

Clinical and histopathological study of brooder pneumonia in broiler farms

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Abstract

The outbreaks of aspergillosis in broiler chicks (4-15 days old) were observed from January to July, 2011 in five broiler farms. The disease was detected on the basis of clinical signs, gross, histopathological and cultural findings. Infected chicks showed signs of ruffled feathers, green watery diarrhea, anorexia, gasping and dyspnea. On examination, numerous small white yellowish nodules were seen in the lungs, air sacs, kidneys, thoracic wall and abdominal serosa. Microscopically the lungs revealed granulomas with central areas of caseation surrounded by heterophils and giant cells. *Aspergillus fumigatus* could be isolated in Sabouraud's dextrose agar from the lesions. Higher morbidity (76 to 100%) and mortality (62.5 to 100%) rates were recorded in the five farms. This is the first record on the occurrence of acute aspergillosis in broiler chicks from Sulaimania/ Iraq.

Key words: Acute aspergillosis, Broiler chicks, Brooder pneumonia

دراسة سريرية ومرضية للالتهاب الرئوي في حقول افراخ اللحم

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الخلاصة

لوحظ حدوث اندلاع لداء الرشاشيات في خمسة حقول لافراخ اللحم بعمر (4-15 يوما) من كانون الثاني إلى تموز للعام 2011. تم الكشف عن هذا المرض على أساس العلامات السريرية والتغيرات العيانية و النسجية والنتائج على الوسط الزراعي. وأظهرت الافراخ المصابة علامات انتفاش الريش و الإسهال المائي الأخضر وفقدان الشهية وضيق التنفس و اللهاث. وشوهت عيانيا العديد من عقيدات صغيرة بيضاء مصفرة في الرئتين و الاكياس الهوائية و الكلى و جدار التجويف الصدري والغشاء المصلي للتجويف البطني. وأظهر الفحص المجهرى للرئتين وجود أورام حبيبية (Granulomas) ذو مركز تجبني و محاطة بالخلايا المغايرة (Heterophils) والخلايا العملاقة. وتم عزل الفطر (*Aspergillus fumigatus*) من الآفات في الوسط الزراعي (Sabouraud's agar). وسجلت أعلى نسبة للإصابة 76 إلى 100% والهلاكات 62.5 إلى 100% في الحقول الخمسة. هذا هو أول تسجيل لداء الرشاشيات الحاد في أفراخ اللحم في السليمانية / العراق. الكلمات المفتاحية: داء الرشاشيات الحاد ، افراخ اللحم ، الالتهاب الرئوي.

Introduction

In the early 1800s, moulds, probably belonging to the genus *Aspergillus*, were described in wild birds in Europe. Since then aspergillosis has been described worldwide in a very large number of avian species and probably all birds are susceptible to infection (1 and 2). Aspergillosis in birds is usually confined to the lower pulmonary system with florid lesions in air sacs and lungs. It is an infectious, non-contagious fungal disease caused by species in the ubiquitous opportunistic saprophytic genus *Aspergillus*, in particular *Aspergillus fumigatus* (3). *Aspergillus* spores are commonly found in air, water, soil, plant debris, rotten vegetation, manure, sawdust litter, biogases litter, animal feed, on animals and indoor air environment (4 and 5). In poultry, a severe

acute form has been observed mostly in young subjects, with high morbidity and mortality rates, and a chronic form in adult subjects, especially in turkey breeders (6 and 7). Infection results in so called brooder pneumonia. Infected birds often show no clinical signs; however, dyspnea, gasping, or accelerated breathing can occur (8). The target organs are the lungs and the air sacs, but in their systemic forms they can also affect the liver, the kidney, the encephalon, the bones, the skin and the eyes (9). Histopathologically, the lesions are characterized by two different patterns: a granulomatous form with internally-septate hyphae that typically develop into non-aerate parenchyma, and a non-encapsulated diffuse form, containing sporangia with a typical

morphology located in the lung or even more frequently in the air sacs (10).

Materials and methods

Sample collection

This study was conducted to diagnose aspergillosis in broiler during the physical visit of the farms and when submitted to microbiology and pathology Laboratory of veterinary medicine college / Sulaimania university. A total of 5 incidences of

aspergillosis in broiler farms, were detected during January to July, 2011. The flock history including types of birds (Ross-308), population of birds per flock, age of birds, morbidity, and mortality (Table 1). The clinical signs of the affected flocks were recorded during the physical visit of the flocks and the farmer's complaints in connection to it was also considered and noted.

Table 1: Clinical history of the different flocks examined

Farms name	Location	Age of birds (Days)	Population Birds/flock	Morbidity rate /flock	Mortality rate /flock	Types of Birds
Sawin	Ranya	4	10000	100%	100%	Ross-308
Ayanda	Kalar	15	8000	80%	62.5	
Kuzhin	Bazyan	14	12000	76%	63.3	
Zryan	Bazyan	5	11000	90%	81.82	
Azad	Kalar	5	6000	100%	100%	

Necropsy and histopathological examination:

Both sick and dead birds submitted for diagnosis were examined systematically at necropsy following standard procedure (11). The birds were also brought to laboratory during physical visit for detailed examinations. The clinical history and signs were carefully considered before the attempt of postmortem examination. The physical appearances of the carcasses and the visible gross morbid lesions of the organs and tissues were recorded. The tissue samples (Lungs) were collected during the course of necropsy and preserved at 10% buffered formalin. Following trimming and blocking in paraffin 5–6 micrometer thick cross sections were prepared and stained with hematoxylin / eosin and PAS (12).

Isolation and Identification:

The isolation of *Aspergillus fumigatus* was carried from affected organs (Lungs, air sacs and liver) of morbid birds. These samples were directly streaked on Sabouraud dextrose agar plates for culturing and were incubated for 3 days at 37 °C. *Aspergillus fumigatus* was identified according to its specific colony characteristics, slides were also prepared for identification of mycelium and hyphae arrangement with lactophenol blue staining method (13).

Results

Clinical signs:

General clinical signs (ruffled feathers, green watery diarrhea and anorexia) and respiratory tract (gasping and dyspnea) referring to aspergillosis was observed (Fig.1).

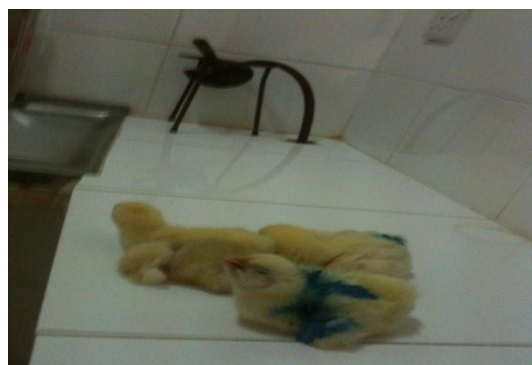


Fig.(1) chick shows signs of gasping and dyspnea

Gross lesions:

Necropsies of chicks which died revealed the presence of white-yellowish caseous nodules in the lungs, air sacs,

kidney, thoracic wall and abdominal serosa ranging from pin point to chickpea in size (Fig.2, 3, 4 and 5).



Fig.(2) white-yellowish caseous nodules in the lung

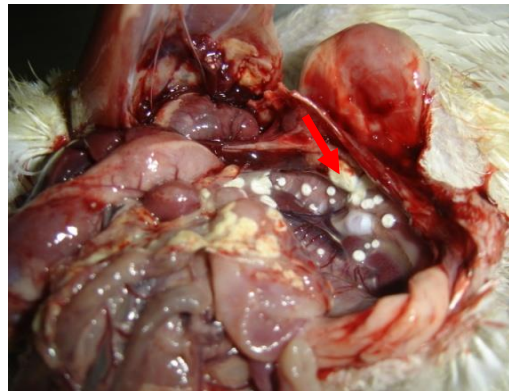


Fig. (3) white-yellowish caseous nodules on the air sacs

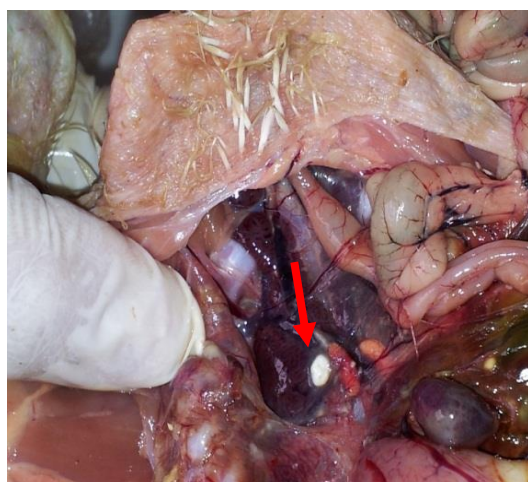


Fig.(4) white-yellowish caseous nodules in the kidney

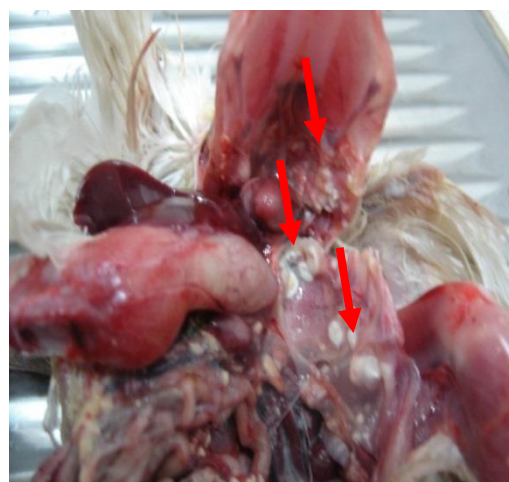


Fig.(5) white-yellowish caseous nodules on the thoracic wall and abdominal serosa

Histopathological lesions:

Histopathological examination of lungs revealed granulomas with eosinophilic necrotic centers surrounded by giant cells and scattered heterophils (Fig .6) *Aspergillus*

hyphae also were observed in stained sections prepared from lesioned organs by PAS staining procedure. Fungal spores and branched septate hyphae were observed in this direct microscopy (Fig.7).

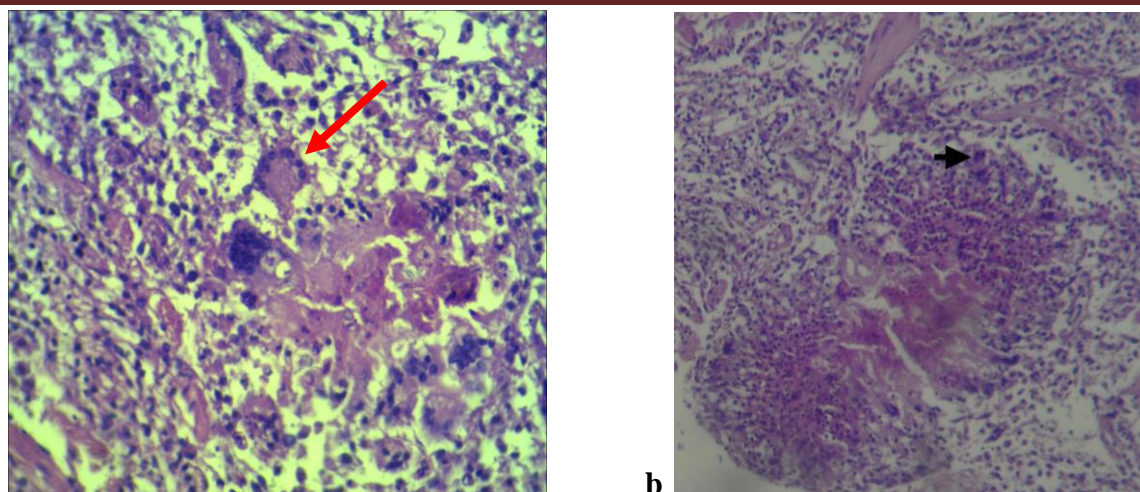


Fig.(6) Aspergillus granuloma with a central eosinophilic necrosis surrounded by foreign-body giant cells (a=H&E 100X), scattered heterophils(b=H&E 40X).

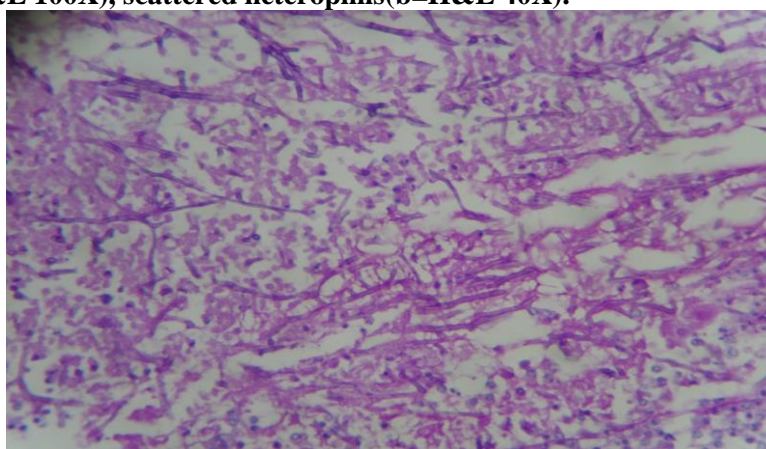


Fig.(7) Fungal spores and grown Hyphae could be observed among the inflammatory necrotic masses (PAS, 100X).

Cultural investigation:

On the third day post incubation, gross examination shows grey whitish colonies (Fig.8) and microscopic examination of

preparation made from these colonies revealed conidiophores with sphere-shaped or semispherical conidia (Fig.9).



Fig.(8) grey whitish colonies

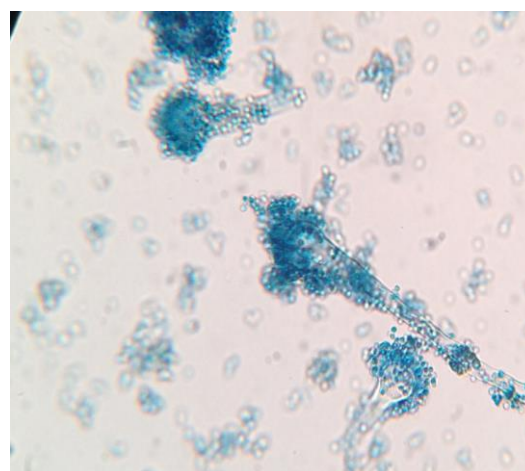


Fig.(9) conidiophores with sphere-shaped or semispherical conidia(Lactophenol cotton blue staining)

Discussion

Aspergillosis in commercial broiler was investigated based on clinical, pathological and cultural findings. The disease was diagnosed on the basis of clinical signs, necropsy findings, histopathological examinations and detection of etiological agent on selective media. Aspergillosis is a mycotic infection primarily of chickens. The age of infection to aspergillus in this study varied from flock to flock. However, birds with different age group are susceptible to aspergillus infection reported elsewhere (8). Clinical signs such as dyspnea, gasping, cyanosis, and hyperpnea are usually associated with aspergillosis (1). In the present study signs resembling respiratory

disease were observed. In the present study it was observed that the disease is occurring in young birds. This finding is also in agreement with those (14) and (15) who reported that aspergillosis with respect to age was high in younger ages. The lesions of granulomatous nodules are commonly confined to lungs and air sacs. Our result is in line with the finding of (1) and (8) who reported that lesions in birds are commonly confined to lungs and air sacs. Histopathological changes of lungs showed granulomas with eosinophilic necrotic centers surrounded by giant cells and scattered heterophils. These findings were described elsewhere (16).

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