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**Scientific Report**

# An unusual case of nasal mucormycosis caused by *Rhizopus oryzae* in a German shepherd dog

**Shirani, D.[1]; Selk Ghaffari, M.[2]; Khosravi, A. R.[3*]; Vajhi, A. R.[1]; Khorami, N.[1]; Zahraei Salehi, T.[4]; Shokri, H.[3] and Abarkar, M.[1]**

[1]Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran; [2]Department of Clinical Sciences, Faculty of Veterinary Medicine, Karaj Branch, Islamic Azad University, Karaj, Iran; [3]Mycology Research Center, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran; [4]Department of Microbiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

[*]**Correspondence:** A. R. Khosravi, Mycology Research Center, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran. E-mail: Khosravi@ut.ac.ir

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## Summary

This study represents an unusual case of mucormycosis localized in nasal cavity of a German shepherd dog. The patient was a 1-year-old male guard dog with unilateral nasal epistaxis, mucopurulent nasal discharge, sneezing and nose pawing. The dog had a history of head trauma about 2 months before admission, which was associated with mild self-limited epistaxis. Initial nasal rhinoscopy showed severe turbinate destruction. The samples of nasal discharge were collected by nasal flush technique and submitted to the Central Laboratory of School of Veterinary Medicine in Tehran for routine cytological, mycological and bacteriological examinations. Direct microscopic examination with 10% KOH/DMSO wet mount revealed the fragments of non-septate hyphae. The fungus was recovered in culture and identified as *Rhizopus oryzae*. This case showed that the veterinary practitioners should be aware of the possibility of localized nasal mucormycosis when examining dogs with chronic nasal discharge.

**Key words:** Mucormycosis, *Rhizopus oryzae*, Dog

## Introduction

Fungal infections caused by *Rhizopus* and *Mucor* species are commonly termed mucormycosis (Nathan *et al*., 1982). Mucormycosis is an extremely rare disease in animals. Its prognosis is very poor and known as an opportunistic infection among immunocompromised hosts accompanied with other primary chronic diseases (Ayabe *et al*., 2004). *Rhizopus oryzae* is the most common etiologic agent of mucormycosis (Fu *et al*., 2004). This fungus is a saprophytic agent of the nasal cavity and paranasal sinuses (Hoffman *et al*., 1993). Mucoral sinusitis and orbital cellulitis had life-threatening progression despite antifungal treatment (Abzug and Walsh, 2004). This paper describes an unusual case of nasal mucormycosis in a young German shepherd dog, which has not been reported before.

## Materials and Methods

A 1-year-old male German shepherd dog was presented to the School of Veterinary Medicine of Tehran University with a 10-day history of unilateral epistaxis, mucopurulent nasal discharge, sneezing and nose pawing. On physical examination, there was no ulceration, depigmentation or crusting of the external nares, whereas stertorous breathing was noticeable. The animal was in good general condition and was vaccinated on a routine vaccination program. The dog had a history of head trauma about 2 months before admission, which was associated with mild self-limited epistaxis. Nasal discharge was initially

serous and then becomes purulent and haemorrhagic. The routine radiographic, biochemical and microbial examinations were performed. Enrofloxacin (Daru Pakhsh Co., Tehran, Iran) was given intramuscularly at the dose of 5 mg/kg every 24 h for 7 days. For mycological examination, the nasal samples were collected by nasal flush technique and then observed by direct microscopy with 10% KOH/DMSO wet mount. A portion of sample was cultured on Sabouraud glucose agar (Merck Co., Darmstadt, Germany) and incubated at 25°C for 2-5 days.

## Results

Oral examination revealed no significant abnormality but pain and discomfort in the nasal region was remarkable during palpation. The rest of the physical examination was normal. Nasal radiography was performed for assessment of intranasal disease. Open-mouth ventrodorsal radiograph showed typical turbinate destruction and increased radiolucency of the left nasal chamber. The vomer bone remained intact. Thoracic radiography revealed no significant abnormality. Initial nasal rhinoscopy showed severe turbinate destruction (black necrotic turbinates). All routine laboratory analysis containing haematological parameters such as RBC count, PCV, MCV, WBC count, neutrophils, lymphocytes, monocytes, eosinophils and basophils, biochemical parameters such as blood urea nitrogen (BUN), serum glucose, serum bilirubin and urine parameters such as specific gravity, pH, bilirubin, calcium, glucose, creatinine, protein and urea were normal (Davidson *et al*., 1998). No clinical cure was achieved by antibacterial treatment. Direct microscopic examination of 10% KOH/DMSO wet mount smear revealed the fragments of non-septate hyphae (Fig. 1). Fungal culture of these lesions yielded a pure growth of *R. oryzae*. Unfortunately, the animal died after 2 days of mycological findings. For this reason, there was not possible to start antifungal therapy. The necropsy was not allowed by the owner.

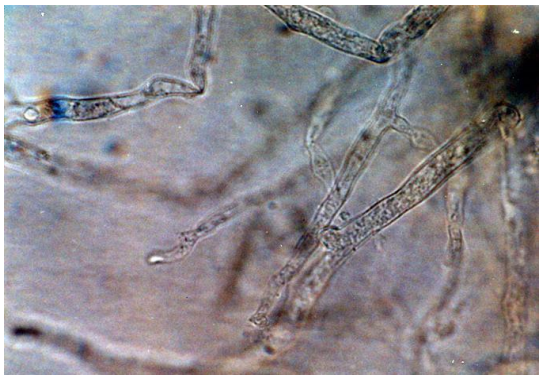

**Fig. 1: Microscopic feature of *Rhizopus oryzae* showing the fragments of non-septate hyphae**

## Discussion

Mucormycosis is a severe fungal disease, which is observed as localized or disseminated forms (Neri *et al*., 2002). In recent years, the clinical importance of mucormycosis has significantly increased (Eucker *et al*., 2001). The most frequent form of the disease in human begins from the nose and the paranasal sinuses and can extend into the brain. It is a fulminant and often fatal disease, which is not well known by many specialists (Sanabria *et al*., 1992). Mucormycosis is poorly defined in dogs and cats, and in most cases, diagnoses have been obtained by rhinoscopic examination. In most of the reported cases, gastrointestinal or respiratory tracts were involved and have acute to subacute courses (Greene, 1998). Some investigators suggest that fungal infections of the nose in German shepherd dogs are related to genetic factors such as reduced serum IgA which is a predisposing factor for development of aspergillosis (Ettinger and Feldman, 2000). Mucormycosis usually occurs in immunocompromised hosts and in trauma or burn victims as well (Chaney *et al*., 2004). There is also a close relationship between diabetes mellitus and mucormycosis in human and animals (Ossent, 1987). However, the results of urinalysis and biochemical tests in the present case were normal and our case was considered as a healthy normoglycaemic dog (Davidson *et al*., 1998). The history of previous trauma and bleeding in our case may be considered as predisposing factors for development of nasal *Rhizopus* infection. Since, mucoral

fungi such as *R. oryzae* can invade the blood vessels and results in thrombosis, necrosis and infarction, it is suggested that the fungus can penetrate from nasal cavity into the brain and leads to infarction. This is named acute rhinocerebral mucormycosis. There are many reports in the medical literatures, in which mucormycosis is presented as a cause of destructive nasal fungal disease in human. However, to the authors' knowledge, this is the first reported case in the German shepherd dog. The most common clinical forms which is reported in dogs and cattle, affects the lymph nodes of respiratory and intestinal tracts characterized by caseous necrosis. The involvement of internal organs can be occurred (Quinn *et al*., 1994). Localized nasal mucormycosis is clinically indistinguishable from other pathologic conditions of the nasal and paranasal cavities and should be considered when examining dogs with chronic nasal discharge.

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