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ENCEPHALITIS: CLINICAL APPROACH TO DIAGNOSIS AND A CASE SERIES REPORT

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Abstract

Encephalitis represents inflammation of the brain tissue and is a common disease that affects especially the small-breed dogs. For a proper diagnostic, the patient history accompanied by a general and neurological examination are important elements. If neurological signs specific for forebrain localization are present, then a suspicion of an inflammatory lesion should be taken into consideration for the differential diagnostic list. For encephalitis, the list of differential diagnostic includes meningoencephalites of unknown origin (necrositing meningoencephalitis, granulomatous meningoencephalitis, eosinophilic encephalitis) and infectious meningoencephalites (bacterial, fungal, rickettsial and viral). In 2018, more than 200 cases presenting neurological disorders were diagnosed in the Faculty of Veterinary Medicine of Bucharest. Considering the fact that encephalitis was a common diagnostic among these cases, this paper includes a presentation of predisposition factors and also clinical aspects that we used for a proper diagnostic approach.

Key words*: neurological examination, sterile encephalitis, infectious encephalitis, forebrain disease.*

INTRODUCTION

Encephalitis represents inflammation of the brain tissue and is one of the most common finding included in the forebrain pathology among the patients presented in the Clinic of the Faculty of Veterinary Medicine of Bucharest with neurological signs.

The etiology of encephalitis includes an infectious type (viral, bacterial, protozoal, rickettsial and fungal) and a noninfectious or autoimmune type (granulomatous meningoencephalitis, necrotizing meningoencephalitis, necrotizing leukoencephalitis, eosinophilic meningoencephalitis) (de Lahunta et al., 2015).

Considering the fact that clinical signs are rarely specific, elements like history and physical examination succeeded by a correct and complete neurological examination were performed for every patient and the neuroanatomic diagnosis was established. In patients with forebrain lesions, we performed the differential diagnosis using acronym „VITAMIND" (vascular, inflammatory/ infectious, traumatic, anomaly, metabolic, idiopathic, neoplastic, degenerative) and we have established the paraclinical investigations required in order to establish an etiological diagnosis (Dewey & da Costa, 2016).

Considering these facts, this paper aims to present a detailed analysis of the cases diagnosed with encephalitis (both infectious and sterile) during the year 2018: the diagnostic approach and the factors that were correlated with the disease onset.

MATERIALS AND METHODS

In order to perform a correct analysis of the cases consulted during the year 2018, a consultation protocol has been implemented. The protocol included certain stages, whose order has been strictly followed: animal signalment, history, physical and neurological examination, neurolocalisation of the disease, differential diagnosis, recommendations of paraclinical investigations and, in the end, etiological diagnosis (or a suspicion diagnosis when the etiological diagnosis could not be established).

The period analysed in this study was 1 of January 2018-31 of December 2018.

All cases have been registered in the Consultation Register and the collected data

have been statistically analysed, so the conclusions reflect the most important factors that are correlate with encephalitis in our clinic.

RESULTS AND DISCUSSIONS

Among the 1900 cases that were diagnosed in the Clinic of the Faculty of Veterinary Medicine of Bucharest, for this study we have chosen 209 cases with predominant neurological signs specific for a certain region of the brain (10.96 % from the total number of cases).
For a better understanding of the diagnostic protocol, we will present in detail every stage of the neurological examination protocol.

I. Animal signalment

Regarding the fact that encephalitis with unknown origin is specific for small dog breeds, while viral encephalitis is more common in young, unvaccinated dogs - species, breed, age and gender are important elements for this stage of the examination.
For the 130 cases diagnosed with encephalitis, the results for the factors includes in the signalment of the animal are shown in Table 1.

Table 1. The distribution of cases by species, breed, age and gender

CRITERIA	NUMBER OF ANIMALS			
SPECIES	Canine 120		Feline 10	
DOG BREEDS	Small purebred dogs 54	Large purebred dogs 23	Mixed breed dogs 43	
AGE	Under 1 year 11	1 to 5 years 60	6 to 10 years 30	Above 10 years 19
GENDER	Male 73		Female 47	

Considering the species, the number of examined dogs with forebrain lesions was significantly larger than the number of cats: 92.3% dogs and 7.7% cats.
It is widely known that the reported cases of cats with encephalitis are fewer than dog cases. Furthemore, in cats the etiology of encephalitis implies, most of the time, an infectious agent (Bradshaw et al., 2004; Georgescu et al., 2009; Singh et al., 2005).
The number of small purebred dogs was higher than large purebred dogs or mixed breed dogs: 45% small purebred dogs, 36% mixed breed dog and 19% large purebred dogs, as is shown in Chart 1.

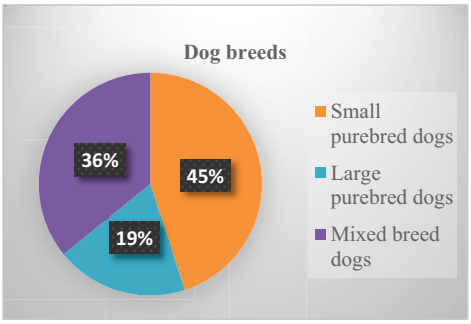

Chart 1. Distribution of dogs according to their breed

The breeds includes in small purebred dogs were: Bichon Maltese - 18 cases, Shih-Tzu - 9 cases, Chihuahua - 7 cases, Pug - 6 cases, French Bulldog - 6 cases, West Highland white terrier - 3 cases, Yorkshire Terrier - 2, Basset Hound, Beagle, Cocker Spaniel - 1 case of each.
The explication for the large number of small purebred dog affected is that they have a genetic predisposition for developing meningoencephalitis of unknown origin (Greer et al., 2010; Schrauwen et al., 2014).
According to the age, the juvenile dogs were more affected than older dogs (59.16% dogs of age 1-5 year old).
The distribution of cases according to the gender was: 60.83% males and 39.17% females.

II. History

The history of the animal included the group of signs that led the owner to the consultation. In addition, we used a template in order to obtain important details in a logical order, with a series of essential questions:

- If vaccination and deworming schedule was complete;
- The time when the animal was last normal and the progression of signs (improving, stabilizes, worsening);
- If there was an interaction with other animals before the onset of the disease;
- Is there was a history of other body systems conditions;
- If any medication was administered until the moment of examination;

- If there was a travel history in order to rule out vector-borne, parasitic or saprophytic exposure.

The most common elements of the history for the patients with encephalitis were: a sudden onset of disease, with progressive clinical signs (from days to weeks) and epileptic seizures (out of 130 patients, 48 patients had seizures – 36.92%).

III. Physical and neurological examination

Physical examination included inspection, palpation, auscultation, body temperature and the assessment of the respiratory movements, pulse, coat, skin and mucous membranes aspect, as it already have been described (Vlăgioiu & Tudor, 2012).

Physical examination before neurological examination was mandatory for every case, because it helped us to exclude a systemic disease that could have evolve with neurological signs.

Neurological examination included assessment of the: mental status and behaviour, posture, cranial nerves, proprioception, gait and other abnormal movements, spinal reflexes, panniculus and perianal reflex.

The most common neurological deficits present in patients with encephalitis were: a depressed/ confused mental status, head turn ipsilateral to the forebrain lesion, head pressing, abnormal movements like circling in large circles, dromomania, and contralateral blindness with normal pupillary light reflex, cranial nerve abnormalities and proprioception deficits in contralateral limbs. In cases with diffuse or multifocal lesions, the neurological signs where unspecific and common for the affected regions of the brain (Figures 1 and 2).

Figure 1. A young dog with the head turn on the left side and depression. The PCR was positive for Distemper

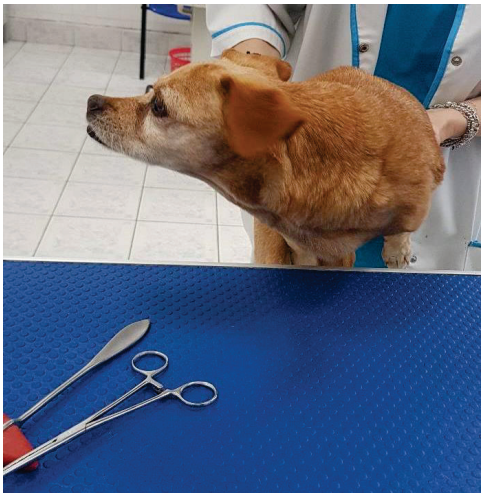

Figure 2. A dog with depression, head turn on the right side and lack of response at the proprioception tests

IV. Neurolocalisation of the disease

After the physical and neurological examination was completed, all the findings were correlated in order to localise the lesion in one of the four regions of the brain: forebrain, cerebellum, brain stem and vestibular apparatus (Figure 3) (Turbatu et al., 2018).

From the 209 cases included in the study, in 130 cases the lesion was localised in the forebrain, in 22 cases the localisation was in the vestibular apparatus, 8 cases had a cerebellar localisation and 3 cases a brain stem localisation. The rest of the patients - 46 were diagnosed with diseases that affect the peripheral nervous system and are not the subject of this study.

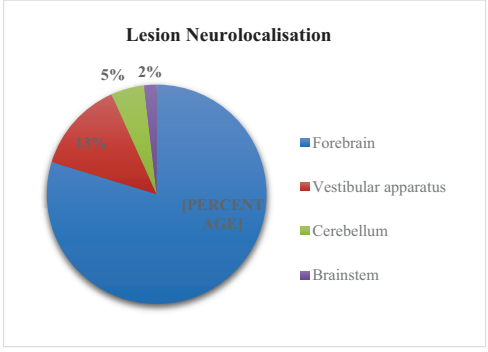

Figure 3. Distribution of cases according to the neuroanatomical localisation

V. Differential diagnosis and paraclinical investigations

For every patient, after the precise localisation of the lesion, a list of differential diagnoses has been taken into consideration using the acronym VITAMIND (Vascular, Inflammatory, Trauma, Anomaly, Metabolic, Idiopathic, Neoplasia and Degenerative).

The vascular pathology implied for the differential diagnosis the stroke and the brain hypoxia, but usually both have a sudden onset and specific clinical and neurological signs.

The inflammatory pathology was the main suspicion for cases with subacute-chronic and progressive onset, asymmetric or multifocal signs and often pain (vocalisations).

Trauma was revealed from the anamnesis and was characterised by a sudden onset, rarely progressive, with a specific localisation of the lesion. Often, acute injury of the brain was associated with oedema and fulminant symptoms (Fernoagă, Codreanu & Cornilă, 2013).

Anomalies are development disorders and are usually slow progressive. The main anomaly that could have been taken into consideration for the differential diagnosis list was hydrocephaly. However, hydrocephalus occurs early in life the animal and involves significant morphological changes.

For the metabolic aetiology, differential diagnosis implied disorders like hepatic encephalopathy, congenital portosystemic shunt, organic acidaemias or hypoglycaemia. (Fitzmaurice, 2010). In this case, the neurological signs were symmetric and there were multiple signs of a systemic involvement.

The idiopathic differential list included specific diseases like Horner syndrome or idiopathic epilepsy. However, the idiopathic aetiology was suspected in cases in which no other underline cause of the illness could be found.

The neoplasia was always on the list because of the asymmetric, progressive evolution of the neurological sign. In order to rule out the neoplasia, we always perform the MRI.

The degenerative aetiology implied deposition diseases, which do not appear often in the brain. The clinical manifestation was always symmetric.

For our cases, after establishing the list of differential diagnoses, the next step was to perform a series of paraclinical investigation in order to establish the correct diagnosis, and when was possible, the etiological diagnosis.

In all patients, we recommended: cardiologic and ophthalmologic examination, tests of the blood that included hematology, serum biochemistry and bile acids, thoracic/ abdominal imaging, urine PCR for infectious diseases, MRI and cerebrospinal fluid analysis in order to confirm inflammation.

Due to the high financial costs these investigations involve, many times we had to choose to perform the ones that are the most sensitive and that offer a quick answer.

From the 130 cases with forebrain diseases, we confirm Distemper Virus (CDV) in 15 cases (11.53% from the total number of cases) using urine PCR (Saito et al., 2006).

The patients with Distemper were younger dog (less than one year old) with signs of acute encephalitis and myoclonus.

CONCLUSIONS

To establish the diagnosis of encephalitis, all stages of the diagnostic protocol should be strictly followed.

The number of cases with neurological signs diagnosed during the year 2018 had a significant percentage from the total number of cases (10.96%).

Considering the species, the number of examined dogs with forebrain lesions was significantly larger than the number of cats: 92.3% dogs and 7.7% cats

The number of small purebred dogs was higher than large purebred dogs or mixed breed dogs: 45% small purebred dogs, 36% mixed breed dog and 19% large purebred dogs

According to the age, the juvenile dogs were more affected than older dogs (59.16% affected dogs 1-5 year old).

The distribution of cases according to the gender was: 60.83% males and 39.17% females.

From the 130 cases with lesions localised in the forebrain (80%), Distemper Virus (CDV) was confirmed in 15 cases (11.53%) using PCR.

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