

Mucormycosis in a group of chickens

Ki-soo Cheong, Byung-moo Rim*

Yong Dong Branch of Veterinary Research Institute,
College of Veterinary Medicine, Jeonbuk National University*

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닭에 집단 발병한 뮤코마이코시스

정 기 수 · 임 병 무*

강원도 가축위생시험소 영동지소

전북대학교 수의과대학*

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초록 : Mucormycosis는 자연 환경속에 상재하고 있는 Mucorales 목의 곰팡이류에 의해 발생하는 질병인데, 강원도 속초시의 한 양계장에서 82수(연령 100일~2년)의 닭에 집단 발병하였다. 임상증상은 식욕감퇴, 하리, 영양실조, 호흡곤란, 마비 등으로 발병 후 수 주간에 폐사하였으며, 부검시 호흡기관을 비롯하여 간장, 심장, 비장, 신장, 소화관 등에서 회황색의 다발성 결절(0.14~4.6 cm)과 소출혈반점을 발견하였다. 병리 조직학적으로 병소는 화농성 혹은 건락성 괴사소와 이를 둘러싸는 위산성 백혈구, 대식세포, 임파구, 거대핵세포의 침윤 등 급성 육아종성염증 소견을 나타내었으며, 본균 특이성의 균사(두께 4~24 μ)를 괴사병소 내에서 관찰하였다. 본 질병의 발생은 사료 첨가제와 치료제로써 항생제의 남용이나 타질병의 일차 감염 등이 전소인으로 작용하는 것으로 사료된다.

Key words; mucormycosis, fungi, hyphae, yellow-gray nodules, granuloma.

Introduction

Mucormycosis is a relatively rare mycotic infection. Generally the etiologic agents are several nonpathogenic fungi of the order Mucorales (Mucor, Absidia, Rhizopus, Mortierella) and are ubiquitous. It is believed that alteration can take place in the fungus as a result of the primary disease, or a metabolic derangement or form of therapy which might render it pathogenic.^{1,2}

The mycotic lesions of many animal species including man, have been reported but it has not been observed in domestic chickens. Most lesions have been found on body surface, the brain, kidneys, liver, spleen, eyes, lymphnode, gastrointestinal tract,

and lungs, and sometimes may be disseminated. Also placentitis in bovines is a particular infection with these organisms.³ The present cases are mucormycosis metastasized to many organs including lungs of the affected chickens.

Materials and Methods

Animals and History: A total of 82 chickens from 4,000 Manina hens, in ages from 100 days to 2 years developed anorexia, diarrhea, malnutrition, dyspnea, paralysis after vaccination of Newcastle disease and fowl pox at a chickens farm, Sokcho, Kangwon. The animals were maintained in the same bad dirty conditions in holding cages of the farm for duration of the inspection and given antibiotics

and Tylosin with nutritive injections every day. But most of them died in a few weeks and were transported to the Yongdong branch of Veterinary Research Institute in September, 1986.

Necropsies: Necropsies were performed approximately 1 to 5 hours after death. Significant tissue samples were used as the source of microbiological examination and histopathologic study after macroscopic observation.

Microbiological examinations: Tissues of 8 severe cases with typical lesions were used as the source of inoculum. Samples were cultured by the routine methods for bacterial isolation.

Histopathologic examinations: Gross lesions were fixed in 10% neutral formalin, and 7μ sections were stained with hematoxyline and eosin (H&E) or with Periodic acid-Schiff(PAS) and hematoxyline.

Results

Necropsy findings: At necropsy there were petechiae and ecchymoses on the serous membranes of the abdominal and the thoracic organs of debilitated corpses. Most tracheas and bronchi were hemorrhagic on the mucous membranes, studded with small yellow granular lesions (Fig 1). Some lobes of lungs and air sacs were congested and on sectioning exuded copious pink, frothy fluid, and contained a number of yellow-gray nodules or dark gray cystic lesions measuring from 1mm to 4.6 cm in diameter.

There were a few petechiae in the epicardial fat and beneath the endocardium including small yellow nodules in the cardiac wall. Scattered in livers, spleen, kidneys, and gastrointestinal tract were numerous petechiae and ecchymoses. There were a number of yellow-gray localized lesions on the surfaces extending into the underlying parenchyma of the spleen, liver, kidneys, and gastrointestinal tract measuring up to 3.7 cm.

Microscopic findings: On microscopic examination it was found that many organs were invaded by large, branching non-septate fungal hyphae which measured approximately 4 to 24μ in diameter and up to 230μ in length. The fungus is identified readily in H&E or PAS-stained tissue sections by the characteristic morphology of the hyphae, considered

to belong to the order Mucorale (Fig 2).

The mucosae of the tracheas and bronchi were ulcerated and surrounded by intense inflammatory reaction with necrosis. In the lungs and the air sacs the hyphae were found in scant numbers in the exudate of the bronchial lumens and in the nodular lesions. The typical lesions consisted of extensive suppurative or caseous necrosis surrounded by heterophils, macrophages, lymphocytes, and giant cells with various sized droplets (Fig 3). The stroma as well as muscle fibers was necrotic around suppurative nodules in the heart and edematous stroma was infiltrated by clusters of heterophils and macrophages (Fig 4).

The hepatic cells revealed moderate diffuse necrosis and the hyphae similar to those in the lungs were associated with multiple caseous necrosis. The same disseminated mycotic lesions and tissue characters were observed in the spleen, kidneys, and gastrointestinal tracts of most cases accompanying edema, congestion, extravasation around the lesions.

Microbiological findings-No microorganisms were isolated from these sample cultures.

Discussion

Ideally, the fungus cultures using appropriate media like Sabouraud's method should be made to confirm the diagnosis, but the isolation was not taken from the other routine methods for the 8 severe cases. The dogssinai of mucormycosis must be substantiated by actually finding the organisms within the affected lesions since the fungi of the mucorales are common and widely distributed in nature and are a frequent laboratory contaminant.^{2,4}

The organisms of the genus *Aspergillus* are identified readily by slender septated hyphae ($3\sim 4\mu$ wide), fungus balls in the infected tissues, and conidiophores in presence of high oxygen tension from the members of the order Mucorales.^{3,5}

Some reported cases of mucormycosis occurred spontaneously without any predisposing factors.⁶⁻⁸ In most of the cases reported mucormycosis has been considered to be a complication infection in a patient debilitated by another disease such as diabetes mellitus, leukemia, or gastroenteritis. Treatment with cer-

tain drugs, such as antibiotics and steroids, or radiation therapy, has also been incriminated as a predisposing factor.⁹⁻¹² It is thought that antibiotics predispose to fungal infection by destroying the bacterial flora of the intestinal tract which normally exert an inhibiting effect on fungal growth. Antibiotics also cause local tissue damage, thus enhancing the invasion of the mycotic organisms; they have been shown to inhibit both antibody synthesis and phagocytic activity. Steroids are thought to alter the host's tissue reactivity to invading organisms.^{13,14} It is our opinion that the extensive antibiotic additives and therapy administered to the chickens were major predisposing factors in the development of mucormycosis.

Although in these disseminated cases, the mucorales have been responsible for the lesions in many sites including the respiratory system, heart, gastrointestinal tract, kidneys, and spleen, the fungus is not found in the brain and blood vessels.

Death could not be attributed directly to single infection of this fungus apart from complicated infection, although it very likely played a contributing role.

Summary

The etiologic agents of mucormycosis are several nonpathogenic fungi of the order Mucorales and are ubiquitous. A total of 82 chickens were infected with the disease and developed anorexia, diarrhea, malnutrition, dyspnea, and paralysis in a chicken farm, Sokcho, Kwangwon.

At necropsy there were multiple nodular lesions and hemorrhages in livers, spleens, kidneys, gastrointestinal track, and respiratory system. On histopathological examination it was found that the nodular lesions were consisted of granulomatous inflammation accompanying characteristic hyphae (4~24 μ wide) of the fungi.

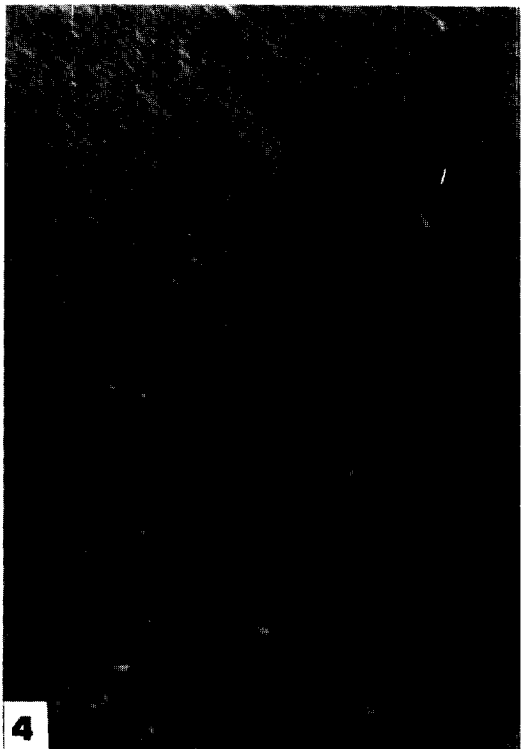
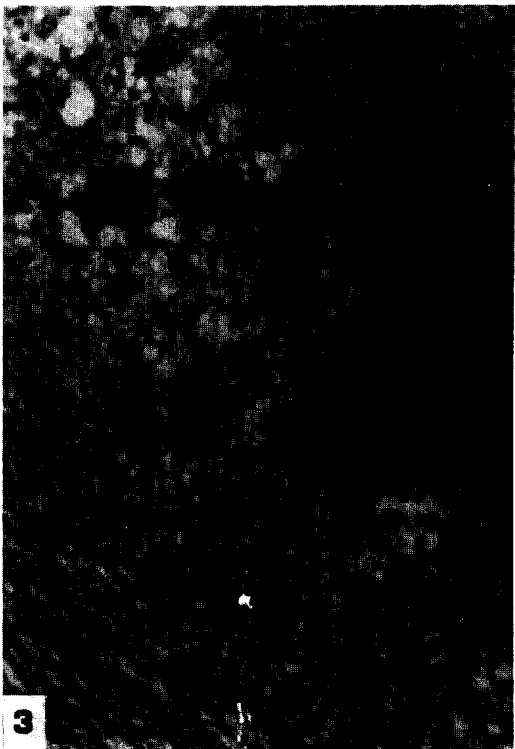
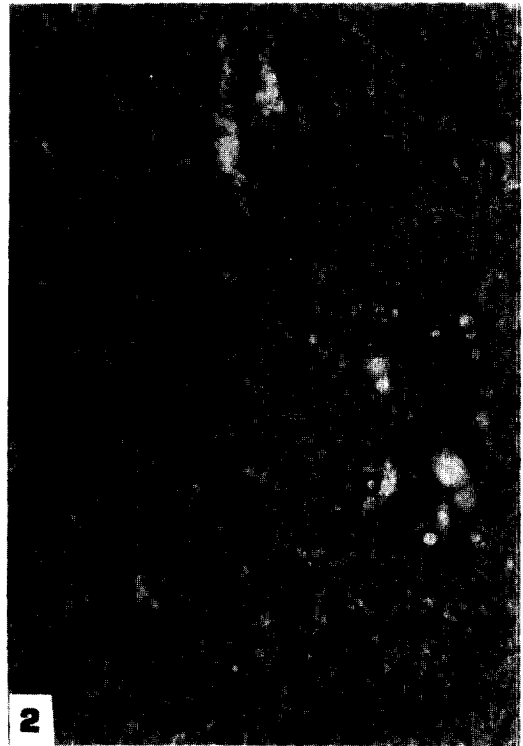
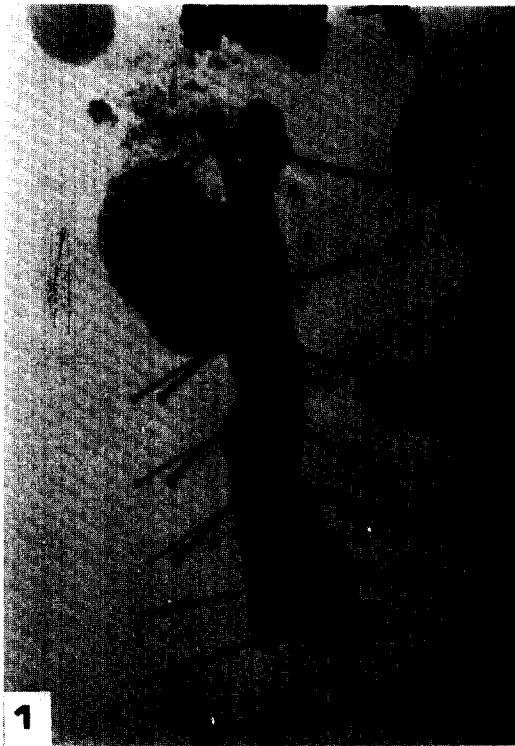
Legends for figures

Fig 1. Multiple granular lesions in the hemorrhagic mucous membrane of the trachea.

Fig 2. Large, branching non-septate hyphae of order Mucorales in caseous necrosis of the kidneys. PAS stain; $\times 200$.

Fig 3. A number of macrophages, heterophils, and gaint cells with various sized droplets in the boundary of the necrotic lesion (right) in the lungs. H & E stain; $\times 200$.

Fig 4. Invasive suppurative nodule (left) in the necrotic cardiac muscle fibers. H&E stain; $\times 100$.



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