

The Case of Gastrointestinal Nematodiosis Forming a Nodule in a Gazelle's (*Gazella subgutturosa*) Abomasum

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Abstract

This study has reported the case of abomasal teladorsagiosis in gazelle (*Gazella subgutturosa*) that was found dead while under care at a wildlife reserve area in Sanliurfa, Turkey. Necropsy was performed on six-year-old, male gazelle, which was found dead in its natural environment and brought to the Department of Pathology, Faculty of Veterinary Medicine, Harran University. At necropsy were observed became whitish in color and thickened the plicae spirals on the abomasum mucosa. In the microscopic examination, parasites were encountered on the mucosa abomasum and lumen of the glands in lamina propria. Also in the lumen of the glands with parasited were detected necrotic debris and neutrophil leukocyte accumulation and to increase in the connective tissue between the glands. In the scanning electron microscopic examination, parasites were observed on the abomasum mucosa. This study is the first report case describing gastrointestinal nematodiosis forming a nodule in the abomasum of in a gazelle in Turkey.

Keywords: Gastrointestinal nematodiosis *Gazella subgutturosa*, histopathology, scanning electron microscopy, abomasitis

Introduction

Gazelle (*Gazella subgutturosa*) is the most common species among the Asian antelope species. It has a bigger and heavier structure than other Asian gazelles.⁸ Today their number is assumed to be about 120,000-140,000; however, it has been classified precisely by International Union for Conservation of Nature (IUCN).^{7,12}

The genres *Ostertagia*, *Teladorsagia* and *Marshallagia* are included in the family *Trichostrongyloidea*, which settle in the abomasum of domestic and wild small ruminants.²⁸ These parasites has a worldwide distribution, occurring in both tropical and subtropical areas of the world, and they are important cause of economic loss.^{14,22}

The *Teladorsagia* spp. is generally a parasite that settles on the abomasum of domestic small ruminants such as sheep and goats. After the infectious larvae of the parasite are taken orally from nature, they stay until the last exsheaths

by entering the glands in the abomasum mucosa of the host. Hyperplastic gastritis-like clinical findings are observed in animals infected with *Teladorsagia* spp.²⁵ Pathological changes in the abomasum mucosa due to parasite are observed in three successive stages. These phases are in the form of tissue, lumen and healing phase.¹⁸ In the tissue phase; the infective period larvae taken by the host enter the lumen of the abomasum glands, forming macroscopic nodules with a diameter of about 2 mm. In parallel with the inflammatory reaction occurring in the abomasum, there is a decrease in the number of parietal and chief cells in the mucosa and an increase in the number of mucus producing cells. This increase in mucus cells, initially seen as focal, is observed in the mucosa as small, protruding and pale nodules. The middle part of these shaped nodules collapses in the appearance of the navel. This structure in the abomasum is considered an indication of hyperplasia bordered by close glands. At the end of this stage, due to

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the separation of parasites from the gastric glands, healing of the damaged parts of the abomasum mucosa begins, and adult parasites in the lumen are automatically removed from the body.^{18, 26}

The larvae hatch from the eggs thrown out with the feces of infected animals with *Ostertagia* species 2 exsheath in the external environment. In infective L3 form matures in the abomasum and intestines of the last hosts.¹¹ The L3 larvae enter of the abomasum glands and exsheath². While some L4 larvae wait in the hypobiotic stage in the abomasum glands, L5 larvae exit to the mucosa to mature.²⁶

The life cycle of *Marshallagia* is direct and except that L2 can hatch from eggs. Following ingestion, larvae burrow into the abomasal mucosa and forms gray-whitish nodules of 2-4 mm in size. The young L5 emerge from the nodules around 16 days post-infection, and egg-laying is apparent soon after.²²

The multinodular lesions of the abomasum are common macroscopic findings of these parasites. Therefore, is important problem to determine the actual parasite responsible for lesions.²⁸ The ante mortem diagnosis of parasite infections in livestock has been based on the detection of nematode eggs or larvae in the faeces by microscopic examination using the methods of flotation and/or larval culture.¹⁷ Besides for diagnosis PCR, histopathological and electron microscopic examinations are performed.^{3, 24, 25}

Case History

In this study the gazelle (*Gazella subgutturosa*) were brought from the Kızılkuyu Wildlife Reserve, located in Sanliurfa province in southeastern Turkey. The abomasum tissues of a gazelle six-year-old, male (*Gazella subgutturosa*), which was found dead in the natural habitat and submitted to the Department of Pathology, Faculty of Veterinary Medicine, Harran University for necropsy, constituted the material of the study. The abomasum tissue was fixed in 10% neutral buffered formalin for histopathological examination. The samples were dehydrated in graded ethanol and embedded in paraffin wax. The sections were cut at 5 µm thickness, mounted on glass slides and routinely stained with hematoxylin and eosin (H&E). The stained sections were examined by light microscope and the histopathological structure of the parasite and its lesion was determined. Besides scanning electron microscopy (SEM) analyses was applied to the affected abomasum tissue. The tissues were washed twice with phosphate-buffered saline (0.1 M, pH 7.4) and fixed in 2.5% glutaraldehyde for 48 h. Then the samples were treated with 1% osmium tetroxide for 1 h and dehydrated through a series of increasing concentrations of acetone (30%, 50%, 75%, and 100%, three repetitions each) and dried in a critical point drier. The

samples were coated with gold-palladium using a Polaron SC7620 sputter coater and examined with SEM (Leica, LEO 440, UK) at different magnifications.

In the necropsy, the mucosa of the abomasum was thicker than normal and covered with a transparent colored mucous exudate. In addition, on the abomasum mucosa was observed the whitish color, rough surface, nodular blisters or lamina thickening (Fig. 1).

In the microscopical examination, was observed that the mucosa was covered with desquamated necrotic, degenerate cell debris and occasional adult parasites (Fig. 2 A). Besides, parasites in different developmental stages were found in the lumen of some glands in lamina propria. The necrotic desquamated cell debris and neutrophil leukocyte deposits were also seen in gland lumens with parasites (Fig. 2 B and C). The increase in connective tissue attracted attention between the glands in lamina propria (Fig. 2 D).

In the scanning electron microscopic examination, adult parasites with long cylindrical shape were observed on the abomasum surface and embedded in the mucosa (Fig. 3 A, B).

Unfortunately, the morphological-genetic examination could not be done because the presence of parasites was not observed macroscopically, but was detected in microscopic examination. In addition, examination for parasites in feces could not be performed as a long time has passed since of the animal death.

Discussion

As a result of the macroscopic, histopathological and scanning electron microscopic examinations, the findings were coherent with *Ostertagia*, *Marshallagia* and *Teladorsagia* causing abomasitis. Although it is not possible to say exactly which is the agent, the author thinks it is *teladorsagia*. Because, *Teladorsagia* is the predominant species in temperate regions and is a parasite with a high transmission rate during abundant rainy seasons.²¹ These parasites are a highly fecund parasite with even moderately infected sheep having very high faecal egg counts.²⁷ However, *Teladorsagia* spp. is considerably less fecund than these parasites and does not appear to be significantly more fecund than other nematode parasites found in temperate regions although definitive data is lacking.^{2,23}

There are different published records of *Teladorsagia* spp. infection in sheep and goat.^{4, 9, 13, 16} In this case, histopathological lesions that findings such as necrotic debris on the abomasum mucosa and the presence of the parasite, inflammatory cell infiltration in the lamina propria, increase in connective tissue, parasites at different stages of development in the gland lumen, hyperplasia in the gland epithelium, were related with the parasite.⁶

Figure 1. Macroscopical appearance the abomasum. Nodule (arrow), laminar thickening (ahead arrow) on mucosa of the abomasum.

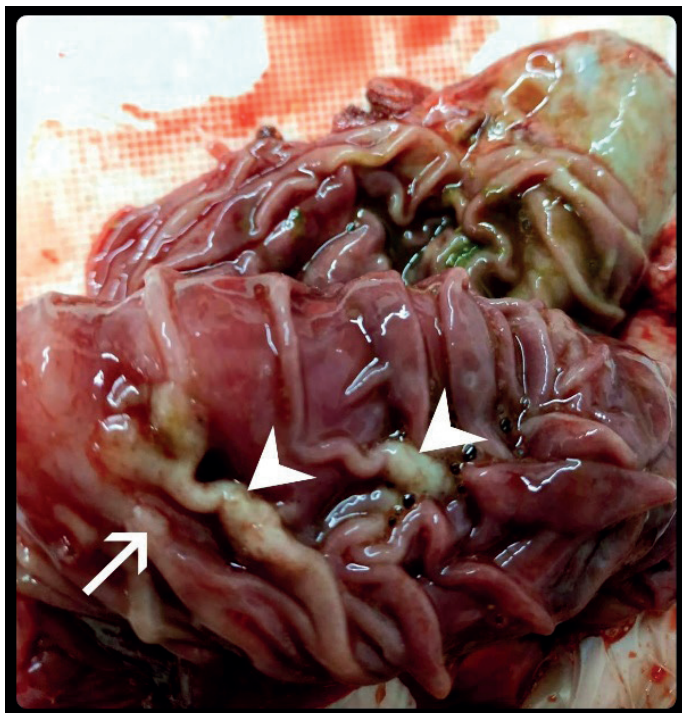


Figure 2. Microscopical appearance the abomasum:

A: Adult parasite (arrows), necrotic desquamated debris (ahead arrows), lumen (L). B and C: Parasites in different developmental stages (arrows), necrotic cells debris (N). D: Parasites in different developmental stages (arrow), increased connective tissue (CT). Hematoxylin&Eosin staining.

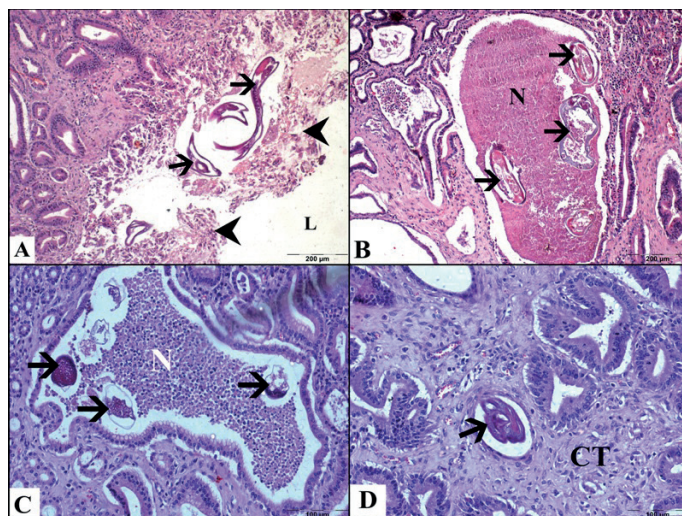
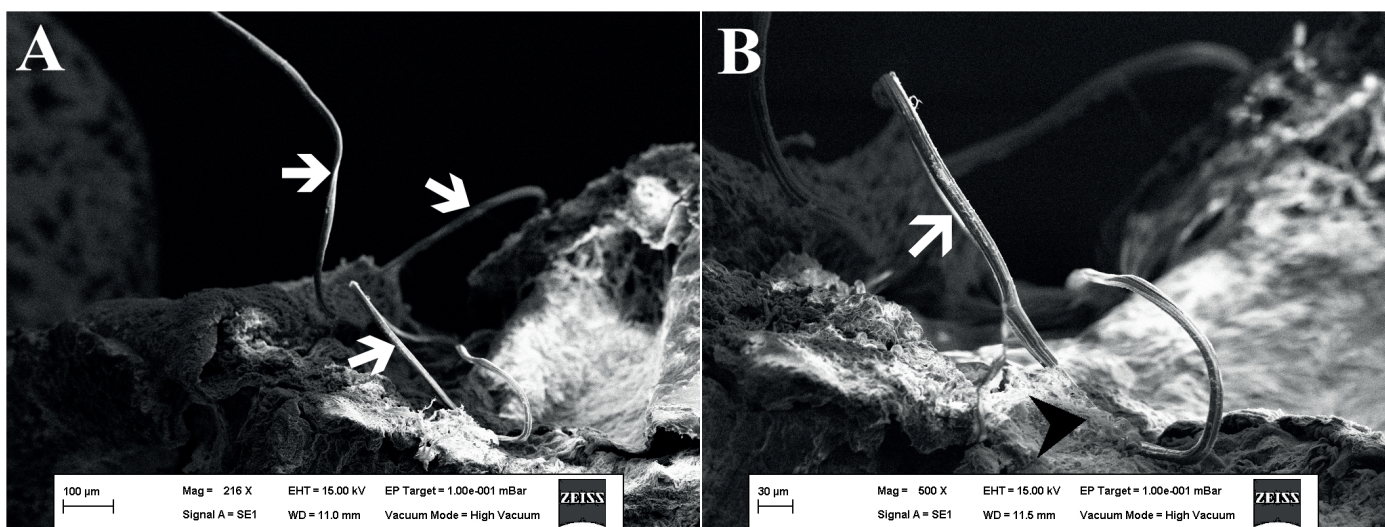


Figure 3. Scanning electron micrographical appearance of parasite on the abomasum:

A: The parasites on the abomasum mucosa (white arrows). B: Abomasum mucosa (ahead arrows),



Baker and Gershwin were stated that the cause of the inflammatory response in different layers of the abomasum could be due to the released of mediators.¹ In addition, some studies emphasized that *Teladorsagia* spp. increases pepsinogen release.^{1, 15} The hyperplastic changes in the glands are associated with chronic irritation during the development of the parasite in tissue¹⁹ and chemicals such as host growth factor-alpha with cytotoxic / inhibitory effect for cells and released by parasites.²⁰

Ethics

This study was carried out with permission from the Republic of Turkey Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks (21264211-288.04-E.1891683). This study was conducted with the approval of the Local Ethics Committee of Animal Experiments at Harran University (28.05.2020/01-19).

Conflict of Interest: No conflict of interest was declared by the authors.

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