**Linguatula serrata**
Tongue worm; Pentastomiasis; Linguatuliasis; Linguatulosis; Halzoun syndrome; Merrara syndrome

**Epidemiology**

*Linguatula serrata* (‘Tongue worm’) belongs to the Pentastomida, a group of worm-like, bloodsucking parasites with an ill-defined taxonomy and phylogenetic status related to arthropods (1). Dogs and other canines are the main definitive hosts while most herbivores, including ruminants, serve as intermediate hosts. The parasites inhabit the upper respiratory tract of terrestrial, carnivorous vertebrates, mostly reptiles and birds (2). All species of tongue worms infecting humans are currently classified as Porocephalida; the species *L. serrata* and *Armillifer armillatus* are responsible for most human cases of infection (3). Although *L. serrata* is distributed worldwide, human infection is infrequent. Although *L. serrata* has not been found in Norway, *Linguatula arctica*, also belonging to the Pentastomida, is fairly common in reindeer (4).

Humans can be infected in two ways: either as an intermediate host (visceral linguatuliasis) or on rare occasions as an accidental final host (nasopharyngeal linguatuliasis), with the former being more frequently described (5). Close contact to dogs and their secretions predispose for infection with *L. serrata* (6). The highest prevalence of visceral pentastomiasis due to *L. serrata* has been reported from the Middle East, where high infection rates for dogs have also been noted. Studies have shown that *L. serrata* was found in 43.3% of stray dogs in Beirut, Lebanon, in 38% in parts of India and in a high percentage in Mexico City (1). *L. serrata* in canines and humans can also lead to nasopharyngeal linguatuliasis (pentastomiasis).

Linguatuliasis is rare in Europe, the United States and China where only a few cases have been reported (6). An increasing number of infections can be suspected in the Western Hemisphere because of the incremental travel to linguatuliasis-endemic areas. In Europe and North America the disease is rarely encountered, and more often seen in immigrants and long-term travellers (6).

**Transmission**

*Visceral linguatuliasis*

Man acquires the visceral form by ingesting vegetables or water contaminated with parasite eggs shed with the faecal matter, saliva or nasal discharge of dogs or other definitive hosts (7). When the infection occurs from the ingestion of eggs, the larvae become encapsulated in various organs, where they can survive up to two years. When the larvae die, they are absorbed or the cyst can calcify. The larvae locate mainly in the liver (3) and, to a lesser extent, in the mesentery and intestinal wall.

Ocular linguatuliasis is extremely rare (5, 8, 9) with fewer than ten cases having been described from the southern US, Portugal, Israel, Ecuador and Austria (2).

*Nasopharyngeal linguatuliasis*

The nasopharyngeal form, also known as “Halzoun” (named for the traditional Middle Eastern dish of kibbe, made with raw lamb or beef) or “Marrara” syndrome (named for the traditional dish consisting of raw sheep or goat liver common in the Sudan), often occurs after consumption of raw or undercooked viscera (liver, lung and lymph nodes) of sheep, goats or other infected domestic herbivores (1, 10, 11). In these cases, the larvae emerge from their cysts in the stomach and migrate up the esophagus to the nasopharynx, where they anchor to the mucosal epithelium with prominent hooks (3).

**Symptoms and course**
Most cases of linguatuliasis are asymptomatic and many go undetected. Symptoms depend on the organ system involved and result from the death of nymphs or their migration. If only a few parasites are present, *L. serrata* may mimic hepatic or pulmonary malignancy clinically and on radiological assessments (6).

*Visceral linguatuliasis*

Although most human infections are asymptomatic patients may develop abdominal pain, chronic cough or night sweats. Encysted nymphs do not produce clinical symptoms and the infection is almost always discovered during surgery, radiological examination or autopsy.

*Nasopharyngeal linguatuliasis*

Symptoms appear a few minutes after the infective food is consumed (1). Incubation period varies depending on where the nymphs are released from their cysts. The most common symptoms are throat irritation and pain. Sometimes there is congestion and intense edema of the area. Lacrimation and nasal discharge are common. At times there is also dysapnea, dysphagia, vomiting, headaches, photophobia and exophthalmia. The course of the disease is rapid and benign. About half of patients recover in less than one day; in others the illness may last one to two weeks.

**Diagnosis**

Diagnosis should be made etiopathologically, subetiologically or presumptively on the basis of whether entire nymphs, cuticle-associated structures, or pearly lesions (linguatula nodules) with targetoid appearance are found (12). The parasitic lesions may be confused with malignancies, leading to a delay in correct diagnosis. The visceral form caused by nymphs is rarely diagnosed in living persons or domestic animals, except during surgery, radiological examination or autopsy (5). Specific diagnosis can be made by identification of the nymph in a biopsy specimen. Histopathological examination reveals a granulomatous reaction with multiple eosinophilic abscesses, at the centre of which degenerated nymphs are found (1). In cases of halzoun or marrara, the nymph should be obtained for indentification.

**Treatment**

Once diagnosis is established, no treatment is necessary for the parasites will degenerate after some time, and no effective antiparasitic therapy exists. Only in symptomatic infections with numerous parasites may a surgical approach have to be considered (6).

**Preventative Measures**

Visceral infections from ingestion of the eggs can be prevented by guarding against contamination of untreated water or raw food with carnivore depositions and washing hands carefully before eating. Halzoun and marrara or nasal infections with the adult parasite can be prevented by not consuming raw or undercooked viscera (1). Likewise, dogs must not be fed the raw viscera of goats, sheep or other herbivores. Avoiding contact with canine saliva and drinking water used by dogs or wild canids prevents this infection (1, 3, 6, 12).

**References**


4. Haugerud R. Om Linguatula arctica, reinens bihulemark. Rangifer 1986;1


