Diagnosis of avian tuberculosis in a poultry farm in Wassit province (Case report)

S. K. Majeed  B. A. Al-Sereah  F. Z. Hamza
Coll. of Vet. Med./ Univ. of Basrah
email: Salehmajeed1940@yahoo.co.uk
(Received 30 September 2013, Accepted 30 October 2013)

Abstract
The study was aimed to investigate the pathological changes of avian tuberculosis in poultry farm in Wassit province in Iraq. A total of 500000 layer hens (Lohmen brown breed) over six month old were reared in a large poultry farm. In a chronic state the farm over a year reported periodic losses of birds mostly of breeding hens. From those affected birds with the chronic condition a fifty birds were selected and sacrificed for PM and histopathological examinations. The main pathological changes were found in the intestine, which include, the villi of small intestine looks like thickened, corrugate and filled with macrophages, a granulomatous inflammatory reaction was the main lesion in the small intestine while the large intestine (ceci) found with dilated mucus glands with macrophages in lamina propria. Secondary reactions were seen in liver, heart, and kidney. In the liver the lesions were congestion of blood vessels, periportal fibrosis, and bile duct proliferation. In heart a mass of aggregation of lymphocytes were found. The kidney of infected chickens showed dilated cortical tubules and mononuclear cell in cortical stroma. Through the study’s conclusion that the field has been contaminate and infected with the germ of avian tuberculosis.

Key words: Avian tuberculosis, small intestine, macrophages, lamina propria.

Introduction
Avian tuberculosis (ATBC) is an insidious, chronic and wasting disease with a worldwide distribution affecting all species of birds, domestic and wild animals (1). It was caused by *Mycobacterium avium* avium (MAA) of serotypes 1, 2 and 3 and genotype IS901+ and IS1245+ (2). In particular, the infection is a significant cause of morbidity and mortality in birds in zoos and breeding establishments (3). A part from this, MAA also causes zoonotic infections in humans as “avian mycobacteriosis” in immune-compromised patients and can lead to pneumonia, lymphadenitis, meningitis, miliary tuberculosis and generalized mycobacteriosis (4) and other forms of the
disease. All this means that the infection is an important one. Due to the fact that MAA is spread in large part by birds, it is difficult, if not impossible, to protect the host organism from exposure and the environment from contamination. Furthermore, MAA is not present in large scale-production hen farms which have introduced well and functioning production practice based on a system of “closed” technology and whose layers have a relatively “short-life”, not exceeding 12 months. The number of hen farms with (ecological agriculture) has increased in the Czech Republic and other European countries. In ecological farms, hens are usually kept at pasture for the production of so called (green eggs). This way of keeping hens increases the risk of hen contact with infected domestic and free living birds (5). MAA is generally transmitted by direct contact with infected birds, ingestion of contaminated feed or water and contact with a contaminated environment. Birds infected with MAA shed the organism via their feces and it can survive in environments for years (6), although the frequency of shedding is not known. The possibility that MAA might be transmitted through eggs from infected hens has long been considered. It has been demonstrated many times that some artificially inoculated eggs will hatch and that chicks from such eggs will be infected with MAA. However, in contrast to this, MAA has not been observed in many hundreds of chicks hatched from eggs of naturally infected hens (7). The aim of this study was investigate the pathological changes of tuberculosis on chicken at Wassit province.

Materials and methods

Fifty chronically sick birds were selected for diagnosis purposes from a large poultry farm in Wassit province have a total of 500000 layer hens (Lohmen brown breed) over six month aged. In a chronic state the farm over a year reported periodic losses of birds mostly of breeding hens. Birds were sacrificed for PM and histopathological examinations. Samples for histopathological examination were taken from visceral organs including, small and large intestine, liver, heart, and kidneys. Specimens were cut in a pieces of 2 to 3 cubic centimeters as transverse sections for intestine and transverse to oblique from liver and kidneys, samples were fixed in 10% phosphate buffered formalin for several days. Routine histological processes were done, and 5µm slides sections were stained by Haematoxylin and Eosin stain according to (8).

Results

The histopathological sections of different organs of diseased birds shows an evidence of infection with the avian tuberculosis which mainly evidence in small and large intestine with an secondary reactions in liver, heart and kidneys. The main pathological changes were found in the small intestine include, the villi looks like thickened and corrugated (Fig.1), and filled with macrophages (Fig. 2,3,4).

![Intestine with thickened corrugated villi filled with foamy macrophages](H&E. stain X4)

Fig. (1): Intestine with thickened corrugated villi filled with foamy macrophages (H&E. stain X4).

![Intestine villi filled with infected macrophages](H&E. stain X10)

Fig. (2): Intestine villi filled with infected macrophages (H&E. stain X10).
The granulomatous inflammatory reaction was seen the main lesion in the small intestine, while the large intestine (ceci) found with dilated mucus glands (Fig.5) with macrophages in lamina propria (Fig.6). In the liver the lesions were seen as a periportal fibrosis (Fig.7), further to congestion of blood vessels and bile duct proliferation (Fig.8). In heart a mass of aggregation of lymphocytes were found (Fig.9). The kidneys show dilated cortical tubules and mononuclear cell infiltration in the cortical stroma (Fig.10).
Discussion

Avian tuberculosis is usually caused by the bacterium *M. avium*. At least 20 different types of *M. avium* have been identified, only three of which are known to cause disease in birds. Other types of Mycobacterium rarely cause tuberculosis in most avian species; however, parrots, macaws, and other large perching birds are susceptible to human and bovine types of tuberculosis bacilli (9). Study of this incidence agreed with mostly the literature and reference on avian tuberculosis especially that the disease was chronic in character with periodic losses, drop in egg production and loss of body weight, all the above indicated that the disease is chronic in nature and agree with the symptom of such a disease as avian tuberculosis (10). Histopathological examination was associated with presence of foamy macrophages (due to wax and lipid materials in the wall of mycobacterium of avian tuberculosis) replacing the lamina propria of small intestine and extending to large intestine giving rise to thickening and corrugation of the villi of small intestine, which result in disturbance with nutrient absorption resulting in loss of body weight and drop of egg production (7),(11). The granulomatous inflammatory reaction caused by mycobacterium paratuberculosis, characterized by presence of foamy macrophages in the target organs, which is small intestine and even extent to large intestine, associated with tubular of macrophages in visceral organs such as liver, also, the foamy macrophages contain lipid of the wall of the ingested mycobacterium (10). In most cases, infected birds show no clinical signs, but they may eventually become lethargic and emaciated. Many affected birds show diarrhea and comb and wattles may regress and become pale. Affected birds are usually older than one year. Some show respiratory signs and sudden death may occur, dyspnea is less common, and granulomatous ocular lesions (12) and skin lesions have been reported. Under intensive husbandry conditions, sudden death may occur, often associated with severe lesions in the liver; such lesions are easily observed at post-mortem examination (13). Avian tuberculosis and paratuberculosis caused mostly cellular immunity due to activation of thymus dependent lymphocytes with enlarged paracortical regions in lymph nodes and lymphatic tissue of arterial sheath in spleen (10). In most species of affected bird, tuberculous-like lesions are mostly found in the intestinal tract, liver and spleen. Lesions in other organs are less common. Exceptions include pigeons, waterfowl, and some finches, in which the disease begins primarily in the respiratory tract (14). Recently incidence of avian tuberculosis reported in Aids patients, due to opportunist infection by avian mycobacterium bacilli, as those patients with reduced cellular immunity (11). Through the study's conclusion unique outbreak of avian tuberculosis were characterized clinically by emaciation, poor
egg production, postmortem findings mainly restricted to small intestine associated with enlarged corrugated intestine, histopathologically and microscopically showed masses of mononuclear/phagocytic macrophages occupying the lamina propria resulting in replacing of vital components of lamina propria and causing thickened mucosa. Presence of tuberculous granulomatous inflammatory reaction of mostly phagocytic macrophages filling the intestinal lamina propria would cause malabsorption and disturbed function of the small intestine giving rise to poor condition of the birds associated with loss of weight and reduced egg production.

References