Spirochetosis (borreliosis)

Borrelia anserina causes a tick-borne, non-relapsing borreliosis (spirochetosis) in avian species including **chickens, turkeys, pheasants, geese, and ducks.**

Mortality :-

The disease is usually an acute septicaemia characterized by variable morbidity and high mortality, but may also be mild when birds are infected with low virulent strains .

Birds also can develop asymptomatic infections with *B. burgdorferi*, the cause of Lyme disease in people, and serve as hosts for ticks capable of spreading the spirochete to mammals .

Method of Spread:-

- **Rodents .**
- **fowl ticks in the genus *Argas perscus* .**
- (mosquitoes, mites)
- cannibalism, scavenging on carcasses.
- multiple use of syringes and needles, or ingestion of infective blood, droppings, or infected ticks**.**
- **Virulent strains are capable of penetrating unbroken skin**
- Recovered birds are not carriers; organisms disappear from tissues .

Etiology :-

Borrelia anserina is a highly motile, helical bacterium , that stains well with aniline dyes, Romanowsky-type stains, and silver impregnation.

Spirochetes can be readily identified in wet smears of blood or tissues by dark-field or phase microscopy .

Clinical signs :-

- **cyanosis** or pallor of the comb and wattles.
- ruffled feathers, **dehydration**, inactivity, and **anorexia**.
- There is a marked **elevation in body temperature** that begins shortly after infection and a rapid loss of body weight.
- Affected birds pass fluid, **green droppings containing excess bile and urates, and have increased water consumption.** Late in the disease, birds develop **paresis or paralysis**, become **anemic** , and are **somnolent to comatose**.
- weakness or paralysis of one or both limbs .
- Infection with low virulent strains may be mild or inapparent .

Grossly :-

- Marked enlargement and mottling of the spleen is typical of spirochetosis .
- Livers often are enlarged and contain small hemorrhages, pale foci, or marginal infarcts. Kidneys are swollen and pale with excess urates distending the ureters.
- Green, mucoid intestinal contents are usually present, and there often are variable amounts of hemorrhage, especially at the proventriculus-ventriculus junction.
- Fibrinous pericarditis occurs infrequently.
- Extensive haemorrhage and muscle necrosis have been reported in naturally infected pheasants.

Microscopically:-

Splenic lesions result from macrophage and lymphoid hyperplasia, erythrophagocytosis, and hemosiderin deposition. Multifocal necrosis and hyalinization of white pulp and/or extensive hemorrhage may be present in some birds.

Diagnosis:-

- Clinically and grosly with Larval ticks on the birds, evidence of tick bites.
- The disease is confirmed by demonstrating *B. anserina* or its antigens in affected birds
- Dark-field microscopy is the method of choice for identifying spirochetes in blood .

Treatment :-

most antibiotics, including penicillin, chloramphenicol, kanamycin, streptomycin, tylosin, and tetracyclines, are effective in treating infected birds. Intramuscular injections of penicillin at 20,000 IU/bird given three times in 24 hr or 20 mg oxytetracycline given daily for two days represent current treatment regimens . Active immunity follows recovery or immunization by vaccination .

Preventing fowl tick infestation is the best method to control spirochetosis in endemic areas. Young chickens in dense poultry areas during the summer were more likely to be infested with fowl ticks .Adult ticks can remain alive without feeding and carry the spirochete for as long as 3 years.

Tuberculosis of poultry

often termed avian mycobacteriosis, avian tuberculosis, avian TB or TB, is a contagious disease caused by *Mycobacterium avium*. Avian tuberculosis is a chronic infection. tuberculosis still occurs sporadically in backyard poultry and game birds, and it remains an important problem in captive exotic birds.

Public Health Significance

M. avium was responsible for a tuberculous infection in humans. In the United States, the first case of avian tuberculosis in humans was published in1930 . the organism most frequently isolated from chickens, is rarely isolated from humans.

Etiology

The most common cause of avian tuberculosis in chickens in the United States is *M. avium* serovars 1 and 2, In Europe, *M. avium* serovar 3 has been isolated from wild birds *M. avium*

grows at temperatures ranging from 25–45°C, although the most favorable temperature range is 39–45°C. *M. avium* is aerobic. However, for primary isolation, growth is enhanced by an atmosphere of 5–10% carbon dioxide . Special media designed for culturing tubercle bacilli is desirable for isolation from field materials. **Colonies are larger if the medium contains glycerin.**

Transmission:-

The tremendous number of tubercle bacilli exuded from ulcerated tuberculous lesions of the intestine in poultry creates a constant source of virulent bacteria.

The respiratory tract is also a potential source of infection, especially if lesions occur in tracheal and bronchial mucosa.

The contaminated environment, especially soil and litter, is the most important source for the transmission of the bacilli to uninfected animals.

M. avium has been isolated from eggs of naturally infected chickens, but hatched chicks failed to develop avian tuberculosis.

Clinical Signs

- Fatigue and depressed birds .
- **Although appetite usually remains good**
- loss of weight (atrophy of breast muscles with a prominent keel. the body fat eventually disappears
- **and the face of the affected bird appears smaller than normal.**

- Feathers assume a dull and ruffled appearance. Comb, wattle, and earlobes often appear pale and thinner than normal and have a dry epidermis. Occasionally, the comb and wattles have a bluish discoloration. Icterus, indicative of advanced hepatic damage, may be noted.
- the bird reveals a unilateral lameness .

Grossly :-

Lesions of avian tuberculosis in chickens are characterized by pinpoint to several centimeter, irregular grayish yellow or grayish white nodules.

(Lesions are seen most frequently in liver, spleen, intestines, and bone marrow. Some organs, such as heart, ovaries, testes, and skin, are affected infrequently and cannot be considered organs of predilection. For turkeys, ducks, and pigeons, lesions predominate in the liver and spleen but occur also in many other organs) .

With advanced emaciation, nodular masses can be palpated along the intestine the hepatomegaly that many tuberculous birds possess may make this procedure difficult or impossible. Intestinal nodules may be ulcerative, resulting in severe diarrhea. Affected birds may die within a few months or live for many, depending on severity or extent of the disease. A bird may die suddenly as a consequence of hemorrhage from the rupture of the affected liver or spleen.

Involvement of liver and spleen results in enlargement, which can result in fatal hemorrhage from rupture. Large nodules have an irregular knobby contour, with smaller nodules present over the capsular surface of affected organs.

Diagnosis

A presumptive diagnosis of avian tuberculosis in fowl usually can be made based on gross lesions , Demonstration of acid fast bacilli in smears or histologic sections of liver, spleen, or

other organs .

Differential Diagnosis

These include coligranulomas (Hjarre's disease),

pullorum disease, other *Salmonella* infections

Staphylococcus infection

fowl cholera.

aspergillosis, and neoplasia (marek's disease) .

Presence of numerous acid-fast bacilli in lesions is significant. When available, culture and identification of *M. avium* is helpful but not essential for a diagnosis.

Tuberculin Test

The technique involves intradermal injection of the wattle with 0.03–0.05 mL of a U.S. Department of Agriculture (USDA) supplied purified protein derivative tuberculin prepared

from *M. avium* in a manner previously described .The injection site then is monitored for a reaction. A more complete methodology and interpretation has been reported elsewhere

Tuberculin testing in poultry may reveal a false-negative result twice during the course of infection: once during early infection and again during late infection, when there is immune

system exhaustion or anergy. **This test is also unreliable in some bird species .**

Treatment:-

Treatment with antituberculosis drugs is impractical and is rarely done to treat domestic backyard poultry. However, combinations of antituberculosis drugs have been used to treat certain exotic birds maintained in captivity . combination of isoniazid (30mg/kg), ethambutol (30 mg/kg), and rifampicin (45 mg/kg). The recommended duration of therapy was 18 months, provided that there were no adverse side effects. Additional investigations are needed to develop suitable regimens for the treatment of tuberculosis in various exotic birds.