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Original paper

Canine eosinophilic bronchopneumopathy: case study

LUCIAN IONIȚĂ¹, ALEXANDRA BRAICA², CĂȚĂLIN MICȘA¹,
NATALIA RĂDULEA¹, ROXANA TURCU¹, ELENA ROMAN¹,
ANDREEA NICOLETA MINCĂ¹, CARMEN IONIȚĂ^{1*}

¹University of Agronomic Science and Veterinary Medicine of Bucharest, Romania.

²“Vasile Goldiș” Western University of Arad, Romania.

Abstract

Eosinophilic bronchopneumopathy, formerly known as PIE (Pulmonary Infiltration with Eosinophils) syndrome, is defined as an inflammatory pathology characterized by the presence of eosinophilic infiltrate in the lungs and bronchiolar structures. (CECILE CLERCX,2007). Canine eosinophilic bronchopneumopathy has been described similarly to that present in humans, highlighting tropism for the airways and lungs, but also the multitude of factors with the potential to trigger, which is why most of them are ranked with idiopathic factor. (Sol Kim et al,2021). Cases of eosinophilic bronchopneumopathy have been identified in most canine breeds, and according to current studies, the predisposition for large breeds under the age of 6, such as rottweilers, Siberian Husky and Alaskan Malamute, has been reported. (C. Clercx 2017). The present case is represented by a male, canine, of the Husky breed, who showed clinical respiratory signs, these were correlated with complementary examinations such as laboratory examinations, cardiological examination, radiological and endoscopic examination. Based on the haematological results, which present a marked eosinophilia, a differentiated diagnostic protocol was achieved compared to possible parasitosis and reactions of autoimmune type. Differential clinical diagnosis was made against dirofilariosis, angiostrongilosis, lupus erythematosus, mycotic pneumopathies. PCR technique was used to determine the possible parasites present, sample collection with the help of endoscopy from the pulmonary infiltrate with cytological examination. The diagnosis of certainty was established on the basis of histopathological examination. He underwent treatment with corticosteroids, the evolution being favorable within 14 days of initialization of the treatment, with complete healing.

Keywords

Dogs; Husky; Eosinophilic reactions; Immunological response; Respiratory diseases.

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✉ *Corresponding author: Associated Prof. CARMEN IONIȚĂ, University of Agronomic Science and Veterinary Medicine of Bucharest, Splaiul Independenței nr 105.
E-mail: ionitacarmen63@yahoo.com

Introduction

The acquired immune system, by its excessive action, can produce inflammatory reactions with secondary tissue destruction, autoimmunization or amyloidosis. The reactions were classified into 4 basic types:

- Type I reaction - Immediate hypersensitivity
- Reaction type II - Antibody-mediated cytotoxics
- Reaction type III - Based on antigen-antibody complexes
- Type IV reaction - Cell-mediated immune reactions (Merck Veterinary, page 823)

Eosinophilic bronchopneumopathy is classified as a localized immediate hypersensitivity reaction and is frequently associated with inflammatory infiltrates in the lung, marked eosinophilia at the peripheral blood level and increased changes in serum globulins.

Pulmonary eosinophilia can occur in response to parasitic diseases (for example, *Dirofilaria Spp*, *Dirofilaria immitis*, *Angiostrongylus vasorum*), fungal (for example, *Aspergillus*), neoplastic (neoplastic formations in the upper or lower respiratory tract) or as an immunological response to external stimuli (foreign body, powders, etc.).

The cited clinical changes include changes in the general condition (apathy, exercise intolerance, breathlessness, decreased body weight) and changes in the respiratory system such as the presence of mucus in the upper respiratory tract, coughing, jetting, “wheezing”.

This study focuses on establishing the diagnosis and correlating it with minimally invasive methods (ultrasound, X-ray, endoscopy, and laboratory examinations).

Differentiated clinical diagnosis consists in the exclusion of migratory or stationary parasitosis in the lung, pneumopathies or cardiopathies.

Materials and Methods

Data about the environment and the owner: Urban environment, lives in the apartment, the owner supports the lack of other allergenic factors such as: cigarette smoke, detergents, room perfume, etc.



Figure 1. The patient in the consultation room

Patient data: Canine, Siberian Husky, male aged 6 years, 32 kg at the time of the first consultation, without known allergies.

Anamnesis: Presented in the clinic for general consultation, showing cough with occasional progressive bronchorrhea, progressive dyspnea, respiratory noises, weight loss, intolerance to moderate and low efforts. Appetite present, defecates and urinates normally.

Clinical data:

General clinical examination: good maintenance condition, proper conformation, altered general condition, apparent pink-normal mucous membranes, body temperature 38°C, no lymphonodal reaction on palpation, no visible lesions in the chest, neck or skull. At the auscultation of the heart does not show pathological breath, at the auscultation of the pulmonary area a breath is perceived, it presents cough with bronchorrhea, without pathological secretions at the level of the nostrils.

Table1. Biochemical examination results:

Test	Results	Reference Interval	LOW	NORMAL	HIGH
Catalyst Dx (April 15, 2022 2:53 PM)					
GLU	96 mg/dL	74 - 143			
CREA	0.9 mg/dL	0.5 - 1.8			
BUN	18 mg/dL	7 - 27			
BUN/CREA	18				
PHOS	4.2 mg/dL	2.5 - 6.8			
CA	9.7 mg/dL	7.9 - 12.0			
TP	7.3 g/dL	5.2 - 8.2			
ALB	3.0 g/dL	2.3 - 4.0			
GLOB	4.3 g/dL	2.5 - 4.5			
ALB/GLOB	0.7				
ALT	73 U/L	10 - 125			
ALKP	197 U/L	23 - 212			
GGT	8 U/L	0 - 11			
TBIL	0.2 mg/dL	0.0 - 0.9			
CHOL	146 mg/dL	110 - 320			
AMYL	419 U/L	500 - 1500	LOW		
LIPA	1147 U/L	200 - 1800			

Table 2. Haematological examination results:

Test	Results	Reference Interval	LOW	NORMAL	HIGH
ProCyte Dx (April 15, 2022 2:46 PM)					
RBC	7.27 M μ L	5.65 - 8.87			
HCT	47.7 %	37.3 - 61.7			
HGB	16.3 g/dL	13.1 - 20.5			
MCV	65.6 fL	61.6 - 73.5			
MCH	22.4 pg	21.2 - 25.9			
MCHC	34.2 g/dL	32.0 - 37.9			
RDW	23.1 %	13.6 - 21.7			
%RETIC	1.0 %				
RETIC	69.8 K μ L	10.0 - 110.0			
RETIC-HGB	24.2 pg	22.3 - 29.6			
WBC	25.53 K μ L	5.05 - 16.76			HIGH
%NEU	45.9 %				
%LYM	15.2 %				
%MONO	4.2 %				
%EOS	34.4 %				
%BASO	0.3 %				
NEU	11.75 K μ L	2.95 - 11.64			HIGH
LYM	3.87 K μ L	1.05 - 5.10			
MONO	1.07 K μ L	0.16 - 1.12			
EOS	8.77 K μ L	0.06 - 1.23			HIGH
BASO	0.07 K μ L	0.00 - 0.10			
PLT	159 K μ L	148 - 484			
MPV	13.6 fL	8.7 - 13.2			HIGH
PDW	13.2 fL	9.1 - 19.4			
PCT	0.22 %	0.14 - 0.46			

Results SNAPshot 4Dx and blade/blade:
 Immitis Ag - Undetected
 Anaplasma spp. AgIgG- Areactiv
 B. Burgdorferi AgIgG- Areactiv
 Ehrlichia spp. AgIgG- Areactiv
 Negative microfilarias - blade/slide test

Table 3. Results SNAPshot 4Dx and blade/blade:

Test	Results
SNAPshot Dx (April 15, 2022)	
AP_spp	Negative
EC-EE	Negative
HW	Negative
Lyme	Negative

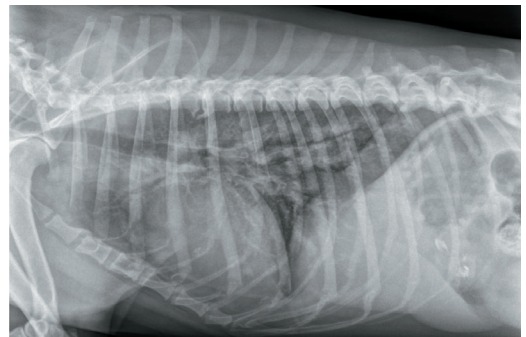


Figure 2. Radiographic image view LL- right

It is recommended complete biochemical and hematological examination, SNAPshot 4Dx, radiography of the skull, neck and chest.

It is observed changes at the level of pancreatic amylase - 419 U / L (reported to 500-1500 U / L), without other biochemical changes, but it is found that the globulins are at the upper limit - 4.3g / dL (reported to 2.5-4.5 g / dL).

During the haematological examination, significant changes were found in the white line, also called the line of defense, represented by WBC = 25.53 K/ μ L (relative to 5.05-16.76 K/ μ L), NEU=11.75 K/ μ L (relative to 2.98-11.64 K/ μ L), EOS=8.77 K/ μ L (relative to 0.06-1.23 K/ μ L), MPV=13.6 fL (relative to 8.7- 13.2 fL), thus identifying an important increase that marks obvious eosinophilia and mild neutrophilism. Taking into account the present results, I would also like to highlight the values of monocytes and basophils at the upper limit.

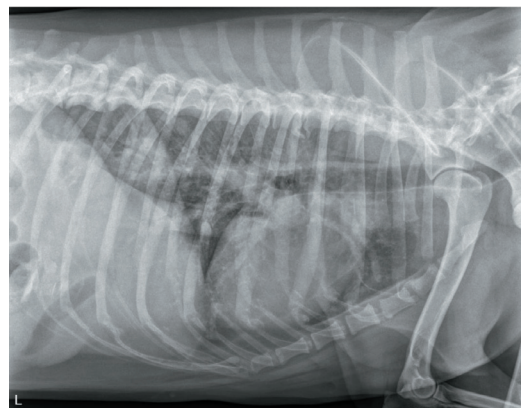


Figure 3. Radiographic image view LL- left

Chest radiographic image:

Radiographically, the broncho-alveolar pattern is observed, with highlighting the bronchogram and thickening of the bronchiolar walls.

Following the laboratory results and the radiographic examination, we decided the need to perform a complete cardiological examination from which the following conclusions resulted:

- Lack of important morpho-functional changes from the hemodynamic point of view
- Low systolic pulmonary arterial hypertension (without a pathology of the left heart present)
- Dilation of the pulmonary trunk and lower left and right pulmonary arteries
- ECG: sinus rhythm
- Average of systolic and diastolic blood pressure values=155/75 mmHg
- PCR testing is recommended for D. Immitis and Angiostrongylus vasorum, suspected a pneumopathy.

Table 4. PCR Test Results:

<i>Babesia</i> spp.	Undetected
<i>Dirofilaria immitis</i>	Undetected
<i>Dirofilaria repens</i>	Undetected
<i>Anaplasma</i> spp	Undetected
<i>Ehrlichia</i> spp.	Undetected
<i>Hepatozoon canis</i>	Undetected
<i>Mycoplasma haemocanis</i>	Undetected

Babesia spp. genome identification* by qPCR and melting curve analysis
 Genome identification *Dirofilaria immitis** by qPCR and melting curve analysis
 Identification of genome *Dirofilaria repens** by qPCR and analysis of melting curves
Anaplasma spp. genome identification* by RT-qPCR and melt curve analysis
 Identification of genome *Ehrlichia* spp.* by RT-qPCR and analysis of melting curves
 Identification of *Hepatozoon canis** genome by qPCR and melting curve analysis
*Mycoplasma haemocanis** genome identification by qPCR

Results PCR negative for *Babesia* spp., *Hepatozoon canis*, *Anaplasma* spp., *Ehrlichia* spp, *Mycoplasma haemocanis*, *Dirofilaria immitis* si *repens*.

Test result *Angiostrongylus vasorum* - Negative.

Table 5. Result test *Angiostrongylus vasorum*

TEST	RESULT
Angio Detect	Negative

To confirm the diagnosis of canine eosinophilic bronchopneumopathy we recommended performing a Tracheo-

Bronchoscopy by examining the upper and lower respiratory segment and then taking tissue and bronchoalveolar fluid from the pulmonary lobes.

Preparation and anesthesia:

Broncho-alveolar lavage is performed under general inhalation anesthesia. Pre-anesthesia clinical examination does not reveal significant changes. The patient is present, with good general condition, restless. It is decided to administer premedication intramuscularly with Dexmedetomidine (2mcg/kg), Butorphanol (0.3 mg/kg) and Ketamine (1 mg/kg). After the administration of the premedication, the patient is left in a quiet and dark room for 15 minutes. After sedation, a peripheral venous catheter is mounted and the induction stage is passed. This stage is performed with Propofol, 2 mg/ kg, followed by orotracheal intubation with endotracheal probe of 10 mm. Maintenance is done with Isoflurane and oxygen. Monitoring during anesthesia includes monitoring of heart rate, heart rate, oxygen saturation and blood pressure measured non-invasively. Fluidotherapy is provided with Ringer, at a rate of 4 ml / kg / h.

Endoscope penetrates through the epiglottis, to the trachea and lungs parallel to the endotracheal probe, taking care that the balloon of the endotracheal probe is not unfluted. After the end of the procedure, the patient is still monitored, until the complete awakening.

Broncho-alveolar lavage:

She tried to take a tissue sample with the help of the biopsy brush but it was revealed the presence of a yellowish secretion and the semi-hard / ceruminous consistency. Sampling was carried out using the cytology brush and then taking bronchoalveolar fluid. An amount of 3ml/kg of sterile saline was introduced into the bronchi and then tried to extract it. The samples were collected from the resulting liquid and scraped.

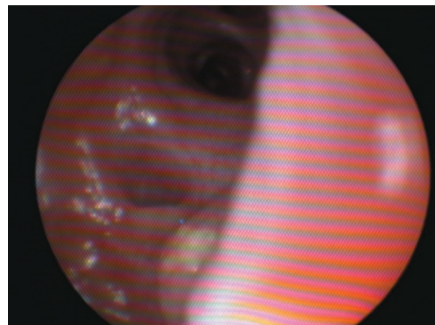


Image 1. Appearance of endoscopic

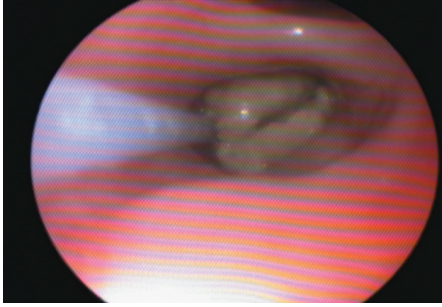


Image 2. Appearance of pulmonary infiltrate

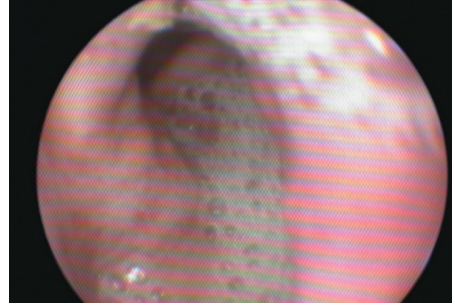


Image 3. Appearance after broncho-alveolar lavage

Result cytological preparation examination:

Cell-rich smear with mucus in moderate quantity, against the background of the numerous inflammatory cells present, the dominant being eosinophilia, neutrophils and macrophages are additionally identified. Normal-looking broncho-alveolar epithelial cells.

Cytological appearance indicates an acute inflammatory process.

Treatment:

I instituted treatment with corticoids (methylprednisolone) per os for two weeks. After a week, significant improvements in general condition are noted, with increased exercise tolerance and a decrease in the presence and intensity of cough.

The final diagnosis being idiopathic canine eosinophilic bronchopneumopathy.

Conclusions

It is found hematological changes of importance at the level of the defense line, the presence of significant eosinophilia (7 times higher relative to the maximum value) cited in such pathologies, WBC about twice as high as the maximum value, mild neutrophilia, which orient the diagnosis to pathologies of an inflammatory or parasitic order.

The lack of changes in serum proteins is emphasized, but the presence of values close to the upper limit indicated by the apparatus is mentioned.

The possibility of the presence or absence of radiological signs indicating a pneumopathy is recognized and the importance of endoscopy with sampling and CT performance is emphasized.

It supports the multitude of triggers of pulmonary localized inflammatory reactions.

It is supported to make a differentiated diagnosis against parasites with pulmonary tropism.

The presence of cough as a characteristic sign is supported, along with dyspnea to varying degrees and intolerance to exertion.

Clinical signs improved significantly within a few days after treatment with an oral corticosteroid.

The possibility of predisposition for the Husky breed, under the age of 6 years, known and noted in the framework of international veterinary studies, is supported.

It is argued the importance of having a general clinical consultation and an annual cardiological specialist consultation.

The importance of blood examinations is supported at least twice a year.

Conflict of interest

The authors declare no conflict of interest.

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