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Case Study

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Microbiological and Histopathological Investigation of Calf Meningitis Caused by *Escherichia coli*

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A B S T R A C T

Escherichia coli is normal inhabitant of intestine of animals *E. coli* strains cause a wide variety of intestinal and extra intestinal diseases such as diarrhoea, urinary tract Infection, septicemia, and meningitis in neonates. Bacterial meningitis is often seen in neonatal calves as a sequele of septicemia caused by *E. coli* with multiple body system and organ involvement. Series of 32 calves of meningitis in neonatal calves, the post frequent clinical findings were lethargy, recumbancy, loss of suck reflex, stupper and comma. The present study was designed to record the incidence and confirm the calf meningitis caused by *E. coli* in a calf.

Introduction

Escherichia coli is normal inhabitant of intestine of animals *E. coli* strains cause a wide variety of intestinal and extra intestinal diseases such as diarrhoea, urinary tract infection, septicemia, and meningitis in neonates (Bigen *et al.*, 1996). Bacterial meningitis is often seen in neonatal calves as a sequele of septicemia caused by *E. coli* with multiple body system and organ involvement. (MERKS and Co). *E. coli* invades the blood stream of infants from nasopharynx or G.I tract and are carried to meninges in calf, (Kenneth Tador, 2002) cases survived from septicemic state showed the clinical evidence of post localization as arthritis, meningitis, panopthalmitis and pneumonia. The present study was designed to record the incidence and confirm the calf meningitis caused by *E. coli* in a calf.

Materials and Methods

On post mortem examination, swab from brain was collected and cultured using Nutrient broth. The organisms from broth were streaked on Nutrient agar, MacConkys agar, Blood agar for studying the cultural characteristics. Isolates were subjected to microscopic examination using gram staining method. Further isolates were subjected to biochemical and sugar fermentation test for identification of bacteria. Antibiotic sensitivity test was carried out on Muller Hinton agar as per the standard method described by Cruickshank *et.al*. 1997. Tissue of different areas of brain were collected and preserved in 10% formal saline, paraffin embedded tissues were sectioned at 3-4 micron thickness and stained by routine

Hematoxylene and Eosin method (Culling,1974).

Results and Discussion

The clinical signs were tremors, convulsions, depression, ataxia, recumbancy, lethargy and loss of suck reflex. Similar findings were recorded by Green and Smith, (1992). Clinical parameters like increased body temperature (103.6 F), respiration rate (30/min), heart rate (96/min) tachycardia were recorded. The calf was died at TVCC, Udgir. After post mortem examination the clinical material collected was subjected to bacteriological analysis. The microscopic examination revealed small gram negative rods (Fig. 1). The colony characteristics on Nutrient agar appeared to be white to yellowish, opaque, glistening moist, small and circular colonies whereas on MacConkys agar lactose fermenting pink red coloured glistening colonies were seen and on sheep blood agar zone of haemolysis was seen.

The isolates were subjected to the biochemical and sugar fermentation test. The isolates fermented lactose, fructose, maltose, dextrose, mannitol and dextrin by producing acid as well as gas (Elefthenios, 2006). Starch and cellulose were not fermented. The isolates were indol positive, Methyl red positive and Voges Prousker and Citrate negative. The isolates were confirmed to be *E. coli*. The present study correlates with the findings of Rodotits *et al.*, (2000). The antibiotic sensitivity pattern revealed the sensitivity to chloramphenicol, gentamicin and enrofloxacin.

Whereas the isolates were resistance to amoxicillin, cloxacillin, amicacin, ceftriaxoane, cefadroxile, ciprofloxacine and oxytetracyclin.

Fig.1 Microphotograph of *E. coli* isolated from the brain tissue of calf meningitis

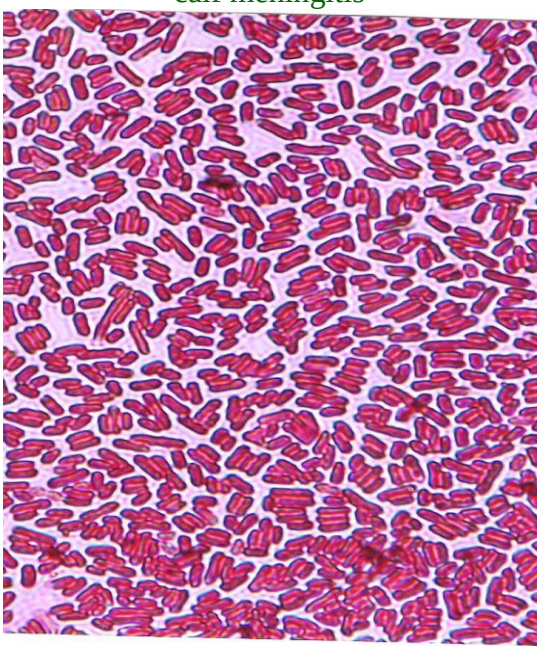
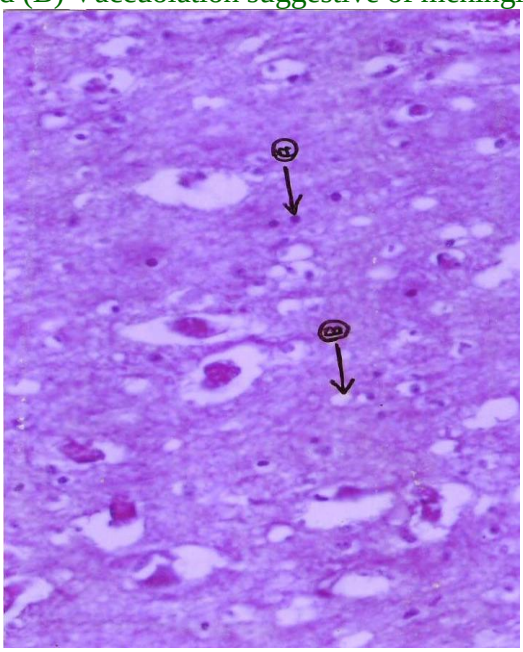


Fig.2 Histopathological micrograph of brain tissue showing (A) Mononuclear Infiltration and (B) Vaccuolation suggestive of meningitis



The present findings confirm that the *E. coli* is the causative agent of meningitis in calf, similar findings were recorded by Rodotits *et.al*. (2000).

Microscopic observations of H and E stained section revealed that diffused, degenerative, necrotic and necrobiotic changes in neuron (Fig. 2). Most of the neurons were completely disappeared in the section leaving empty spaces, the characteristics changes such as condensation, swelling, chromatolysis, occasional satellitosis and neurophagia were evident. Most of the cerebral capillaries revealed sever congestion and at places there were lymphocytic aggregation. Histopathological findings are in concurrence with the findings of Vegad *et al.,* (1995) Suggestive of diffused meningitis.

A case of calf meningitis was confirmed by histopathological examination and isolation, identification of *E. coli* from the brain tissue.

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