

CASE REPORT

MADUROMYCOSIS IN A HORSE IN WESTERN CANADA

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Introduction

Maduromycosis or mycetoma refers to a group of tumefactions caused by a variety of fungi of the classes *Ascomycetes* and *Deuteromycetes* and by *Actinomyces* (8, 12). The common diagnostic feature is the presence of granules in exudate and lesions. The disease, first reported in man near Madura, India has been described in man, dogs, cats and cows (8, 13). There are only a few reports of maduromycotic lesions in horses (Table I).

The agents cause progressive, invasive subcutaneous and submucosal granulomata which fail to respond to any conservative treatment and often progress to osteomyelitis.

This report concerns a suspected case of *Monosporium apiospermum* or its perfect form, *Allescheria boydii*, infection in the nasal cavity, sinuses and left retrobulbar fossa of a horse from Western Canada. The causative organism is a known saprophyte of Canadian soil (6).

History

A 13 year old crossbred gelding from east-central Alberta was presented to the Large Clinic at the Western College of Veterinary Medicine in June 1973 because of a retrobulbar swelling causing severe exophthalmus of the left eye. The horse had received a severe kick over the eye from another horse one year previously. The swelling had been noted one month prior to admission. The rapidly growing mass had failed to respond to antibiotic and steroid treatment. The horse was euthanized after surgical biopsy and establishment of the etiological diagnosis.

Gross Findings

Findings were restricted to the head region of the horse.

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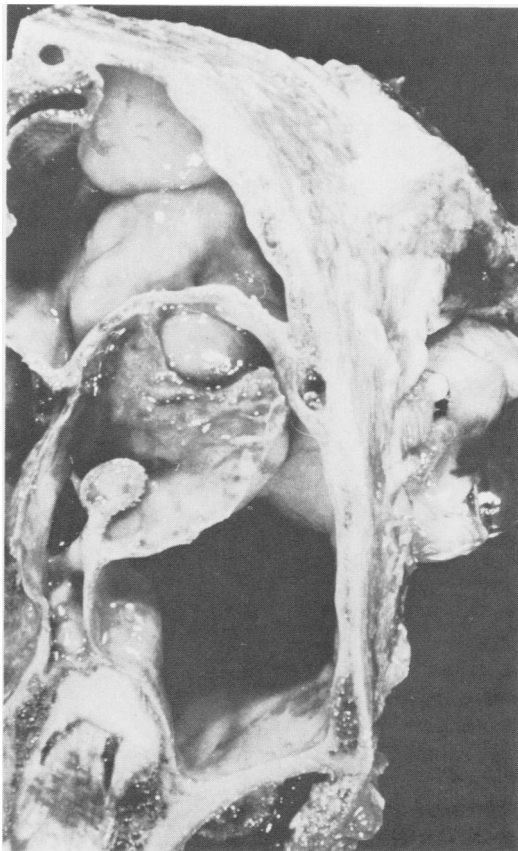


FIGURE 1. Retrobulbar mass extending submucosally into frontal sinus.

The left cornea was dehydrated, and appeared cloudy, and the lens was opaque. The exophthalmus was so severe the left eyelids could not close. A firm smooth raised mass extended from the zygomatic arch to the dorsal part of the frontal bone.

Dissection of the mass revealed fibrous invasion and fracture of the zygomatic arch. The entire retrobulbar fossa was filled with fibrous tissue and numerous bone fragments. There was extensive osteolysis and bone remodelling as the mass penetrated the left cranial sinus and extended submucosally along the turbinates (Figure 1) and cribriform plate (Figure 2). The posterior portion of the growth caused three bulges, measuring 1 cm in diameter each,

TABLE I
 CASES OF EQUINE MADUROMYCOSIS RECORDED IN THE LITERATURE

Pathological-Anatomical Findings	Mycological Findings	Author(s)
Neoplasia-like lesions in septum nasi	Pigmented microcolonies	1
Cutaneous lesions at the coronary band	Dark brown microcolonies	2
Small cutaneous and subcutaneous nodules disseminated over all but the dorsum	Heavily pigmented thickwalled chlamydo-spores. No gross pigmentation of microcolonies. Cultured <i>Brachycladium spiciferum</i>	3
Large cutaneous granuloma on tail	White microcolonies. <i>Allescheria boydii</i> isolated	13
Cutaneous disseminated nodules approximately 2.5 cm diameter	Brownish coloured fungi. <i>Helminthosporium</i> isolated	7
Subcutaneous and intrafascial lesions in right biceps and semitendinosus subsequent to wounding	Cultured <i>Helminthosporium</i> sp.	11
Left lateral thorax subcutaneous lesion	Pigmented microcolonies	5

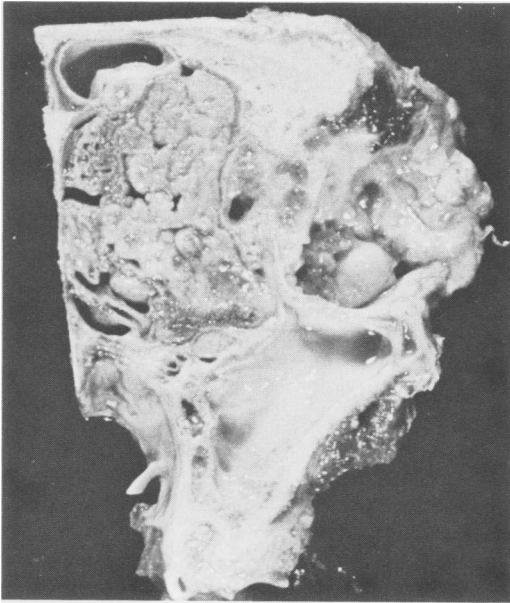


FIGURE 2. Lobulated portion of mycetoma invading the cribriform plate.

into the cranial vault. The thickness of the bone was reduced but there was no involvement of the meninges.

Cross sections of the mass demonstrated a mosaic pattern of fibrotic tissue with numerous white to yellowish, 1–5 mm diameter, granules disseminated irregularly throughout. Bone spicules were common in areas of osteolysis.

Microscopic Findings

Routine 5 μ hematoxylin and eosin (H & E) sections of the mass demonstrated an intense pyogranulomatous response associated with

numerous disseminated microcolonies of a non-pigmented fungus. An intense ring of granulocytes surrounded each colony. There were numerous foreign body type giant cells and a large zone of epithelioid macrophages. A fibrous response surrounded the numerous microcolonies (Figure 3).

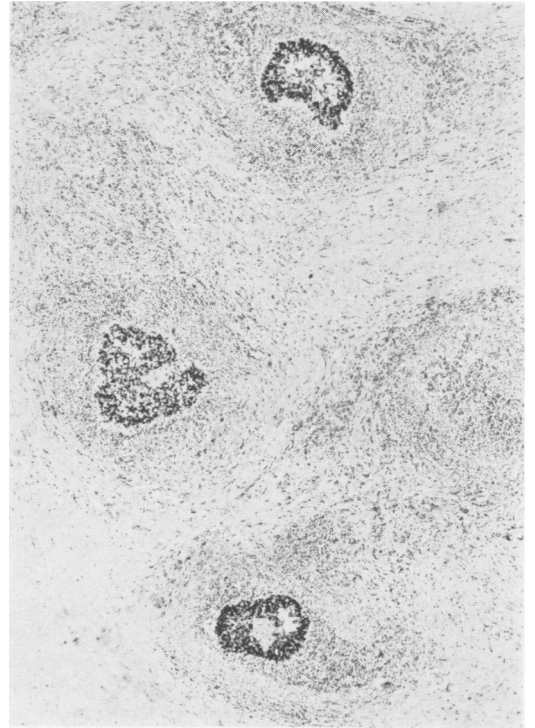


FIGURE 3. Microcolonies of fungi in tissue, surrounded by pyogranulomatous reaction and extensive fibrosis. Grocott-H & E. X40.

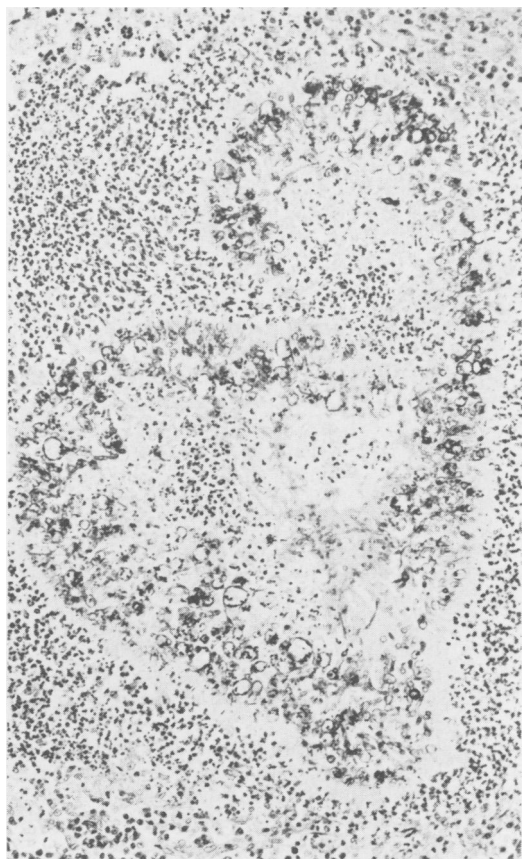


FIGURE 4. Fungal colony in tissue. Note presence of mycelia of irregular width. Grocott-H & E. X400.

A Grocott's methenamine-silver-stain used to outline fungal morphology, revealed septate mycelia with irregular hyphal width from 2 to 4 μ (Figure 4). Unicellular oval to pear-shaped swellings (6 \times 9 μ), found attached to the hyphae were regarded as chlamydospores (Figure 5). On the basis of the histological findings a tentative diagnosis of maduromycosis due to *Monosporium apiospermum* was made.

Mycological Findings

Microbiological culturing on blood agar at 37°C and on Sabourauds agar at 37°C and room temperature yielded rapid and apparently pure growth of an *Aspergillus* species within 24 hours. The fungi morphologically resembled *A. fumigatus*.

Since histological evidence presented was suggestive of a maduromycotic rather than an *A. fumigatus* infection, a phase-contrast microscopic examination of the original, frozen sample was conducted subsequently. Presence of a few large, septate mycelia with globoid

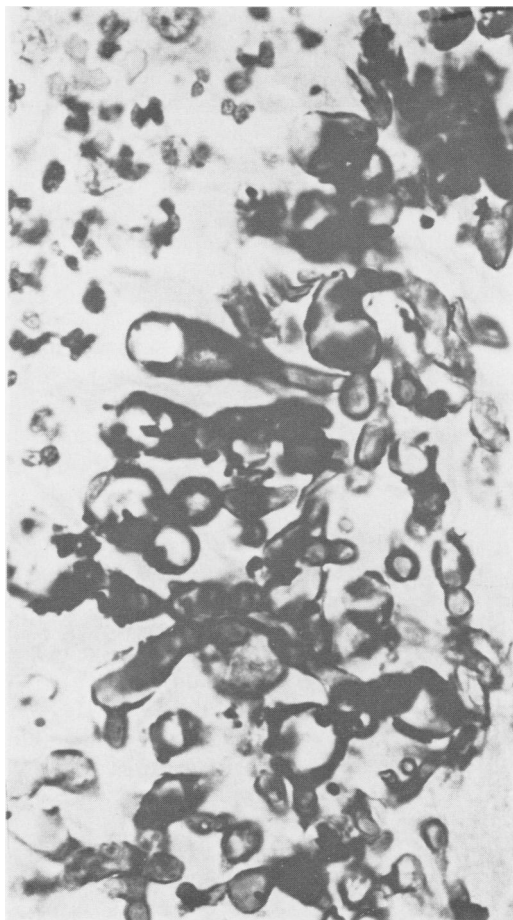


FIGURE 5. Mycelium with chlamydospores. Grocott-H & E. X1200.

structures amongst a heavily tangled mass of *Aspergillus*-mycelia was noted. Recultivation of the sample again yielded rapidly growing *Aspergillus* sp., but phase-contrast microscopic examination of a three day old culture showed structures very suggestive of conidiophores with a single, terminal conidium, typical of *Monosporium apiospermum* amongst the mycelial and conidial structures presumed to represent *A. fumigatus*.

Discussion

The most frequent etiological agent of human eumycotic mycetoma in North America is *Allescheria boydii*, an ascomycete which has been isolated from both soil and sewage (9). It appears that *A. boydii* or its imperfect form, *Monosporium apiospermum*, is the fungus associated with maduromycosis in temperate climates (13). The agent is regarded as an opportunist with previous injury of the skin or the surface membranes apparently needed

to allow infection. Experimental infection of mice with *M. apiospermum* resulted in production of typical lesions after subcutaneous inoculation, not however after intramuscular or intraperitoneal infection (12, 13).

In the present case it is assumed that the trauma and tissue destruction experienced one year earlier, may have become secondarily infected by the fungus, leading eventually to the extensive inflammation of the retrobulbar tissues and to osteomyelitis. Maduromycotic processes are destructive to all tissue; therefore it is difficult to assess whether the initial insult caused the infection and fracture of the zygomatic arch, or if the infection began in the nares, as described in bovine maduromycosis (3, 4, 10) and progressed from there through frontal bone and zygomatic arch.

Maduromycotic infections do not respond to antibiotic treatment and, if possible, should be surgically removed. Diagnosis must be made by the correlation of histopathological findings and cultural characteristics, if possible, as surface contaminating fungi create problems in interpretation of cultural findings.

The failure to obtain *A. boydii* or *M. apiospermum* in culture cannot be explained. The consistent finding of *Aspergillus* sp. on cultivation has to be regarded as a contaminant, since *Aspergillus* spp. are not known to produce "granules" and colonies in tissue as described in this and other papers on maduromycosis.

Summary

Maduromycosis of the zygomatic arch, frontal bone and retrobulbar fossa of a 13 year old gelding was diagnosed histologically. On the basis of the morphology of the fungal microcolonies, *Monosporium apiospermum* was thought to be the causative agent. Attempts to culture the fungus failed and *Aspergillus* sp. only were isolated.

Résumé

L'histopathologie a permis aux auteurs de diagnostiquer un cas de maduromycose affectant

tant l'arc zygomatique, l'os frontal et la cavité rétro-bulbaire d'un cheval hongre, âgé de 13 ans. La morphologie des microcolonies fongiques les amèna à penser que la condition était attribuable à *Monosporium apiospermum*. Leurs efforts en vue de cultiver ce champignon s'avèrent cependant infructueux; ils ne réussirent à isoler que des *Aspergillus* sp.

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IN MEMORIAM

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