Diseases caused by Escherichia infection

Escherichia coli is a common member of the normal flora of the large intestine. They are gram negative rod. shaped bacteria, which colonize the intestine shortly after birth. These bacteria remain benign as long as they do not acquire genetic element encoding virulence. Strain that acquire bacteriophage or plasmid DNA encoding enterotoxins or invasion factors become virulent and can cause either watery diarrhea, or an inflammatory dysentery. The Escherichiae include many primary pathogens of importance to domestic animals characterized by enteric diseases. Three groups of E coli are associated with diarrheal diseases. E coli strains that produce enterotoxins are called enterotoxogenic E coli. Second group of E coli strains has invasive factors and cause tissue damage and inflammation. The third group called entero. pathogenic and associated with outbreak of diarrhea in newborn but not produce any recognizable toxin or invasive factors.

1. Colibacillosis

It is an acute disease (mainly of young animals) caused by E. coli

Rout of infection and pathogenesis

The disease is seen in animals and human especially calves, piglet, lamb and foals. The infection mainly occurs through ingestion of contaminated food or water. Under certain condition (feeding error, bad management, crowding, the animals not tack colostrum and bad weather) the E coli acquired the virulence and enterotoxins factors and becomes pathogenic.

A. Enterotoxic Colibacillosis

The disease is the most common colibacillosis in animals. It is common in calves and lambs. The disease is contracted orally by ingestion of food and water contaminated with a pathogenic strain shed by an infected animal. The pathogenesis of diarrhea includes two steps: intestinal colonization followed by elaboration of enterotoxins. The microorganisms come in contact and adhere with the microvilli and produce potent enterotoxins. The toxin stimulates the increase

cellular secretion by activation of adenylate cyclase. Moreover, the enterotoxin activates guanylate cyclase, which increase secretion of fluid from the intestinal mucosa, leading to diarrhea, dehydration and death.

B. Enterotoxemic Colibacillosis

it is observed in calves and swine due to proliferation of E. coli in the intestine with production of neurotoxin leading to vascular damage and non inflammatory edema in gastric, colonic, subcutaneous and central nervous system.

C. *Local invasive Colibacillosis:-* The enteric E coli penetrate and destroy the epithelial lining and producing dysentery.

D. *Septic colibacillosis*

The affected animals show polyserositis, arthritis, meningitis and pyelonephritis due to endotoxins produced by E coli, which invade the animal through digestive and respiratory systems, pharynx or umbilicus.

*****Actionbacillosis (Woody tongue)**

It is a chronic granulomatous disease of deeper structure of tongue, oral cavity and adjacent lymph nodes of cattle, small ruminants, horse and man. The disease is characterized by formation of fibrous tissue with chronic suppuration.

Cause :- Actinobacillus ligniersii is a small non. motile gram negative bacillus.

Pathogenesis

The organism affects the soft structures and spread through lymphatic to regional lymph nodes. Infection occurs in soft tissue more than bone. Infection occurs through wound infection caused by sharp object like awns. The organism initiates granulomatous inflammation around it beside

diffuse fibrosis leading to enlarged firm tongue (woody tongue). The presence of eosinophilic clubs is due to combination of the product of host reaction and invading organisms

Signs

The tongue may be enlarged and protruded from the mouth

Moreover, anorexia, salivation and abnormal position of tongue are seen. The affected lymph nodes are enlarged.

Lesions

The tongue is the most affected organ besides neighboring lymph nodes of head, gum, palate and pharynx. The tongue is enlarged hard in consistency beside glistening cut surface (woody tongue). Circular or irregular granuloma of about 5cm in size of white, gray or yellowish whites colors and firm in consistency display the normal structure are seen. In cut section, irregular yellowish granules of 2. 3mm in diameter called sulfur granules are seen. Lesions may be found in the wall of forestomach, skin, liver and lungs.

Microscopically, the granulomata consist of gram negative bacilli in the center surrounded by palisade eosinophilic club shaped structure (Indian club) appearing as rosette

The radiating clubs followed by layer of neutrophils surrounded by epithelioid cells and finally fibrous connective tissue.

*****Actinomycosis (Lumpy jaw)**

It is a chronic infectious suppurative granulomatous disease of cattle , but many species may be infected under natural infection. It is characterized by hard , irregular chronic focal suppurative inflammation in the mandible and maxilla.

Cause :- Actinomyces bovis, a gram. positive rod shaped anaerobe microorganism

Route of infection :- The infection occurs through wound infection caused by sharp pieces of feed or foreign material. The organism is commonly present in the mouth cavity

Pathogenesis :- Microorganisms gain entry through wound infection caused by sharp object. The microorganisms have affinity toward the hard tissue. The organism initiates granulomatous inflammation around. The presence of eosinophilic clubs is due to combination of the product of host reaction and invading organisms.

If an alveolar periostitis occurs, the infection can easily be transported by the venous or lymphatic circulation, probably within the cytoplasm of the macrophages, into the bone marrow or it may invade the bone marrow by direct contact.

Generalized disease involved hard tissue is recorded in dog.

Lesions:- Hard irregular enlargement of the mandibular and maxillary bones, which give the disease it common name (lumpy jaw) is seen

Enlarged and honeycombed bone is due to destructive rarefaction and regenerative process.

The cut surface is white and glistening results from diffuse fibrous tissue proliferation in which small abscesses is embedded. Sinus tracts may be drainage through skin or oral cavity, yellowish pus containing hard in masses called sulfur granules. Similar lesions may be seen in lungs and lymph nodes.

Microscopically, early lesion shows acute suppurative inflammation with the accumulation of neutrophils . Later on, macrophages, lymphocytes, fibroblasts, and later giant cells appear in the area forming The classic lesion in this case consists of centrally located eosinophilic bacterial colonies surrounded by radiating brightly eosinophilic short clubs

A large number of neutrophils and epithelioid cells followed by layers of giant cells, lymphocytes and plasma cells. Finally the lesion is encircled by thick dense zone of mature fibrous connective tissue. The colonies may become calcified and stained blue.