Journal of Coastal Life Medicine

journal homepage: www.jclmm.com

Document heading doi:10.12980/JCLM.2.201414B60

Aspergillosis and proventricular impaction in an ostrich (*Struthio camelus*)

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PEER REVIEW

Peer reviewer

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Comments

This is a valuable study that described pathologic characteristics and diagnosis method of aspergillosis in ostrich as a farm animal.
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ABSTRACT

Aspergillosis is the most common mycotic infection in a wide variety of bird and causes significant economic losses. The present study described concurrent occurrence of aspergillosis and proventricular impaction in a 4-year-old male ostrich. The bird had respiratory problems, coughing and anorexia. Postmortem examination revealed numerous greenish-white caseous foci, 0.5 to 1 cm in diameter distributed on the surfaces of the air sacs and throughout the lungs. In histopathological study, multifocal areas of caseous necrosis that surrounded by inflammatory cells including heterophils, lymphocytes and macrophages were present. Long branching septated hyphae were visible in the necrotic areas with hematoxylin and eosin and Periodic acid-Schiff staining. Thrombi were present in the blood vessels. The proventriculus was full of gravel.

KEYWORDS

Aspergillosis, Ostrich, Pathology

1. Introduction

Ostrich (*Struthio camelus*) is a large bird with economic potential and takes into consideration as a farm animal. This bird lives naturally in semi-arid and desert areas of some African countries. In many countries, ostrich industry is expanding due to its products such as meat, eggs, skin for leather and feathers for decoration[1]. In spite of such circumstances, little is known about ostrich diseases. One of the most common mycotic infections in avian species in the world is pulmonary aspergillosis but it is uncommon in mammals[2,3]. Some reports are documented in dog[4], horse[5] and cow[6]. In avian species, aspergillosis has been reported in chickens[7], turkeys[8], ostriches[9,10], *Coturnix quail*[11] and penguins[12].

The disease occurs as chronic and acute forms. The acute form of the disease is associated by high mortality rates in young animals. The chronic state of aspergillosis affects adult ostriches and is characterized by caseous foci in the lungs and air sacs[2,13]. The disease is usually diagnosed at postmortem examination[14]. The present study described pathologic findings of aspergillosis and proventricular impaction in adult ostrich in Iran.

2. Case history

A 4-year-old male ostrich with a history of respiratory problems, cough and anorexia was referred to the Department of Clinical Sciences, Veterinary School, Shahid Bahonar University of Kerman. Postmortem examination showed lesions in the trachea, bronchus, lungs and air sacs. The lumen of trachea, bronchus and parabronchus were filled with large masses of cheesy-like contents. The walls

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Foundation Project: Supported by Kerman School of Veterinary Medicine.

Article history:
Received 10 Feb 2014
Received in revised form 22 Feb, 2nd revised form 10 Mar, 3rd revised form 20 Apr 2014
Accepted 5 Jun 2014
Available online 19 Jun 2014

of the thoracic air sacs were covered with caseous materials (Figure 1). Numerous greenish-white caseous foci, 0.5 to 1 cm in diameter distributed on the surfaces of the air sacs and throughout the lungs (Figure 2). The proventriculus was impacted with a large amount of gravel (Figure 3).

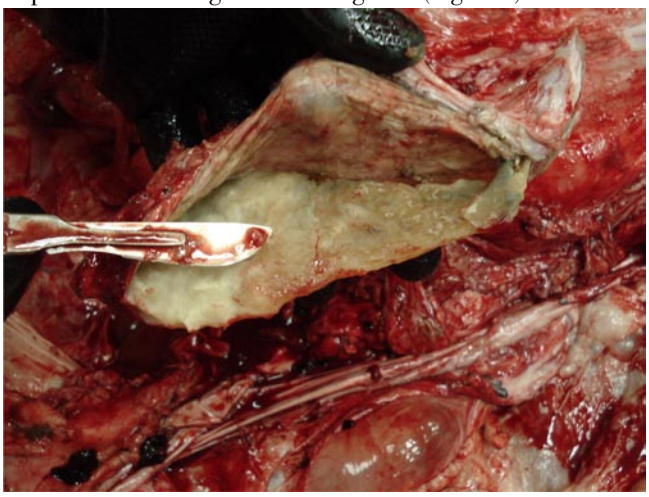

Figure 1. In the inner surface of thoracic air sac, massive caseous materials are cumulated.

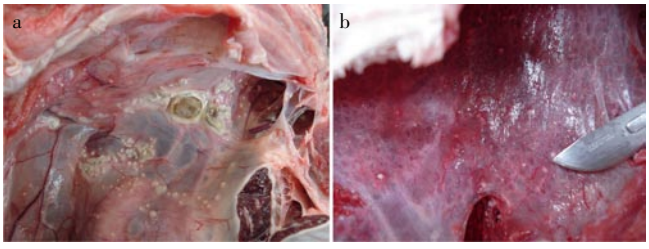

Figure 2. Numerous greenish-white caseous foci, 0.5 to 1 cm in diameter distributed on the surfaces of the air sacs (a) and throughout the lung (b).

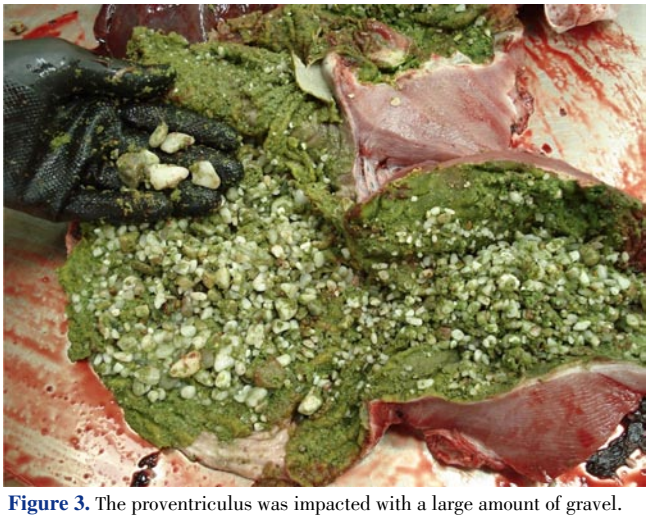

Figure 3. The proventriculus was impacted with a large amount of gravel.

Tissue samples of lungs were fixed in neutral buffered formalin and processed routinely for microscopic examination. Slides were stained with hematoxylin and eosin (HE) and periodic acid-Schiff (PAS). Histopathological study of lungs revealed multifocal areas of caseous necrosis surrounded by inflammatory cells including heterophils, lymphocytes and macrophages. Long branching septated hyphae were visible in the necrotic areas with HE and PAS staining (Figure 4). Thrombi were present in some blood vessels.

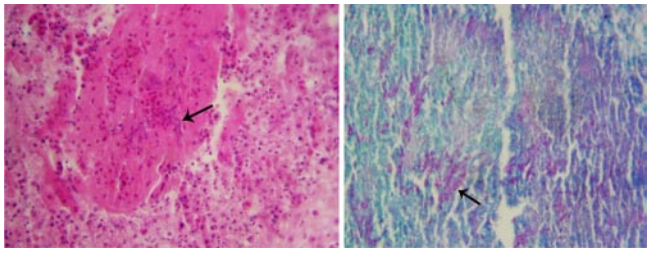

Figure 4. Lung: caseous necrotic area contains fungal hyphae (arrow) staining with HE (a) and PAS (b) (× 400).

3. Discussion

Aspergillus is a member of the phylum Ascomycota with over 185 species. About 20 species are harmful for humans and animals. *Aspergillus* can be found in soil, plant debris, wood and air. The most common pathogenic species is *Aspergillus fumigatus*. However, non-fumigatus species including *Aspergillus flavus, Aspergillus terreus, Aspergillus niger* and *Aspergillus versicolor* can cause aspergillosis[14,15].

In the veterinary medicine, most reports of aspergillosis are documented in avian. Aspergillosis generally occurs secondary to stress, suppression of immune system, antibacterial therapy, infected hatcheries, contaminated feed and air[16,17]. Sporadic and epidemic aspergillosis in ostrich were reported from many parts of the world[9,10,18]. The present study described sporadic form of this disease in a 4-year-old male ostrich. Grossly, the lumen of airways and parabronchus were filled with large masses of cheesy-like contents. Caseous materials covered the walls of the thoracic air sacs. Numerous greenish-white caseous foci, 0.5 to 1 cm in diameter distributed on the surfaces of the air sacs and throughout the lungs. The fungal hyphae was confirmed by PAS stain. In addition, proventricular impaction occurred due to accumulation of a large amount of sands. Pathologic characteristics of ostrich aspergillosis in the previous studies are in consistence with our study[9,19,20]. To our knowledge, this is the first report of aspergillosis in ostrich in Iran. Reza *et al*. (2013) reported concurrent occurrence of aspergillosis and pox disease in a canary flock in Iran[21]. Unilateral or bilateral swellings of the eyelids were observed in the canaries. At necropsy, small popular lesions in the skin associated with diffuse hemorrhages in the subcutaneous tissues were observed. Trachea was filled by heavy mucoid exudate and the lungs showed consolidation. The air sacs were thickened by yellow caseous substances. Fibrinous exudate covered the surface of enlarged liver. Splenomegaly and caseous pericarditis were other visible lesions. Histopathological examination of the lungs revealed infiltration of lymphocytes, few macrophages, giant cells as well as heterophils with central necrosis. Fungal hyphae and spores were also observed in these foci[21].

Concurrent occurrence of aspergillosis and impaction in ostrich is reported by Sancak and Paracikoglu (2005). They isolated *Aspergillus fumigatus* from the lungs and air sacs of a 3-month-old male blue-neck ostrich. In necropsy, a large accumulation of gravel was observed in the proventriculus[20]. Impaction can be a secondary problem as a result of initiating problems[22]. Different reports are present about impaction in the different parts of digestive system in ostrich.

In the most cases, foreign materials were responsible for occurrence of impaction. Improvement of management programs including decreasing stressing factors, correcting eating habits, avoiding access to foreign materials could prevent this disorder[22,23]. Further studies should be done for access to information about various management problems and diseases in ostrich farms.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

The authors wish to thank Kerman School of Veterinary Medicine for financial support of this study.

Comments

Background

Ostrich (*Struthio camelus*) is a large bird with economic potential. In many countries, ostrich industry is expanding due to its products such as meat, eggs, skin for leather and feathers for decoration. In spite of such circumstances, little is known about ostrich diseases. One of the most common mycotic infections in avian species in the world is pulmonary aspergillosis.

Research frontiers

The present study, described gross and histopathologic findings of aspergillosis associated with proventricular impaction in an ostrich. Long branching septated hyphae were confirmed with special staining.

Related reports

Aspergillosis causes causeous necrosis in respiratory system. Lesions are shown with numerous greenish-white caseous foci that were distributed on the surfaces of the air sacs and throughout the lungs.

Innovations and breakthroughs

The present study described pathologic characteristics of aspergillosis and proventricular impaction in an adult ostrich. In adult birds, this disease occurs as sporadic. Impaction can be a secondary problem as a result of initiating problems. This is the first report of aspergillosis in ostrich in Iran.

Applications

Aspergillosis occurs secondary to stress, suppression of immune system, antibacterial therapy, infected hatcheries, contaminated feed and air. Various management problems are responsible in affecting to aspergillosis. The epidemiologic studies are important for understanding the pathogenesis of diseases.

Peer review

This is a valuable study that described pathologic characteristics and diagnosis method of aspergillosis in ostrich as a farm animal.

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