

Histopathological changes in the abomasa of fallow deer from the Brijuni islands in Croatia - short communication

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ROBIĆ, M., A. BECK, M. BELIĆ, R. TURK, B. ARTUKOVIĆ: Histopathological changes in the abomasa of fallow deer from the Brijuni islands in Croatia - short communication. Vet. arhiv 86, 265-271, 2016.

ABSTRACT

This study was performed to establish histopathological changes in the abomasa of fallow deer (*Dama dama*) from the Brijuni islands, in order to investigate the possible presence of *Helicobacter* species in this species, since literature data on abomasal histopathology are scarce, and data on the presence of *Helicobacter* species in red deer are absent. The study was performed on 23 abomasal samples taken from young adults (c. 1 year of age) shot in legal hunts. In all the samples inflammatory changes were visible. The histopathological findings from the samples examined were similar, indicating the epizootical nature of the disease, and they were similar to findings described in dogs with a gastric infection from *Helicobacter*-like organisms. However, in the abomasa of fallow deer *Helicobacter* organisms were not detected after the appropriate stains were applied, therefore the aetiological factor responsible for such histopathological changes has yet to be identified.

Key words: fallow deer, abomasal histopathology

Introduction

Fallow deer (*Dama dama*) are animals belonging to the *Cervidae* family which includes 40 species. Fallow deer belong to the *Cervinae* tribe and *Dama* genus (GILBERT et al., 2006). Fallow deer from the Brijuni islands represent a specific population, since no natural enemy exists there, and because they practically cohabit with humans, scavenging for leftover food.

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Studies published on pathology in fallow deer are scarce, and regardless of numerous investigations of *Helicobacter* species in a broad range of domestic and wild animals (CURRY et al., 1987; FOX et al., 1997; LEE et al., 1992; QUIEROZ et al., 1996; EATON et al., 1993) there are no literature data regarding helicobacteriosis in wild ruminants.

The most common causes of abomasitis in ruminants are abomasal nematodes, *Haemonchus contortus* and *Ostertagia* spp. invasion. These parasites are visible macroscopically and lesions in the abomasum are present on gross examination (GELBERG, 2007). Severe abomasitis in young ruminants is associated with *Clostridium pefrignes* infection, and characterized as acute necrotizing and haemorrhagic inflammation with submucosal emphysema and severe clinical signs (SCHLEGEL et al., 2012).

The aim of this study was to determine histopathological changes in the abomasa of fallow deer from the Brijuni islands, and the possible presence of the *Helicobacter* species. This was the first investigation of abomasal histopathology in red deer from the Brijuni islands.

Materials and methods

In this study 23 samples of the abomasa of fallow deer from the Brijuni islands, aged about 1 year, were analysed. The samples were collected immediately after legal shooting. Gross lesions were absent. Samples were taken from the pyloric part of the abomasum, washed in saline, fixed in neutral formalin solution, embedded in paraffin and cut into slides 5 µm thick. The slides were stained by the hematoxyline-eosine method for detection of histopathological changes. For visualization of *Helicobacter*-like organisms the Giemsa and Warthin-Starry method was used (SHEEHAN and HRAPCHAK, 1980)

Results

In all the abomasal samples inflammatory changes were observed, in 21 samples they were suggestive of chronic abomasitis, and acute abomasitis was histopathologically diagnosed in 2 samples. The results are summarized in Table 1. Additionally, in 9 samples erosive abomasitis was established, in one sample an ulcerative lesion in reparation was observed, and in 4 samples glandular (animals No. 2, 11, 18, 23) or mucosal (animals No. 1, 19) atrophy was diagnosed. The most prominent histopathological change was infiltration of inflammatory cells into the lamina propria and between the abomasal glands, which was absent in only two samples examined. Infiltrations of inflammatory cells were clearly bounded, and were of a follicular or laminal form. In 13 samples the infiltrate mainly consisted of mononuclear cells (lymphocytes and macrophages), while in 4 samples mixtocellular (neutrophils, eosinophils, lymphocytes and macrophages) and mononuclear infiltrates were present together, and in 4 samples a mainly mixtocellular (neutrophils, eosinophils, macrophages and lymphocytes) infiltrate was observed. In 2

samples infiltrations of inflammatory cells were absent, but oedema, desquamation of superficial epithelial cells and glandular epithelial vacuolisation were present. In 12 samples submucosal oedema was established, and in 4 samples there was mucosal and submucosal oedema. In 7 samples a mild degree of mucosal necrosis was visible. Staining with Giemsa and Warthin-Starry method did not reveal *Helicobacter*-like organisms.

Table 1. Histopathological changes of abomasal samples from fallow deer from Brijuni islands

Animal No.	Desqamation	Edema	Erosions	Connective tissue proliferation	Infiltration	Epithelial vacuolisation	Necrosis	Atrophy
1	-	+	-	+	mononuclear	+	-	-
2	-	+	-	+	mononuclear	+	+	-
3	-	-	-	+	mononuclear mixtocoellular	-	-	-
4	+	+	-	-	mononuclear mixtocoellular	-	+	-
5	-	-	-	-	mixtocoellular	-	+	-
6	+	+	+	+	mixtocoellular	-	+	-
7	+	-	-	+	mononuclear	-	-	-
8	-	+	-	+	mononuclear	-	-	-
9	-	+	+	+	mononuclear	-	-	-
10	+	+	-	-	mixtocoellular	-	-	+
11	-	-	+	+	mononuclear	+	-	-
12	-	+	-	+	mononuclear	+	-	-
13	-	+	-	-	-	+	+	-
14	-	+	+	-	mononuclear	+	+	-
15	-	+	+	+	mononuclear mixtocoellular	-	-	+
16	+	+	+	-	mixtocoellular	-	-	+
17	+	+	-	-	mononuclear	+	-	-
18	-	+	-	-	mononuclear	+	-	+
19	+	+	+	-	mononuclear	+	-	-
20	+	+	+	-	mononuclear	-	-	-
21	+	+	+	-	mononuclear	-	-	-
22	+	-	-	-	mononuclear mixtocoellular	-	+	-
23	+	+	-	-	-	+	-	-

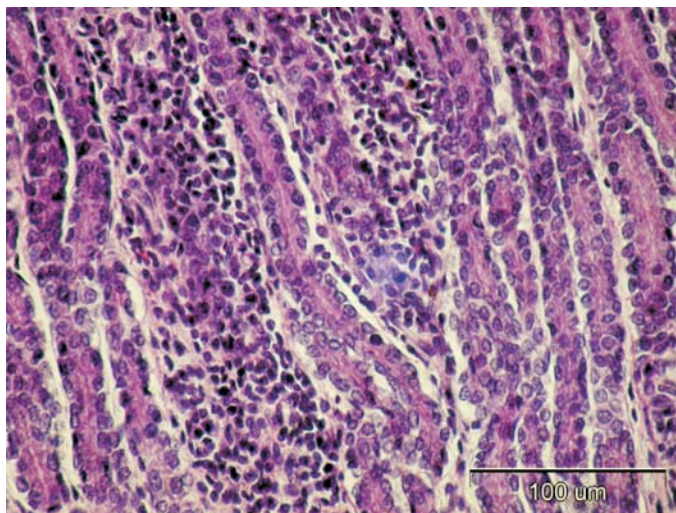


Fig. 1. Mononuclear cells infiltrate in lamina propria. H&E, $\times 40$, (animal No. 12).

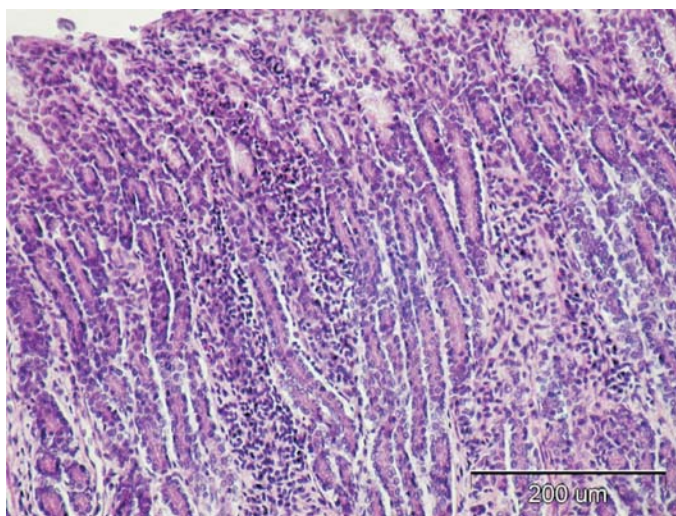


Fig. 2. Mononuclear cells infiltrate and connective tissue proliferation between abomasal glands. H&E, $\times 10$, (animal No. 12).

Discussion

Although fallow deer represent an interesting species, both as wild and hunting animals, literature data on digestive pathology are rare. The available literature regarding digestive tract pathology of the cervidae family (including fallow deer) mainly deals with parasitic invasions (MAJEVSKA et al., 2012; SANTIN-DURAN et al., 2004; BATTY et al., 1987) or bacterial infections (BALSEIRO et al., 2008). SATO and MATSUURA (1998) described gastric mucormycosis in a Sika deer. PALMER et al. (2001) reported on abomasal ulcers in the captive white tailed deer population, attributed to intercurrent diseases in the affected animals. No literature data dealing with *Helicobacter*-like organisms in fallow deer have been published according to our knowledge.

The histopathological changes observed in the abomasal samples from fallow deer from the Brijuni islands we investigated revealed chronic inflammatory changes in 21 and acute inflammatory changes in 2 abomasal samples, which is interesting, since the animals were young (about 1 year old) and appeared healthy. It is noteworthy that they live freely in a National Park, without a natural enemy, essentially free of stressful situations, including predators or humans. Food resources are limited, since in the Brijuni National Park plant cover alterations are forbidden, therefore supplementary food is constantly provided. Since the observed mono and mixtocellular infiltrates resembled those established in dogs with infections by *Helicobacter*-like organisms (ROBIĆ et al., 2007.), the Giemsa and Warthin-Starry methods were applied to eliminate these organisms as an aetiological factor. Nevertheless all the samples were negative on both staining methods. The histopathological findings in all the abomasa samples examined presented with very similar morphology, therefore it is reasonable to conclude that the same aetiological factor was responsible for all the findings. Unfortunately we were not able to identify it. The histopathological findings in the abomasal samples examined were not similar to those of other common forms of abomasitis in ruminants. Further investigation is needed to determine the cause of abomasitis in fallow deer from the Brijuni islands.

References

- BALSEIRO, A., J. F. GARCIA MARIN, P. SOLANO, J. M. GARRIDO, J. M. PRIETO (2008): Histopathological classification of lesions observed in natural cases of paratuberculosis in free-ranging fallowdeer (*Dama dama*). *J. Comp Pathol.* 138, 180-188.
- BATTY, A. F., D. I. CHAPMAN, N. CHAPMAN (1987): Prevalence of nematode parasites in wild fallow deer (*Dama dama*). *Vet. Rec.* 120, 599.
- CURRY, A., D. M. JONES, J. ELDRIGE (1987): Spiral organisms in the baboon stomach. *Lancet* 2, 634-635.
- EATON, K. A., M. J. RADIN, L. KRAMER, R. WACK, R. SHREDING, S. KRAKOWKA, J. G. FOX, D. R. MORGAN (1993): Epizootic gastritis associated with gastric spiral bacilli in cheetas (*Acinonyx jubatus*). *Vet. Pathol.* 30, 55-63.

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- FOX, J. G., C. A. DANGLER, W. SAGER, R. BORKOWSKI, J. M. GLIATTO (1997): *Helicobacter mustelae* associated gastric adenocarcinoma in ferrets (*Mustela putorius furo*). Vet. Pathol. 34, 225-229.
- GELBERG, H. B. (2007): Alimentary tract. In: Pathological basis veterinary disease. (McGavin, M. D., J. F. Zachary, Eds.). Mosby Elsevier, St. Louis, pp. 330-341.
- GILBERT, C. A., ROPIQUET, A. HASSANIN (2006): Mitochondrial and nuclear phylogenies of Cervidae (Mammalia, Ruminantia): Systematics, morphology, and biogeography. Mol. Phylogen. Evol. 56, 101-117.
- LEE, A., S. KRAKOWKA, J. G. FOX, G. OTTO, K. A. EATON, J. C. MURPHY (1992): Role of *Helicobacter felis* on chronic canine gastritis. Vet. Pathol. 29, 487-494.
- MAJEWSKA, A. C., P. SOLARCZYK, B. MOSKWA, W. CABAJ, W. JANKOWSKA, P. NOWOSAD (2012): *Giardia* prevalence in wild cervids in Poland. Ann. Parasitol. 58, 207-209.
- PALMER, M. V., W. R. WATERS, D. L. WHIPPLE (2001): Abomasal ulcers in captive white tailed deer (*Odocoileus Virginianus*). J. comp. path. 125, 224-227.
- QUIEROZ, D. M., G. A. ROCHA, E. N. MENDES, S. B. DE MOURA, A. M. DE OLIVEIRA, D. MIRANDA (1996): Association between *Helicobacter* and gastric ulcer disease of the pars esophagea in swine. Gastroenterology 111, 19-27.
- ROBIĆ, M., B. ARTUKOVIĆ, A. BECK, A. GUDAN, A. SVETINA, Ž. GRABAREVIĆ (2007): Histopathological changes in stomach of dogs with naturally acquired *Helicobacter* infection. Vet. arhiv 77, 103-111.
- SANTIN-DURAN, M., J. M. ALUNDA, E. P. HOBERG, CONCEPCION DE LA FUENTE (2004): Abomasal parasites in wild sympatric cervids, red deer, *Cervus elaphus* and fallow deer, *Dama dama*, from three localities across central and western Spain: relationship to host density and park management. J. Parasitol. 90, 1378-1386.
- SATO, Y, S. MATSUURA (1998): Gastric mucormycosis in a sika deer (*Cervus nippon*) associated with proliferation of *Clostridium perfringens*. J. Vet. Med. Sci. 60, 981-983.
- SCHLEGEL, B. J., V. J. NOWELL, V. R. PARREIRA, G. SOLTES, J. F. PRESCOTT (2012): Toxin associated and other genes in *Clostridium perfringens* type A isolates from bovine clostridial abomasitis (BCA) and jejunal hemorrhage syndrome (JHS). Can. J. Vet. Res. 76, 248-254.
- SHEEHAN, D. C., B. B. HRAPCHAK (1980): Theory and practice of histotechnology. Battelle Press, Columbus, Richland.

Received: 3 June 2015
Accepted: 10 December 2015

ROBIĆ, M., A. BECK, M. BELIĆ, R. TURK, B. ARTUKOVIĆ: Histopatološke promjene u sirištima jelena lopatara na Brijunima - kratko priopćenje. Vet. arhiv 86, 265-271, 2016.

SAŽETAK

Istraživanje je provedeno da bi se ustanovile patohistološke promjene u sirištima jelena lopatara (*Dama dama*) s brijunskog otočja i eventualna prisutnost *Helicobacter* vrsta u ove vrste, budući da je malo literaturnih podataka koji se tiču patohistoloških promjena u sirištu. Pregledom literature nismo pronašli niti jednu referencu o prisutnosti *Helicobacter* vrsta u jelena lopatara. Istraživanje je provedeno na 23 uzorka sirišta mladih odraslih jedinki (starosti oko godinu dana), žrtvovanih u redovitom odstrelu. U svim uzorcima ustanovljene su upalne promjene u sirištu. Patohistološki nalazi svih pregledanih uzoraka bili su slični, što ukazuje na epizootsku prirodu bolesti, te sličnost nalazima u želucima pasa inficiranih helikobakteru sličnim organizmima. Međutim, u sirištima jelena lopatara nakon obrade odgovarajućim tehnikama bojenja nismo ustanovili *Helicobacter* vrste, te zaključujemo da je etiološki čimbenik odgovoran za promjene nepoznat.

Ključne riječi: jelen lopatar, patohistološke promjene, sirište
