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A TRAUMA CASE REPORT AND INCIDENTAL FINDING OF HYPODERMA PARASITISM IN A FREE-RANGING ROE DEER (CAPREOLUS CAPREOLUS)

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Abstract

Deer motor vehicle-crush (dMVC) trauma is a significant cause of death in free-ranging populations including tissue disruptions, organ dysfunctions and cellular damages. The present case describes the gross lesions of a Capreolus capreolus with death in suspicious circumstances. Supplementary information was provided by the police concerning the place (hunting area) and the circumstances of the accident. Radiological examination revealed multiple ante mortem (head, neck and costal) and postmortem (anterior members) fractures. The most relevant lesions observed in gross investigations were the multiple fractures and characteristic motor vehicle accident with skin abrasions and subcutaneous suffusions. Hemorrhagic effusions were remarked in the abdominal and thoracic cavities due to liver rupture (entirety transdiaphragmatic herniation) and lung perforation by rib fracture. Incidental, were found dorsal in thoracic and lumbar regions larvae of Hypoderma diana (n=93) causing myiasis in roe deer. Concerning the results from examinations, the cause of death was the hemorhagic shock due to politraumatism caused by car accident.

Key words*: deer, dMVC, Hypoderma larvae, trauma, case report.*

INTRODUCTION

The roe deer *(Capreolus capreolus)* is reddish brown in colour during summer but in the winter they become grey, pale brown or even black. Males are larger than females and have short antlers, usually with three points. The roe deer is widespread and common, and is expanding in many areas (Lorenzini et. al., 2002). It occupies a wide variety of habitats, including deciduous, mixed or coniferous forests, arable land, and suburban areas with large gardens (Stubbe, 1999).

In the first half of the last century the roe deer from Southern Europe almost endangered because of habitat loss and overexploitation, but its numbers started increasing again 20-40 years ago because of countryside abandonment, improved hunting regimes and reintroductions (Lorenzini et al).

Car accidents involving wildlife animals are a serious and growing problem in Europe (Montgomery, 2012). They pose a risk for human life and may result in mortal victims, damage to vehicles and the loss of wildlife (Lagos, 2012).

The rate of these traffic accidents may be related to a number of factors such as traffic volume, technical aspects of roads, vehicle speed, time of day or the animal's motivation for crossing the road (Kusta 2014) This paper is the first to report data on deer Motor Vehicle Crush (dMVC) in Romania.

MATERIALS AND METHODS

A free-ranging roe deer (2½-years-old male of *Capreolus capreolus*) weighting around 28 kg, body lenght of 114 cm was submitted for postmortem investigations: radiography, necropsy and parasitological exams. The person who brought the deer described that it was found dead in a forest area during a routine control. Parasitological investigations were focused on identification of the cutaneous parasites (larval stages of bot flies).

The specimens were counted, isolated and preserved in formaldehyde 10% solution.

RESULTS AND DISCUSSIONS

Postmortem changes (relaxation, corneal opacification and hemoglobin imbibitions) prove a period of approximately 48±8 hours after the installation of death.

The radiological examination revealed fracture at the base of skull, diastase fracture of the occipito-parietal, temporo-parietal and sphenoid-temporal symphisis (Figure 1). Associated to the skull base fracture, the X-ray reveals emphysema in that zone.

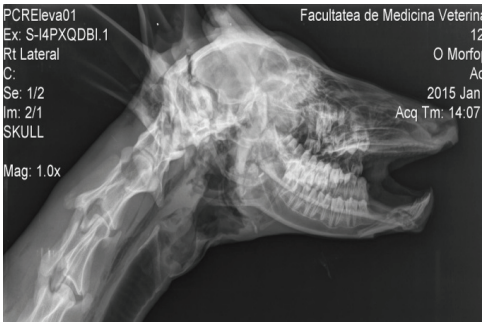

Figure 1 Radiological examination revealed diastase fracture of the occipito-parietal, temporo-parietal.

The part of the right limb shows an open spiroid diaphyseal metacarpus fracture. The left forelimb displays a spiroid diaphyseal metacarpus fracture and multiple diaphyseal fractures of the radius and ulna proximal epiphysis.(Fig. 2)

The radiographs demonstrate the presence of fluids in the abdominal and thoracic cavity and air in the connective tissue (subcutaneous emphysema).

General appearance attests a good maintenance.

The fur was gray and lusterless, presented depilated areas, with blood stains on the neck and interscapular, and a white spot near the tail (perianal-distinctive for males).

The thoracic and lumbar skin (after fur trimming) points out 89 wounds about 2-3 mm in diameter. Some of this wounds were blocked with larvae of *Diptera*: *Oestridae* (myasis-causing flies). A total number of 93 third instars larvae of *Hypoderma diana* were recovered, with size of 10-15 mm lenght and 2-3 mm width (Figures 3,4).

Fig. 2 –Radiological examination The left forelimb displays a spiroid diaphyseal metacarpus fracture and multiple diaphyseal fractures of the radius and ulna proximal epiphysis. The right limb shows an open spiroid diaphyseal metacarpus fracture

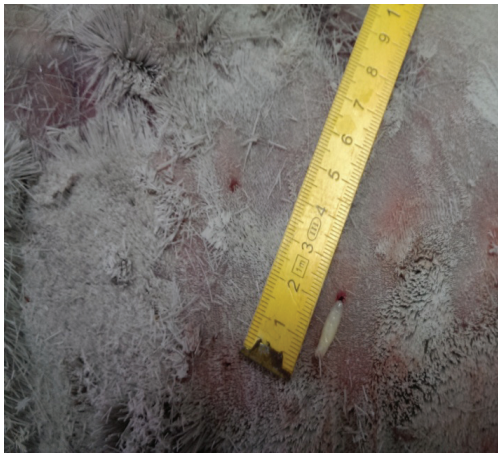

Figure 3 –*Hypoderma diana* - *larvae* in lumbar skin

The skin revealed antemortem laceration areas on the neck (dorsal and ventral), dorsal on the chest at T8-T13. Postmortem lesions were made up by abrasion areas with varied sizes from 2-3 cm to 26 cm arround the entire body surface (chest, abdomen, limbs) (Figure 4).

Figure 4 – Macroscopic examination lacerations and abrasions

Connective tissue presented specific morphologicaly aspects of bleeding expressed as hematoma and subcutaneous emphysema prevailing in the right thoracic and cervical area.

Muscle tissue associated to the apendicular skeleton is well developed. The thorax muscle was affected by the fractured 7th rib that penetrated the right hemithorax causing laceration, suffusions and subcutaneous emphysema (Figure 5).

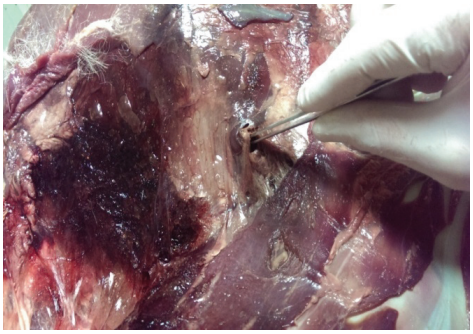

Figure 5 – The right hemithorax, rib fracture which caused laceration, suffusions and subcutaneous emphysema

Bone tissue reveals multiple fractures before death in the cervical area (atlas), costal zone (seriated ribs fracture 7-13 on the right side and 8-13 on the left side). Because the rib fractures were located on to the chondro-costal joint, it means that they were produced by crushing and it was the outcome of a compression on the breastbone or on the distal ends of the ribs (a small range from the chondro-costal joint) (Figure 6). Postmortem fractures were identified at the forelimbs (humerus, radius, ulna and metacarpus) with partially avulsion.

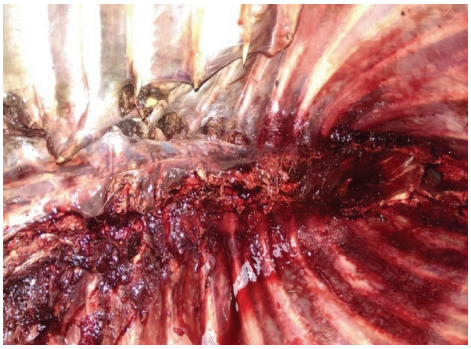

Figure 6 Rib fractures were located on to the chondro-costal joint

The diaphragm presents multiple ruptures, represented by partial circumferential rupture (insertion area on the right hypochondria), radial rupture, that creates a large communication between the thoracic and abdominal cavity, with the possibility that the organs from abdominal cavity to migrate in the thoracic space due to a powerful abdominal compression (Figure 7).

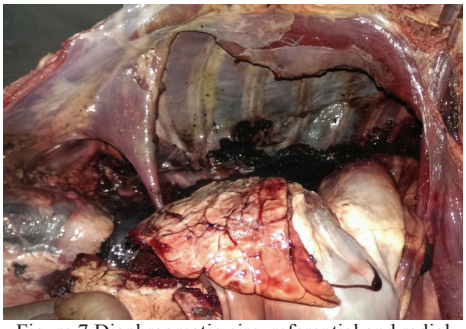

Figure 7 Diaphragmatic circumferential and radial rupture.

Thoracic cavity presented transdiaphragmatic herniation of the liver and a portion of polygastric complex. Thoracic space indicated clotted blood accumulation (pneumo-haemothorax) resulted from the rupture of the liver and lung. Larynx, trachea and the main bronchi presented huge amounts of clotted blood, resulted from the lung rupture.

The lung had multiple ruptures at the right diaphragmatic lobe caused by the broken peaks ribs with secondary pneumohemothorax.

About 75-80% of the lung expresses the lack of air from the lobes, elastic consistency, without crepitation). Mediastinal space contains a moderate quantity of clotted blood (mediastinal hematoma).
Abdominal cavity shows blood accumulation (haemoperitoneum) resulted from the liver rupture. The omentum shows blood infiltrations due to the overflow of blood in abdomen.
Liver presented multiple rupture areas, with total migration from abdominal cavity in thoracic cavity (Figure 8)

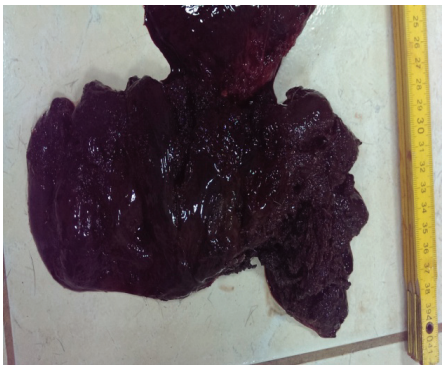

Figure 8 Liver rupture

Rumen, omasum and abomasum occupy the thoracic space. This abdominal position change is the consequence of the diaphragm rupture.
The kidneys presents discontinuous renal capsule. This lesion was produced after the death of the animal because there was not any vital reaction.
The bones that define the base of the skull show multiple fractures. Face bones shows multiple fractures with muscle laceration. The tongue points out ample laceration on the right edge, because of the teeth rupture. Pharynx and the soft palate presented ample laceration of the mucosis and underlying tissues that created a communication with the skull base. The hyoid has bilateral fracture of the epihyoid. Along with the brain injury, necropsy shows numerous issues which advocate for the traumatized individual, represented by multiple fractures. The head injury could be the primary inflict.
At the necropsy were identified several abnormalities that are part of the traumatic pathology, with multiple injuries caused by violence.
The diaphragm and liver rupture, with its total shift in the thoracic cavity and the bleeding after the rupture of organs, resulted because of the high-pressure exerted on the abdomen. It is emphasized that these lesions has the highest degree of specificity and is associated to road accidents in which the vehicle is passing over the victim's abdominal cavity.
Pulmonary rupture was the effect of the fractured ribs which resulted consecutively the thoracic compression.
In the case of kidneys the capsule rupture was made after the death of the animal, the same in the case of the fracture of the forelimbs.
Taking as reference point the trauma moment, we remarked 3 time slots: previously (head and thorax), simultaneously (thorax and abdomen) and subsequently (limbs) trauma (Ciobotaru, 2013).
The presence of parasites in the subcutaneous level hasn't played a major role in inducing the death of the animal; these are causing myasis (parasitic disease caused by the infestation with larvae of bot flies which later erupt on the skin surface). However, it is well known that hypodermosis affects livestock production and wild ruminant welfare, not only by inducing pathology in internal organs and skin but also by impairing the host's immune system.
Larvae of *Hypoderma* affect wild and domesticated ruminants including cattle, buffaloes, sheep, goats, deer and reindeer. In Europe, the most common hypodermoses in wild animals are caused by *Hypoderma diana* and *Hypoderma actaeon* in roe deer and red deer and *Hypoderma tarandi* in reindeer (Otranto et al., 2003).
In Romania, *H. diana* has been reported in roe deer, in Northwestern areas of country (Ilie et al., 2012).

CONCLUSIONS

The necropsy revealed the presence of cranio-cerebral, thoracic and abdominal polytrauma. Given the heterogeneous nature and the varied placement of the lesions, we can affirm that the examined animal was the victim of a road accident with repeated blows.

Forelimbs and kidney lesions were produced after the death of the animal, while the remaining lesions taken separately are representing possible cause of death:

1- cranio-cerebral trauma caused damage to the central nervous system, followed by blocking the cardio-respiratory activity.

2- hemoragic shock caused by the rupture of the liver and lungs.

3- transdiaphragmatic herniation of the liver and the polygastic complex induced death by asphyxia due to compression of the lung.

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