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PATHOLOGICAL STUDIES ON DISEASES CAUSING ENTERITIS IN CATTLE AND BUFFALOES

BY

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VI. Conclusion & Summary

In this study some enteritis causes in cattle and buffaloes were detected. A total of 100 animals (39 cattle and 61 buffaloes) of different ages, sexes and breeds were examined during a period of 25 months from March 2014 to April 2016. The survey included either necropsied recently died cattle at dairy farms of Dakahlia province with a history of enteritis and diarrhea or those slaughtered at the regional slaughter houses and showed lesions of enteritis. Ages of the animals ranged from 1 day up to 6 years. Out of one hundred cattle affected with enteritis, 65 cases (65%) revealed bacterial infection (7 cases of them caused by MAP and 58 cases caused by other bacteria). 19 animals were infected by mixed bacteria. Infection *with E.coli + proteus* was found in 12 cases (12%), *E.coli + klebsiella* was found in 4 cases (4%) and *E.coli + salmonella* was found in 3 cases (3%), 1 case (1%) showed viral infection and the remaining 34 cases (34%) revealed parasitic and protozoal infestation. Tissue specimens were collected from small intestine and mesenteric lymph nodes of slaughtered and necropsied cattle and buffalo showing gross lesion of enteritis and lymphadenitis. Each tissue specimen was divided into two portions. The first portion was immediately fixed in 10% neutral buffered formalin for histopathological examination. The second portion was held at -4 °C for bacterial isolation to identify the causative agents. Blood samples were collected from suspected cattle to be infected with john's disease to be examined by ELISA for detection of antibodies against MAP.

The main gross and microscopic lesions of the detected bacteria were summarized Table lesion seen in **MAP** infection were intestinal mucosa thickening and folding into transverse rugae which did not disappear when the intestinal wall was stretched. The mesenteric lymph nodes were enlarged, congested and edematous. While, microscopically in all examined animals the intestinal mucosa and submucosa showed signs of granulomatous enteritis with

marked cellular infiltrations. By using ZN stain, acid-fast rods were seen scattered within the cytoplasm of the macrophages. Mesenteric lymph nodes revealed multifocal to coalescing areas of histiocytic granulomas that can replace much of the cortex and infiltrate the medullary sinuses.

In cases of ***salmonella*** **infection** the main gross lesions seen were thickening of the intestinal wall with presence of edema. The mucosa particularly of the ileum and colon was hyperemic and covered with yellow-grey necrotic materials which when removed leave underlying surface of ulceration. The mesenteric lymph nodes were also enlarged, congested and edematous. Microscopically, the intestinal mucosa exhibited congested blood vessels and villous atrophy characterized by blunting and fusion of villi, extensive necrosis of the surface epithelium of villi and exfoliation in the intestinal lumen admixed with minute hemorrhages, fibrin and variable numbers of neutrophils, macrophages, and lymphocytes. Multifocally, erosions and ulcers of the mucosa overlying the Peyer's patches were also detected.

In cases of ***E. coli*** **infection** the gross lesions detected were classified according to the ages of infected cases into two categories cases infected with *E.coli* and less than 3 weeks old and cases more than 3 weeks old. The main gross lesions observed were small intestine dilation, flaccidity, and filling with yellow fluid**.** The intestinal wall was thickened and edematous; and the mucosa was hyperemic, and exhibited petechiae on the surface. In severe cases mainly in animals more than 3 weeks old, the wall was hemorrhagic; and the mucosa was covered by yellow necrotic fibrinous membrane. The mesenteric lymph nodes were enlarged, congested and edematous. Microscopically, the intestine showed marked congestion of mucosal blood vessels. The lamina propria was expanded by large number of inflammatory cells. The intestinal villi were mildly atrophied. Crypts were elongated and showed proliferation of lining epithelium.

Multifocally, there were also small areas of hemorrhages in the mucosa. The submucosa was markedly expanded by edema and congested blood vessels.

In **mixed bacterial infection** the similar macroscopic and microscopic lesions were noticed as in *E. coli and* salmonella infection with different severity.

The cases with ***Cl. perfringens*** infection showed thickened necrotic and hemorrhagic intestinal wall. The mucosa was hyperemic, with hemorrhagic areas covered by hemorrhagic fibrinonecrotic membrane. Blood clots and hemorrhagic exudate was occasionally occluding the intestinal lumen. The mesenteric lymph nodes were enlarged, hemorrhagic and edematous. Microscopically the intestine showed marked diffuse, coagulative necrosis in intestinal villi**.** Multifocal loss of villi and crypts was seen, and lamina propria was multifocally denuded. The lamina propria was expanded by large number of inflammatory cells.

On other hand, in **BVD infection** the main lesions demonstrated were thickened, and congested intestinal mucosa, with occasional focal areas of hemorrhages. The mesenteric lymph nodes were also enlarged, congested, and edematous. Microscopically the intestinal mucosa exhibited moderate destruction of the epithelial lining of the crypts of Lieberkühn with presence of necrotic debris and desquamated epithelium in the crypt lumen, also other crypts revealed hyperplasia and hypertrophy of lining epithelium. Occasionally, affected crypts were dilated and contained mucus, epithelial debris, or hyperplastic epithelial cells. Multifocal areas of hemorrhages were seen among the crypts. There were also extensive destruction of crypts and villi which replaced by cellular debris admixed with large numbers of inflammatory cells and erythrocytes. Multifocally, the lamina propria was markedly expanded by aggregates of mononuclear inflammatory cells. The submucosa showed marked congestion of blood vessels and herniation of few numbers of crypts into the

submucosal space. The mesenteric lymph node showed marked edema and mononuclear inflammatory cells infiltrates of medullary sinuses, with lymphoid depletion.

In *Eimeria* spp. infection the detected gross lesions were observed in the small intestine, large intestine, and cecum. The intestinal mucosa of the small and large intestine was thickened, congested and edematous. The mesenteric lymph nodes were also enlarged, congested, and edematous. Microscopically the intestinal mucosa showed congested blood vessels and the lamina propria was moderately infiltrated with mixed inflammatory cells. Multifocally, the lining epithelium of intestinal villi and crypts of Lieberkühn were markedly distorted by abundant intracellular *Eimeria* spp. in varying stages of development in the enterocytes. Occasionally, most enterocytes were parasitized by gametes

In *Cryptosporidia* infected cases the gross lesions were observed in the small intestine, large intestine, and cecum. The intestinal mucosa of the small and large intestine was thickened, congested and edematous. The mesenteric lymph nodes were also enlarged, congested, and edematous. Microscopically, the intestinal mucosa exhibited moderate villous atrophy characterized by blunting and fusion of villi. Meanwhile, crypts of Lieberkühn revealed hyperplasia and hypertrophy of lining epithelium. Occasionally, crypt abscesses were seen. Variable numbers of amphophilic to basophilic; round cryptosporidium protozoa were seen in the microvillus border of cells on the villi.

***T. vitlorum* infected cases** revealed focally thickened intestinal wall and hyperemic mucosa. The intestinal lumen was obstructed by adult roundworms. The mesenteric lymph nodes were enlarged and edematous. Microscopically, adult *T. vitlorum* in intestinal lumen had a smooth cuticle, coelomyarian musculature, intestinal and reproductive tracts within a pseudocoelom. The small intestinal villi were fused and blunted or had diffuse coagulative necrosis. In some cases the intestinal villi were lost

It was concluded that the lesions of Johne’s disease and the lesions of other detected diseases causing enteritis in these study were serious. These lesions affected the animal health and subsequently affected the animal production and the economic outcome of animal breeding. These findings emphasize the importance of careful histopathological examination of the intestines and mesenteric lymph nodes for the diagnosis of some enteric diseases as john's disease. Further studies are recommended for investigation of methods for diseases control and prevention. Moreover, the control and prevention programs should be initiated in Egypt to minimize the economic losses.

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