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The mesenteric lymph nodes pathology by nymph stage of *Linguatula serrata* in cattle

M. Yakhchali[1], A.A. Tehrani[2]

[1]*Department of Pathobiology, Parasitology division, Faculty of Veterinary Medicine, Urmia University, Iran*

[2] *Department of Pathobiology, Pathology Division, Faculty of Veterinary Medicine, Urmia University, Iran*

***Corresponding authors**: Mohammad Yakhchali, **Address:** Department of Pathobiology, Parasitology division, Faculty of Veterinary Medicine, Urmia University, Iran, **Email**: m.yakhchali@urmia.ac.ir, **Tel**: +984432770508

Abstract

Linguatula serrata is a cosmopolitan and zoonotic parasite which occurs in carnivores (definitive host) and herbivores animals (intermediate host). Present study was aimed to find out the pathological changes of affected mesenteric lymph nodes (MLNs) by nymph stage of *L. serrata* in cattle. Carcasses of slaughtered cattle were inspected directly and infected MLNs with *L. serrata* were collected. Infected MLNs were fixed in 10% formalin and embedded in paraffin. Prepared sections were stained by Hematoxyline-Eosin (H&E) and examined. The MLNs were grossly enlarged, smooth and edematous with cystic areas which nymph stages scattered throughout the lymph nodes. Histopathology changes were included inflammatory reactions brought about by the parasite on the lymph nodes. Reticuloendothelial proliferation resulted in macrophage accumulation, many of these reaction patterns included granulomata. The vascular lesion included prevascular cuffing and mild vaculities. The lymphocytes reduced in number with apoptotic cell death. In view of the consumption of raw or undercooked visceral organs of cattle in the region, a systematic and rigorous inspection of the MLNs in slaughtered cattle would be useful to reduce human infection risk.

Keywords: *Linguatula serrata*, Pathology, Cattle

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Introduction

The linguatulids are obligate endoparasites belonging to the phylum Arthropoda (Symmers and Valteris, 1950) (1). Five species have been found in man and animals, the only one occurring as zoonotic parasite being *Linguatula serrata* (Fröhlich 1779). *Linguatula serrata* is referred to as "tongue worm", because many species within the phylum have transparent tongue-shaped bodies. This parasite has been reported from subtropical and temperate regions (2). The adult parasite lives in the paranasal sinuses of the dog or, less often, other carnivores (cat, fox, wolf) (3, 4). The larva of this specie requires mammalian intermediate hosts include human beings and herbivores such as cattle, buffalo, sheep and goats in which to develop (5). Both adults and nymphs of *L. serrata* may parasitize human-beings (6).

In Iran, the role of dogs in spreading the infection is important because the infection rate in dogs was found

to be 1.13% and 62.2% in Urmia city and Shahrekord (3, 7). Prevalence of MLNs infection with *L. serrata* nymphs was reported in domestic ruminants from different parts of the country (8-15).

Detection of nymph stages of *L. serrata* in the MLNs of large ruminants is of more concern in Iran, where people consume more cattle meat. Furthermore, raw consumption of infected liver may also lead to infection in humans called Halazoun syndrome (16-18). Linguatolosis in human was reported by other researchers in Iran (19-20). So far, pathological study on affected MLNs with *Linguatula* nymph from cattle of Iran has not been reported. Objective of current study was to find out the pathological changes of affected MLNs by nymph stage of *L. serrata* in cattle from northwestern Iran.

Materials and Methods

Carcasses of the slaughtered cattle from industrial Urmia abattoir of Iran were inspected. Four infected jujenal MLNs per animals were collected and put into a container with 10% buffered formalin. The MLNs were examined and measured grossly for the presence of nymph stage and morphological characteristics used to identify the parasite (21).

All infected MLNs with immature stage of *L. serrata* were fixed in 10% buffered formalin. The lymph nodes were sectioned in 5 µm thick pieces. Sections were stained with Hematoxyline–Eosin (H&E) and examined under light microscope (22).

Results

Grossly, the infected MLNs were externally enlarged, smooth and edematous. A cut section revealed cystic areas which diameters varied between 0.3-0.7 cm. Nymph stages (3.5-5.3mm) of parasite were scattered throughout the lymph nodes (Fig 1).

Histopathological study of infected MLNs in cattle revealed migratory route of the parasite with cystic spaces (Fig 2). Lymph node tissue damage and necrosis were seen in medulla. The empty spaces were expanded, filled with edema and surrounded with necrotic area (Fig.3). Coagulative and liquefactive necrosis was observed in cortex and medulla, respectively. The vascular lesion included prevascular cuffing and mild vacuities in cortex area of MLNs (Fig.4). The lymphocytes reduced in numbers and cellular necrosis including apoptosis with chromatolysis was seen in the nuclei (Fig.3). Inflammatory cell infiltration in medulla included macrophages, eosinophiles, plasma cells and lymphocytes (Fig.4).

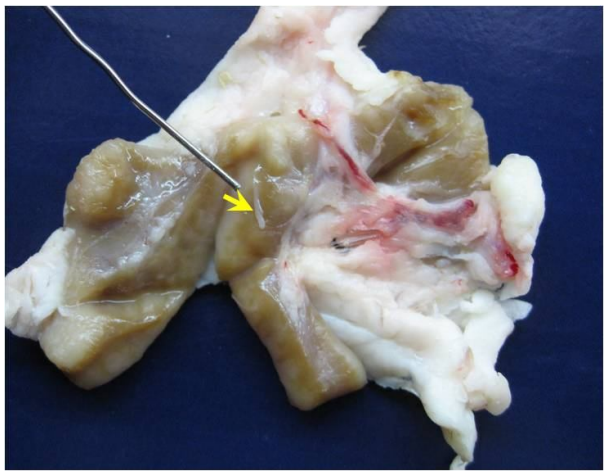

Fig. 1. Mesenteric lymph nodes of natural infected cattle with Linguatula serrata serrata (arrow) in a cystic cavity.

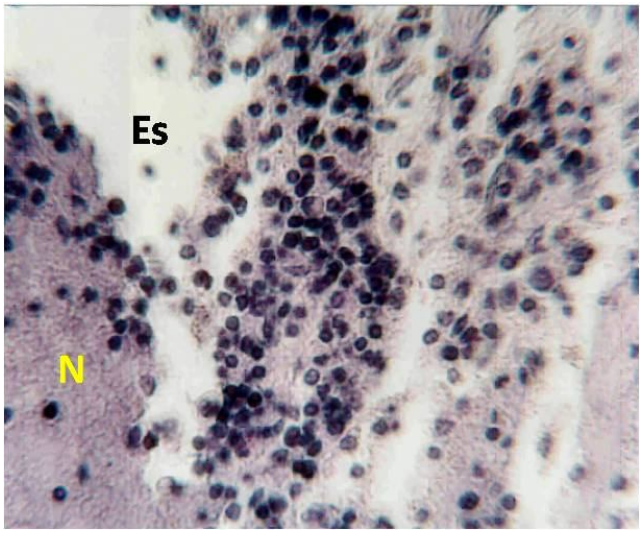

Fig 2. The lymphocytes reduce in numbers, the necrotic underlying tissue (N) and empty spaces (ES) are evident. Apoptotic lymphocytes around the necrotic area (arrow) (H&E, 400×).

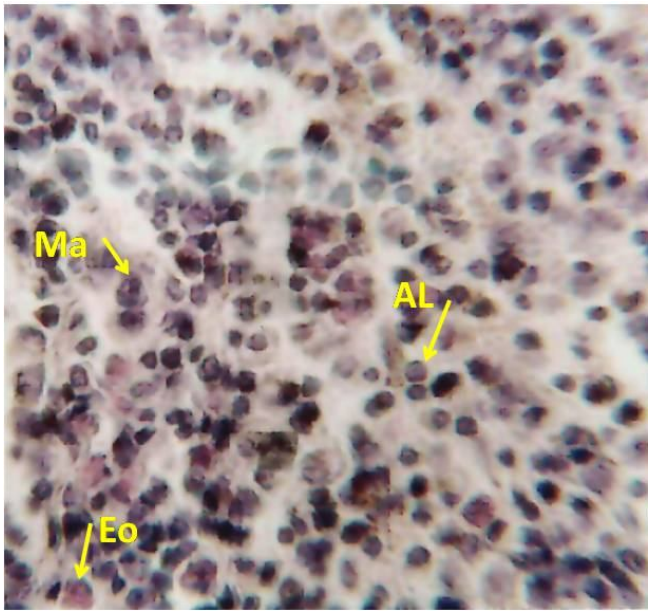

Fig.3. Infiltration of macrophages (Ma) and eosinophiles (Eo) with presence of apoptotic lymphocytes (AL) (H&E, 400×).

Discussion

In this study, observed histopathological changes in infected MLNs of cattle including necrosis, inflammatory cell infiltration, Lymphocyte apoptosis and chromatolysis, vascularitis and oedema were in agreement with the findings of other researchers (16, 23). Jubb et al. (24) noted that the cysts are common in MLNs of domestic animals such as cattle. Viable nymph can be found in normal MLNs, but usually the nodes show focal or diffuse hyperplasia and oedema, with the nymph die in the nodes and become encysted in encapsulated abscesses, which older lesions may calcify and resemble tubercles (24). Oryan et al. (15) noted that the infected MLNs of examined camel were grossly enlarged and degraded accompany with massive tissue necrosis, hemorrhages and oedema in the sections. In the present study, hemosiderosis by infiltration of hemosiderophages was not evident similar to that Oryan

et al. (15) reported in MLNs of infected camel. Nourollahi Fard et al. (18) reported edema and hemorrhage in infected MLNs of cattle, with a loss of lymphocytes, granulomatous inflammation characterized with accumulation of epithelioid macrophages and giant cells. The larva during migration in the intermediate host may produce lesions similar to those produced by nematode larvae (2,23).

The inflammatory reaction was mild in infected MLNs tissue of cattle. While in infected MLNs of sheep and camel with *L. serrata*, it was reported strong reaction (15,23). Additionally, Yakhchali and Tehrani (23) reported similar finding in water buffaloes while it was in contrast with Sivakumar et al. (25). Granulomatosis reaction with macrophage, lymphocyte, eosinophiles and giant cells infiltration revealed that there was compatibility between short established nymph and host tissue reaction (6). However, the observation of granulomatosis due to *L. serrata* suggested the concurrent occurrence of pentastomosis and other chronic infections (bacteria and fungi) and Lung worm larva (2,22,26).

Conclusions

The results of the current study completed other pathological findings and confirmed the possible invasion of MLNs by *L. serrata* nymphs in Iranian cattle. Because of this and parasite infection potential to promote other concurrent infections during larva tissue migration, a systematic and rigorous inspection of the MLNs in slaughtered cattle would be useful to reduce human infection rate.

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