

# GROSS AND HISTOPATHOLOGICAL LESIONS OF ONCHOCERCOSIS IN CAMELS (*Camelus dromedarius*)

A. Khodakaram-Tafti and M. Khordadmehr

Department of Pathology, School of Veterinary Medicine, PO Box 71345-1731, Shiraz University, Shiraz, Iran

## ABSTRACT

A total of 103 camels of different ages and both sexes slaughtered at Yazd slaughterhouse of Iran were inspected and out of these 6 had infection with *Onchocerca fasciata*. Grossly, one or multiple nodules about 2-4 cm in diameter containing the worm were observed in subcutaneous tissues of neck and less frequently, in the head and shoulders. Histopathologically, multifocal granulomatous inflammatory reaction was seen around the parasites in affected areas. Transverse and longitudinal sections of the worms were observed within the granulomas. The granulomas were composed of thick fibrous walls, the cellular infiltrate of lymphocytes, plasma cells, macrophages, multinucleated giant cells and eosinophils associated with different degrees of coagulation necrosis and calcification around the parasite cross sections. It seems that onchocercosis is one of relatively common skin lesions of camels in Iran.

**Key words:** Camel, gross pathology, histopathology, *Onchocerca fasciata*, onchocercosis

Filarioid nematodes are known to occur among domestic animals almost all over the world (Anderson, 2000). All filarioid nematodes produce microfilariae into the skin (*Onchocerca* spp, *Parafilaria* spp and *Stephanofilaria* spp) or blood circulation (*Setaria* spp) of the host where these are available to the haematophagous insects which operate as intermediate hosts and are active vectors for the parasites (Anderson, 2000, Solismaa *et al*, 2008). Generally, *Onchocerca* spp are medium-sized filarioids which usually inhabit subcutaneous tissues, ligaments and aponeuroses of large mammals (Anderson, 2000). The filarial nematode *Onchocerca fasciata* lives an adult worm, forming well developed fibrous tissue nodules within the fascial sheath of various parts of the camel body. The parasite was first described by Railliet and Henry (1910) and redescribed by Bain and Nasher (1981). Onchocercosis due to *O. fasciata* was reported in dromedary camels from Saudi Arabia, Egypt, Iran and also Somalia and Sudanese camels slaughtered for human consumption in Saudi Arabia (Ghandour *et al*, 1991; Cheema *et al*, 1984; Nasher, 1986; El-Massry and Derbala, 2000; Moghaddar and Zahedie, 2006). More than 200,000 dromedary camels are living in the arid and semiarid deserts of Iran and farmers are raising them for meat, milk, transport, reproduction and agriculture purposes (Rahbari and Bazargani 1995; Mowlavi *et al* 1997, Khodakaram-

Tafti *et al*, 2001). The present study describes the gross and histopathological features of onchocercosis in dromedary camels slaughtered in Iran.

## Materials and Methods

A total of 103 slaughtered camels of different ages and both sexes from Yazd Province of Iran were examined for onchocercal lesions by detection of nodules in the subcutaneous tissues of the neck, head and shoulders. The camels were subjected to careful gross examination by palpation for the presence of onchocercal nodules. The distribution and size of the nodules were noted for each animal. Appropriate tissue samples containing nodules from affected areas were fixed in 10% buffered formalin, embedded in paraffin, and sectioned at about 5 µm, stained with hematoxylin and eosin and were examined histopathologically. The nodules were also digested in a 2% acidic solution of pepsin (HCL pepsin). They were incubated at 37°C in a water bath for 4-8 h. Digested nodules were examined under a dissecting stereo microscope for detection of adult parasites.

## Results

Onchocercal lesions were observed in 6 of 103 (about 6%) of slaughtered camels. The existence of nodular lesions were mainly on the sides of the neck. In addition, the nodules were also found on the head and shoulders of 2 affected cases. Grossly, one

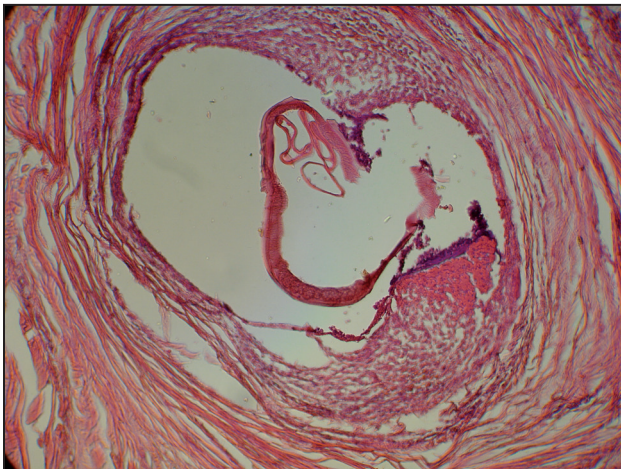
SEND REPRINT REQUEST TO A. KHODAKARAM-TAFTI [email: tafti@shirazu.ac.ir](mailto:tafti@shirazu.ac.ir)



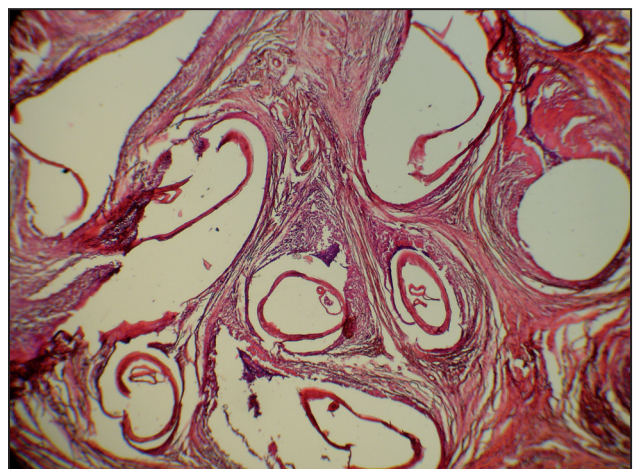
**Fig 1.** Raised onchocercal nodules in the skin of neck and head of a dromedary camel.



**Fig 2.** Gross appearance of cut section of an onchocercal nodule with granuloma formation in subcutaneous tissue.



**Fig 3.** Onchocercal granuloma containing cross section of *Onchocerca fasciata* surrounded by calcification, coagulative necrosis and inflammatory reaction in deep part of cutaneous tissue (H&E x 450).



**Fig 4.** Camel onchocercosis. Several cavities containing the transverse and longitudinal cross sections or fragments of the worms with different degrees of surrounding inflammatory reaction and granulomatous reaction (H&E x 280).

or multiple nodules about 2-4 cm in diameter were observed (Fig 1). These nodules were raised with relatively hard consistency and are similar to lymph node appearance. On cross section, tangled thin filarial worms were surrounded by a thick whitish fibrous tissue (Fig 2). The complete worms were not recovered from digested nodules. Morphology of worm portions, the cuticle and cross sections in the subcutaneous tissues were adjusted to *Onchocerca fasciata*. In some nodules, calcification was noticed by the whitish calcareous appearance.

Histopathologically, multifocal granulomatous inflammatory reaction was diagnosed around the parasites in the affected areas. Multiple granulomas containing onchocercal cross sections were located in deep parts of cutaneous tissue. The granulomas were composed of thick fibrous capsules, the cellular

infiltrate of lymphocytes, plasma cells, macrophages, multinucleated giant cells and eosinophils associated with coagulation necrosis and calcification (Fig 3). Several cavities containing the transverse and longitudinal cross sections or fragments of the worms with different degrees of surrounding inflammatory reaction were scattered inside the granulomas (Fig 4). Small number of cross sections of the parasites belonged to female worms with uterus full of embryonated eggs and microfilariae. Microfilariae were not seen in the tissues adjacent to the granulomas but multifocal lymphocytic dermatitis was observed.

### Discussion

In the present study, onchocercosis was detected in about 6% of slaughtered camels. Different



occurrence of this disease from 2.75% (El-Massry and Derbala, 2000) to 15.5% (Cheema *et al*, 1984) were reported in Egypt (in imported camels) and Saudi Arabia, respectively. Usually the damage caused by filarioid worms is the result of chronic inflammatory reactions around dead or dying worms or microfilariae. Dead worms in the subcutaneous tissues usually become calcified and surrounded by dense fibrous tissue, causing little damage, but they may also act as a focus for bacteria and abscesses may develop.

In this study, even though no living nematodes were found in the lesions, but morphology of parasite in the subcutaneous nodules were adjusted to *Onchocerca fasciata*. Morphological studies of this nematode were based on the examination of microfilariae, worm portions and the cuticle (Bain and Nasher, 1981; El-Massry and Derbala, 2000).

Despite histopathological and ultrastructural studies, the vector(s) of *O. fasciata* remains unknown (Bain and Nasher, 1981; Cheema *et al*, 1984; Ghandour *et al*, 1991; Determann *et al*, 1997; El-Massry and Derbala, 2000). All filarioid nematodes are transmitted by haematophagous vectors.

It was suggested that the currently high prevalence of filarioid nematodes in some animals may be associated with the ongoing climate change. Due to the warming of earth surface and increasing precipitation, the conditions are improving for the vectors of filarioid nematodes and favouring the parasite's transmission and development in the vectors (Solismaa *et al*, 2008).

In addition to the detrimental effects on health and well-being of animals, filarioid nematodes could possess a threat against meat hygiene in meat producing animals and could inflict economical losses to the meat and milk. *Onchocerca* nodules particularly in heavily infected camels are sometimes mistaken as tuberculous infection and resulted in confused condemnation. Results of this study showed that this parasite produces variable pathological changes which often lead to condemnation of infected parts of carcasses in camel meat inspection. Future challenges are recognising the intermediate hosts or vectors and possible ways of control and prevention of this disease.

## Acknowledgements

The authors would like to thank Shiraz University, Iran for financial support. The authors also wish to thank Mr. Shirvani and Mr. Yusefi for their technical assistance.

## References

- Anderson RC (2000). The superfamily filarioidea. Their development and transmission. In *Nematode Parasites of Vertebrates*; 2<sup>nd</sup> (Ed), New York, CABI Pub. pp 467-529.
- Bain O and Nasher K (1981). Redescription de *L' onchocercerque* du dromedaire, *O. fasciata* R. et H., 1910. *Annales de Parasitologie Humaine et Comparee* 56:401-406.
- Cheema AH, El-Bihari S, Ashour NA and Ali AS (1984). Onchocercosis in camels (*Camelus dromedarius*) in Saudi Arabia. *Journal of Helminthology* 58:279-285.
- Determann A, Mehlhorn H and Ghaffar FA (1997). Electron microscope observation on *Onchocerca ochengi* and *O. fasciata* (Nematoda: Filarioidea). *Parasitology Research* 83:591-603.
- El-Massry AA and Derbala AA (2000). Evidence of *onchocerca fasciata* (filarioidea: onchocercidae) in camels (*Camelus dromedarius*): I- prevalence, nodular lesions appearance and parasite morphology. *Veterinary Parasitology* 88:305-312.
- Ghandour AM, Al-Amoudi AA and Banaja AA (1991). *Onchocerca fasciata* (Railliet and Henry, 1910) and its nodule development in camels in Saudi Arabia. *Veterinary Parasitology* 39:67-77.
- Khodakaram Tafti A, Maleki, M and Oryan, A (2001). Pathological study of intestines and mesenteric lymph nodes of camels (*Camelus dromedarius*) slaughtered in Iran. *Journal of Camel Practice and Research* 8:209-213.
- Moghaddar N and Zahedie A (2006). Prevalence and pathogenesis of *Onchocerca fasciata* infection in camels (*Camelus dromedarius*) in Iran. *Journal of Camel Practice and Research* 13:31-35.
- Mowlavi G, Massoud J and Mobedi I (1997). Hydatidosis and testicular filariasis (*D. evansi*) in camel (*C. dromedarius*) in central part of Iran. *Iranian Journal of Public Health* 25:21-28.
- Nasher AK (1986). Incidence and intensity of *Onchocerca fasciata* Railliet and Henry, 1910 in local camels in Saudi Arabia. *Ann Parasitol Hum Comp* 61:77-80.
- Rahbari S and Bazargani TT (1995). Blood parasites in camels of Iran. *Journal of Veterinary Parasitology* 9:45-46.
- Solismaa M, Laaksonen S, Nylund M, Pitkanen E, Airakorpi R and Oksanen A (2008). Filarioid nematodes in cattle, sheep and horses in Finland. *Acta Veterinaria Scandinavica* 50:20.