

Case Report of Meningoencephalitis in Calves Caused by *Escherichia coli*

Case Report

Gholami¹, M R., Ezzi, A.,¹ Hablolvarid, M.H.¹ and Khaki, P.²

1. Pathology Dept., Razi Vaccine & Serum Research Institute,

P.O.Box 11365-1558, Tehran, Iran

2. Microbiology Dept., Razi Institute

Received 5 Aug 2002; accepted 15 Nov 2002

Colibacillosis is one of the most common diseases of new born farm animal caused by *Escherichia coli* (*E.coli*). In dairy calves the morbidity and mortality rates raised under intensified condition. The morbidity is usually 30% but may reach to 75%. Case fatality varies from 10% to 50% The population mortality rate in calves can vary from a low of 3% in well managed herds to high of 60% in herds without management practice (Radostit *et al* 1994, Hall 1985, Burner & Gillespie 1973).

There are two different types of the disease, enterotoxigenic and septicemic. Enterotoxigenic strains of *E.coli* possess to ability to colonize in upper parts of small intestine and to produce enterotoxins, which cause diarrhea and dehydration (Linterman 1988, Girardeau *et al* 1988, Levine 1987). Most strain of septicemic form belong to certain serogroups and they have special virulence, and invading the tissues and systemic circulation via the intestinal lumen, nasopharyngeal mucosae and tonsillar crypts or umbilical vessels to induce tissues damage in some organs and causes hepatitis, arthritis, peritonitis, pericarditis, pneumonia, nephritis, white spotted kidney (cortical abscesses) and meningoencephalitis (Jubb *et al* 1985, Goldberg 1994). Some bacteria such as *E.coli*, streptococcus, salmonella and pasteuria sporadically may infect the central nervous system. Some times the

Author for correspondence.

infectious may acquired prenatally and onset is usually with in a few days of birth up to 2 weeks, the portal entry of bacteria can be oral, interauterine and umbilical (Stephens *et al* 1981, Thomson 2001).

In this paper meningoencephalitis due to *E. coli* in calves was discussed.

Case history

One hundred cases of calves with clinical history of fever, diarrhea, dehydration and some of them with fibrinous artheritis, serosities, opistotonus, convolsion and tremore were necropsied. Whole brain removed from the skull and fixed in 10% formalin. After processing the tissues, 5 μ sections from different parts of brain prepared and stained with hematoxiline and eosine (H&E) and Gram methods. Specimens from bone marrow, blood and brain were cultured on blood agar and Eosine Methilen Blue agar. The plates were incubated at 37°C for 24-48h in aerobic condition. Suspected colonies were differentiated by biochemical tests.

E. coli was isolated from bone marrow and blood of 80 cases. The bacterium was also isolated from 3 calves with age around 2 weeks and with clinical history of incoordination, head deviation artheritis, ataxia recumbency and high fever (42°C). 17 cases were negative. Gross lesions of brain include hyperhemia of meningial blood vessels and opacity of meninges due to presence of purulent exudate. The volume of cerebrospinal fluid was increased. Microscopy fibrinous leptomenigitis with neutrophile infiltration, engorgment of vessels and hemorrhages were noted (Figures 1,2). In brain mostly in cerebrum, areas of disseminated malacia with neutrophile infiltration and neuronal necrosis, congestion of vessels, hemorrhages, perivascular-cuffing (P.V.C) with neutrophile infiltration were prominent (Figures 3,4). Special Gram staining of affected areas colonies of gram-negative bacteria were seen in some blood vessels and brain tissues (Figures 5,6).

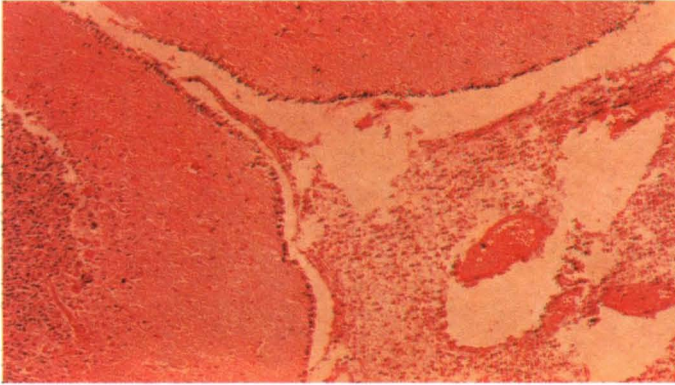


Figure 1. *Meningitis with neutrophile infiltration (H&E)×100*

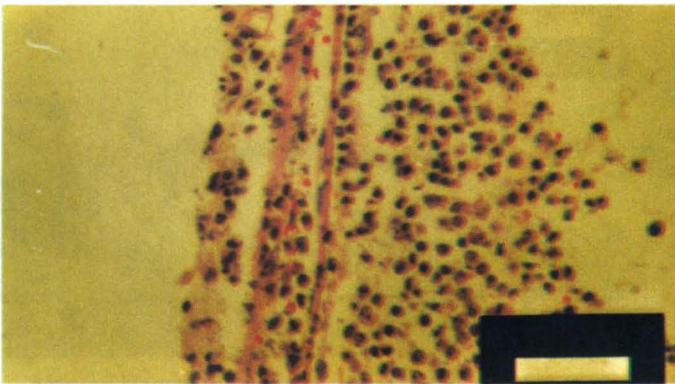


Figure 2. *Neutrophile infiltration in meninges (H&E)×400*

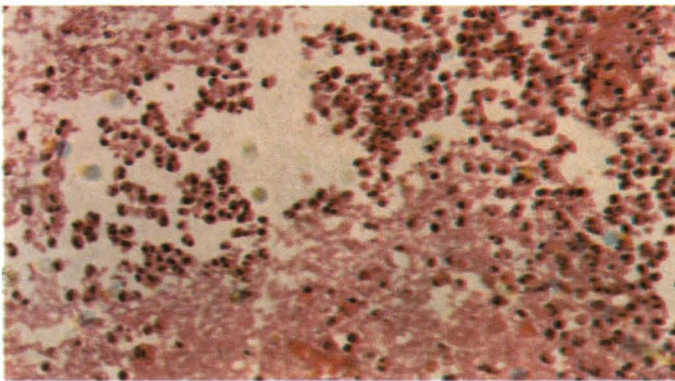


Figure 3. *Necrosis and neutrophile infiltration in brain tissues (H&E)×200*

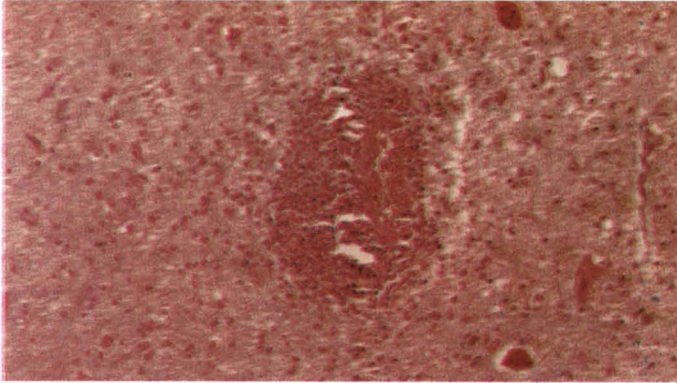


Figure 4. *P.V.C with neutrophil infiltration in brain tissues (H&E)×200*



Figure 5. *Emboli of bacteria in leptomenigeal vessels (Gram stain)×1000*

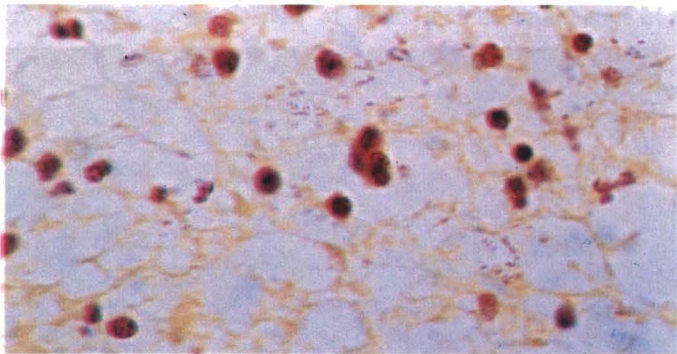


Figure 6. *E.coli bacteria in necrotic areas of brain tissues (Gram stain)×1000*

References

Burner, D.W., Gillespie, J.H. (1973). *Hagan Infectious Disease of Domestic Animals*. (6 edn.). Cornell University Press.

Girardeau, J.P., Girardeau, J.P., Der Vartanian, M. , Luc Ollier, J. and Contrepois, M. (1988) Cs31A, a new k88-related fimbrial antigen on bovine enterotoxigenic and septicemic *Escherichia coli* strains. *Infection & Immunity* 56:2180-2188.

Goldberg, S.A. (1994). Acute exudative meningoencephalitis in domestic animal. *Cornell Veterinary Journal* 11:192-194.

Hall, G.A., Reynolds, D.J., Chanter, N., Morgan, J.H. and Parsons, K.R. (1985). Dysentery caused by *Escherichia coli* in calves: Natural and experimental disease. *Veterinary Pathology* 22:156-163.

Jubb, K.V.F, Kenedy, P.C. and Palmer, N. (1985). *Pathology of Domestic Animal*. Academic Press, London.

Levine, M.M. (1987). *Escherichia coli* that cause diarrhoea enterotoxigenic, enteropathogenic, enteroinvasive, enterohemorrhagic and enteroadherent. *Journal of Infectious Disease* 155:377-389.

Linterman, P.F. (1988). Characterization and purification of the F17-adhesion on the surface of bovine enteropathogenic and septicemic *Escherichia coli*. *American Journal of Veterinary Research* 49:1794-1798.

Radostit, O.M., Blood, D.C. and Gay, C.C. (1994). *Veterinary Medicine*. (18th edn.). Bailliere Yindall, London.

Stephens, L.R. (1981). Infection thrombo embolic meningoencephalitis in cattle a review. *Journal of American Veterinary Medical Association* 178:378.

Thomson, S. (2001). *Special Veterinary Pathology*. (3rd edn.), Mosby, London.