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ZOONOTIC POTENTIAL OF VISCERAL LINGUATULLOSIS

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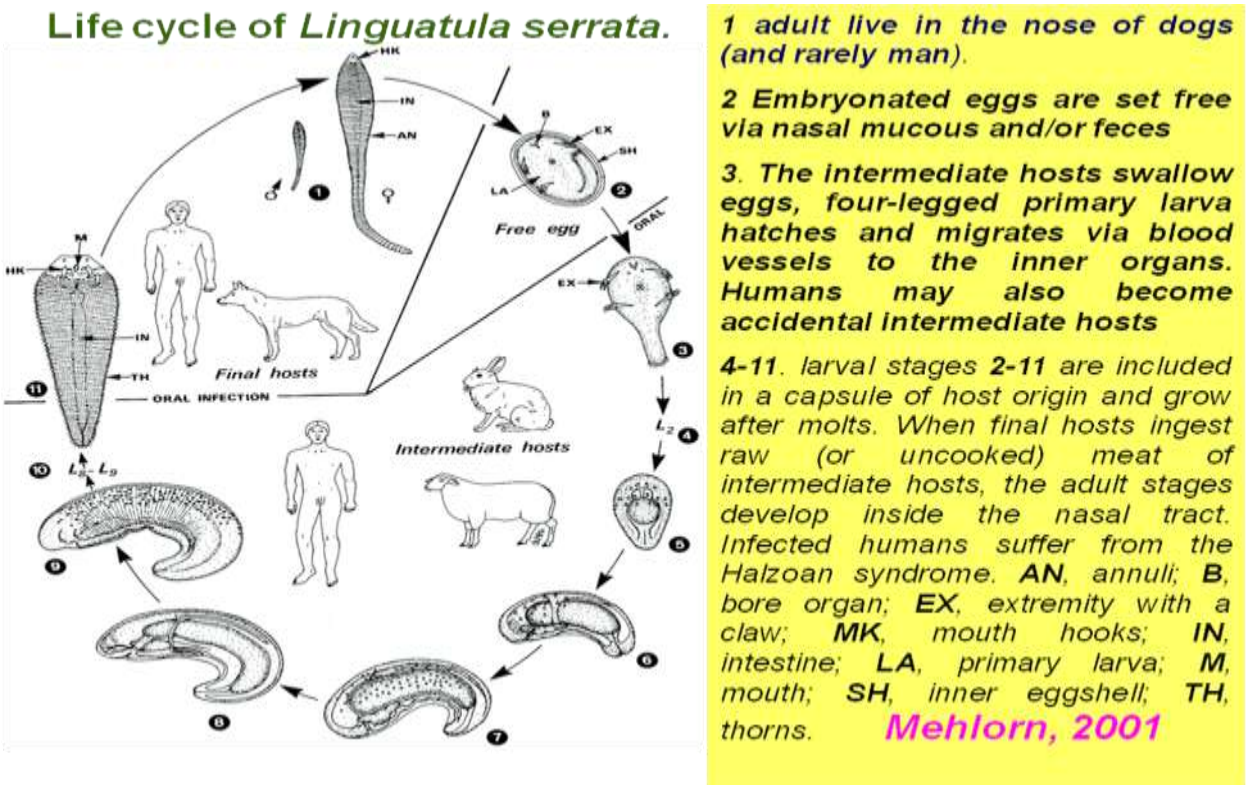
ABSTRACT

Visceral linguatullosis is a parasitic infection caused by *Linguatula serrata.* Recovery of the nymphal stages of the parasite from crossbred Holstein Friesian cattle is reported in this study. White colored tongue shaped nymphal stage of *L. serrata* were observed in the mesenteric lymph nodes which were edematous with fluid flowing out on incision. The parasites actively wriggled into the parenchyma of the nodes. On the basis of predilection site and the structural features as observed under electron microscopy, the parasite was identified as nymphal stage of *L. serrata* and the finding appears to be important in the context of its zoonotic potential as the humans may act both intermediate as well as the final host.

KEYWORDS: *Linguatula serrate.*

INTRODUCTION

Visceral linguatullosis is a parasitic infection caused by *Linguatula serrata* (Tongue worm), is a pentostome with characteristics of both the arthropods and annelids (John and Petri 2006). Adult parasite lives in the upper respiratory tract (nasal cavity) of dogs inducing parasitic rhinitis (Meshgi and Asgarian 2003). The eggs released by the parasites are coughed out in the respiratory secretions or saliva and if swallowed are excreted in the faeces. Vegetations and water contaminated with the eggs are the major source of infection for animals. The first stage larvae penetrate the gut wall, migrate and encyst in various organs like liver, lymph nodes, lungs etc. The primary larvae metamorphose to the third stage larvae and remain encysted (John and Petri 2006). On ingestion of third stage larvae by the definite host, the life cycle is repeated. *Linguatula serrata* have been reported in cattle livers, sheep and goats and the disease has been mostly reported from Middle-East (John and Petri 2006; Meshgi and Asgarian 2003; Schlossberg 2004). Halzoun-Marrara syndrome, which has been described in Lebanon, Turkey, Greece (Halzoun) and Sudan (Marrara), is produced by ingestion of nymphs or third-instars larvae together with food such as raw or semi-raw sheep liver or lymph nodes. The symptoms are varied and include an irritated and sore throat, edema, and congestion that may extend to the larynx, Eustachian tubes, conjunctiva, nose, and lips. Dyspnea, dysphagia, vomiting, headache, photophobia, and exophthalmia may also be present (Prathap, 1981, Khalil and Schacher, 1965). Humans may act as both intermediate and aberrant definitive hosts for linguatulids upon ingesting infective eggs and nymphs, respectively. Linguatuliasis often goes undetected, but can be diagnosed by clinical signs and symptoms and microscopically examination (Prathap, 1981).



MATERIAL AND METHODS (CASE REPORT)

A crossbred female Holstein Friesian cow of 10 years age, parturated 25 days earlier presented with dullness, depression, anorexia, abdominal distension due to bloat since last 5 days and inability to stand on hind legs. When the animal was brought to clinics, the animal showed sternal recumbency, cold extremities, muzzle dry, subnormal temperature (98.9^0F), Respiratory rate 44/minute, Rumen pH 6.7, Blood glucose 48 mg/dl (O-toluidine method, Winkers & Jacobs, 1976), and Blood calcium 4.5 mg/dl (Cresolpthaleine Complexone method, Bayers reagent Kit). The animal was suspected for Milk fever (Post-parturient Paresis), but did not respond to calcium therapy and died. Necropsy was conducted for detailed examination to find out the cause of the death. Recovery of the nymphal stages of the parasite in the mesenteric lymph nodes made possible to arrive at the diagnosis of Visceral linguatullosis. Histopathology and electron microscopic studies were conducted employing standard techniques to confirm the occurrence of *Linguatula serrata.*

RESULTS AND DISCUSSION

Linguatula serrata occurs in the nasal and respiratory passages of the dogs, fox and wolf, and rarely in man, horse, goat and sheep. Herbivorous animal's viz. horse, sheep, goat, bovine and rabbits serve as intermediate hosts. Recovery of the nymphal stages of the parasite from crossbred Holstein Friesian cattle is reported in this study. Necropsy was conducted on a pleuriparous, crossbred Holstein Friesian cow, which was admitted in the veterinary clinics and died. Prior to death, clinical signs were weakness and loss of muscle tone. Hematological examination revealed leucocytosis with shift to left and monocytosis (Table I and Fig 1).

Table I. Haemogram.

Hemoglobin	13.0 g/dl
PCV	43%
TEC	8.45X
TLC	10^6/cumm
DLC	$14X10^3$/cumm
Neutrophils	38%(5320)
Lymphocytes	61%(8540)
Eosinophils	1%(140)
Monocytes	1%(140)

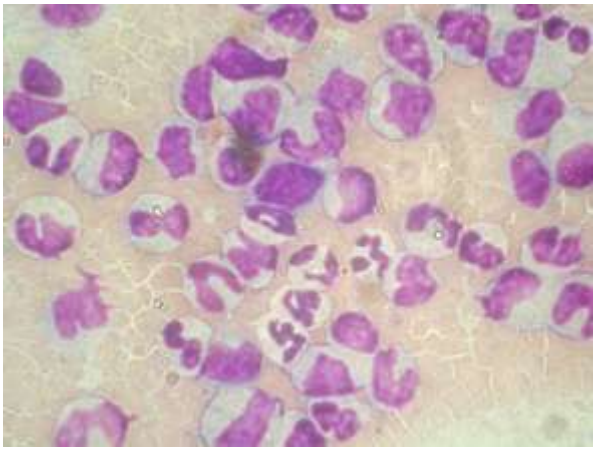


Fig. 1: Lymphocytes (shift to left).

White colored tongue shaped nymphal stage of *L. serrata* were observed in the mesenteric lymph nodes which were oedematous with fluid flowing out on incision (Fig 2). The parasites actively wriggled into the parenchyma of the nodes. Small cystic spaces containing viscid, turbid fluid, containing parasites, were observed. The parasites were approximately 5 to 6 mm long with slightly convex dorsal and flattened ventral surfaces and having transverse striations. Anterior end was broad and thick sub-terminally. Microscopic examination of the ventral surface revealed an elongated sub-terminal oral aperture in the anterior end with a pair of strong hooked claws on either side. The cuticle was armed with spines arranged in transverse rows, directed posteriorly.

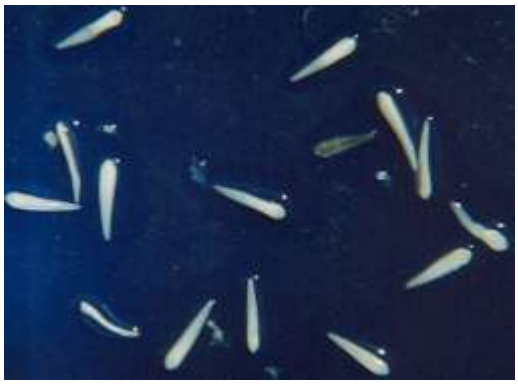


Fig. 2: Nymphs of *Linguatula serrate.*

Fig. 3: Hooks and Spines(Electron Microscopy).

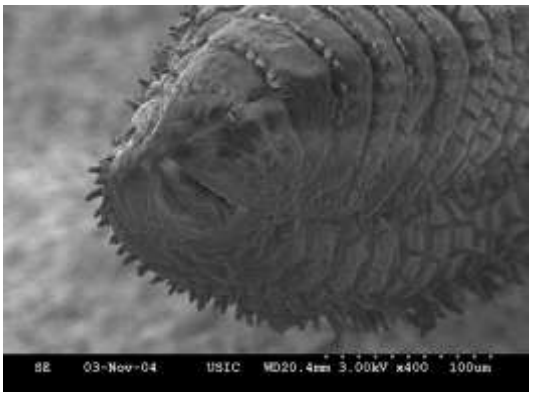


Fig. 4: Cuticle armed with spines.

Scaning electron microscopic picture of anterior ventral end of parasite clearly revealing characteristic structures (Fig 3). Tusk shaped hooks with additional spur like structure arise from a depression giving it a mouth like appearance (Fig 4). Higher magnification of the body of parasite revealing triangular structure of cuticular spines and pores.

Hypersensitivity reaction of upper respiratory tract and buccopharyngeal mucosa following consumption of infected raw liver, lungs, trachea and rumen of goats and sheep – a Sudanese dish known as Marrara and the Syndrome as Marrara syndrome (Khalil 1965; Siavashi *et al* 2002) and Halazoun in Lebanon. Clinical features-itching in the throat and nose, unilateral conductive

deafness, tinnitus and facial palsy (Siavashi *et al* 2002). *Linguatula serrata* was found in the bile duct of a 40 year old man in Turkey with jaundice and gall stones and in hepatic granuloma in a man from North America (Baird *et al* 1988). One case of ocular linguatualosis observed in a woman characterized by conjunctivitis and visual difficulties in Ecuador (Lazo *et al* 1999). The disease is induced by consumption of water and food infected with the feces or pulmonary excretions of carnivores containing eggs of the pentastomid (Fain, 1975; Drabick, 1987). When the embryo reaches the intestine, it transforms into a first larva that crosses the intestinal wall and migrates to different organs such as liver, lungs, mesenteric lymph nodes, and less frequently, brain, intestine, and the prostate gland. At these sites the larvae become encysted and undergo several changes until they transform into third-instars larvae or nymphs, where they can survive for one or more years. When they die, they are absorbed or may calcify. Encysted nymphs rarely produce clinical symptoms and are discovered during surgical intervention and radiologic examinations or at autopsy (Drabick, 1987). Few studies of *L. serrata* involving advanced morphology and systematic morphometry have been conducted. Banaja (1983), in a study of an *L. serrata* larva recovered from the abdominal cavity of a goat, described its characteristic fine morphology and discussed the functional morphology of spines and pores. The first study related to morphometry was published by Rego (1980) who carried out a systematic analysis of the pentastomids existing in the helminthological collection of the Oswaldo Cruz Institute (Rio de Janeiro, Brazil), which consisted of four *L. serrata* larvae, one of them detected in the intestine of a man and the remaining three in different host animals.

On the basis of predilection site and the structural features as observed under electron microscopy, the parasite was identified as nymphal stage of *L. serrata* and the finding appears to be important in the context of its zoonotic potential as the humans may act both intermediate as well as the final host.

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