airway on cough-reflex sensitivity in Guinea pigs. Am. J. Respir. Crit. Care. Med. 177, 585–592.

Kristianingrum, Y.P., Sutrisno, B., Widyarini, S. and Sugiyono. 2023. A case study of pig diseases in the special region of Yogyakarta. IOP. Conf. Ser.: Earth. Environ. Sci. 1174, 012006.

Molossi, F.A., Kemper, R.T., de Cecco, B.S., Rosa, R.B., Sonne, L. and Driemeier, D. 2020. Tracheal stenosis in a Holstein cow. Cienc. Rural. 50, e20200098.

Piva, M.M., Schwertz, C.I., Bianchi, R.M., Kemper, R.T., Henker, L.C., Nagae, R.Y., Cê, T.R.M., Barcellos, D.E.S.N., Driemeier, D. and Pavarini, S.P. 2020. Causes of death in growing-finishing pigs in two technified farms in southern Brazil. Pesq. Vet. Bras. 40, 758–775.

Sarli, G., D'Annunzio, G., Gobbo, F., Benazzi, C. and Ostanello, F. 2021. The role of pathology in the diagnosis of swine respiratory disease. Vet. Sci. 8, 256.

Szeredi, L., Dán, Á., Makrai, L., Takács, N. and Biksi, I. 2015. Acute tracheal oedema and haemorrhage with fibrinonecrotic tracheitis in pigs—a porcine counterpart of bovine Honker syndrome? J. Comp. Pathol. 152, 206–210.

Yazel, L. 2022. Hemorrhagic tracheitis requires attention. Farmland, IN: Four Star Veterinary Service. Available via https://4starvets.com/hemorrhagic-tracheitis-requires-attention/ (Accessed 17 November 2023)