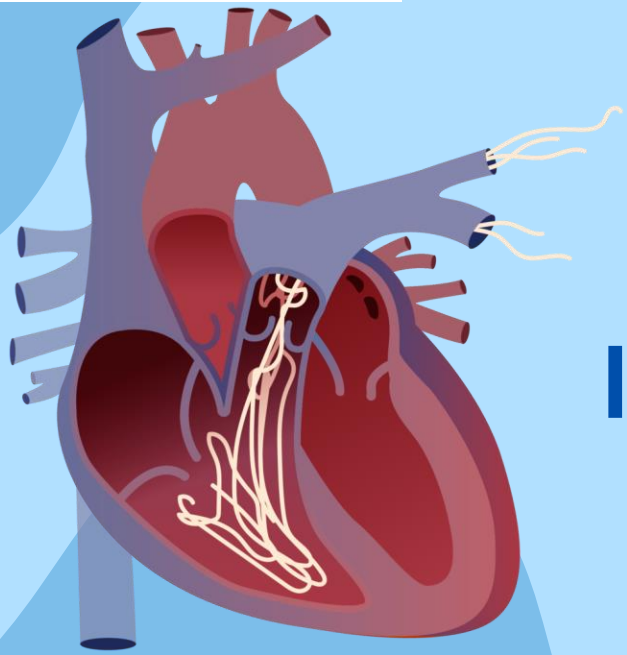
EUROPEAN SOCIETY OF DIROFILARIOSIS AND ANGIOSTRONGYLOSIS



Use of corticosteroids during treatment in dogs infected with *Dirofilaria immitis:* Is it a risk or a benefit?

Costa-Rodríguez N[1], Morchón R[2], Morales BR[1], Vera-Rodríguez DJ[1], Montoya-Alonso JA[1], Carretón E[1].

1 Internal Medicine, Faculty of Veterinary Medicine, Research Institute of Biomedical and Health Sciences (IUIBS), University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain.

2 Zoonotic Infections and One Health GIR, Laboratory of Parasitology, Faculty of Pharmacy, University of Salamanca, Campus Miguel Unamuno, Salamanca, Spain

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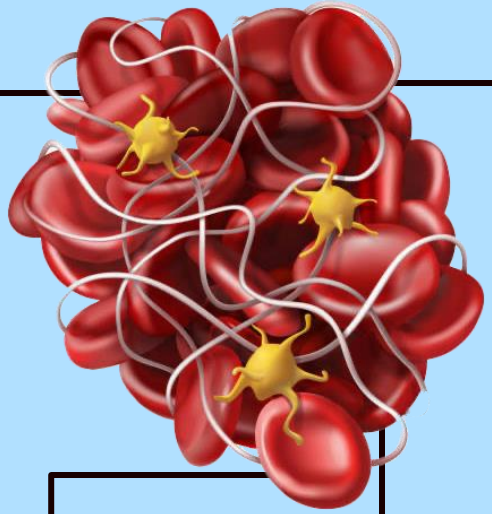
MVIT Medicina Veterinaria e Investigación Terapéutica
Universidad de Salamanca
Universidad de Las Palmas de Gran Canaria Facultad de Veterinaria
FV

INTRODUCTION: D-Dimer

High sensitivity
Low specificity

For PTE diagnosis



Fibrinolysis after thrombosis

More sensible than other coagulation parameters

Fibrin degradation product

Measured 1-2h after thromboembolism

Increases after 30min
→ Normal after 24h

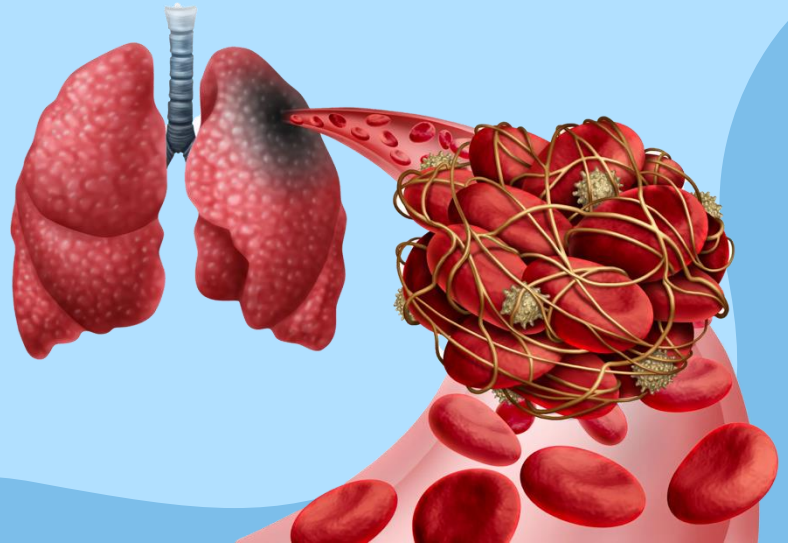
INTRODUCTION: Pulmonary Thromboembolism (PTE) risk

Parasite load → obstruct normal blood flow → promotes blood cloths → higher risk

Oclussion of arterial vessel → stops normal blood flow to distal region

↳ BUT ventilation continues causing:

- Alveolar dead space
- Imbalance ventilation-perfusion
- Hypoxemia and hyperventilation



INTRODUCTION: Pulmonary Thromboembolism (PTE) risk

Common symptoms:

- Persistent and chronic cough
  → ⇧ exercise
- Dyspnea
- Tachypnea
- Respiratory distress

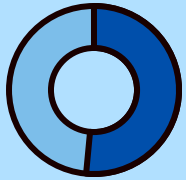
⟹ Non-specific

Objective

This study aims to investigate the effects of low dose of corticosteroids on D-dimer levels in dogs with heartworm disease before, during, and after adulticide therapy.

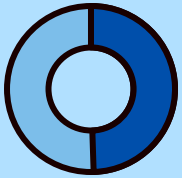
MATERIALS AND METHODS

48 TOTAL ANIMALS



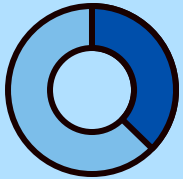
52,1%

Males



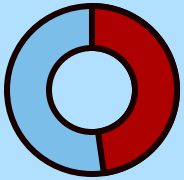
50%

High parasite load



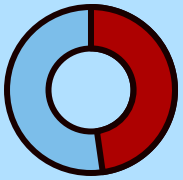
37,5%

Glucocorticoid therapy (0,5mg/kg BID)



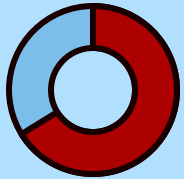
47,9%

Females



48%

Microfilariae



64,5%

Symptoms

MATERIALS AND METHODS

Mean age: 6,3 years

D-dimer <0,2 µg/mL

VCHEK ANALYZER

Vcheck

2022/05/24 14:08

SN : VA20DBITG1339
Version : V1.00_R026.10(0.5)
Mfg. Date : 2021 Sep 14
Operator ID : guest
Patient ID : BOBBY

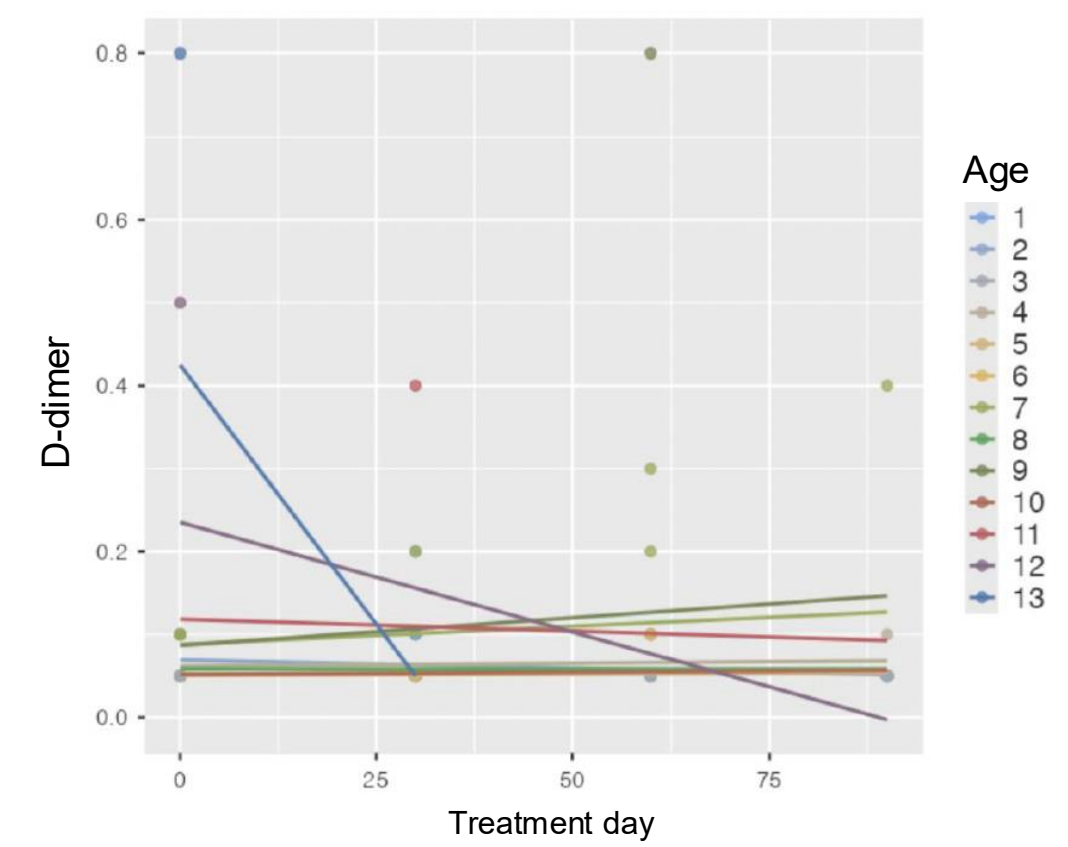
D-Dimer = 0.8 ug/mL
Procedural Control = Valid
Interpretation : Abnormal

RESULTS

No differences between gender

No differences between breeds

RESULTS: Age

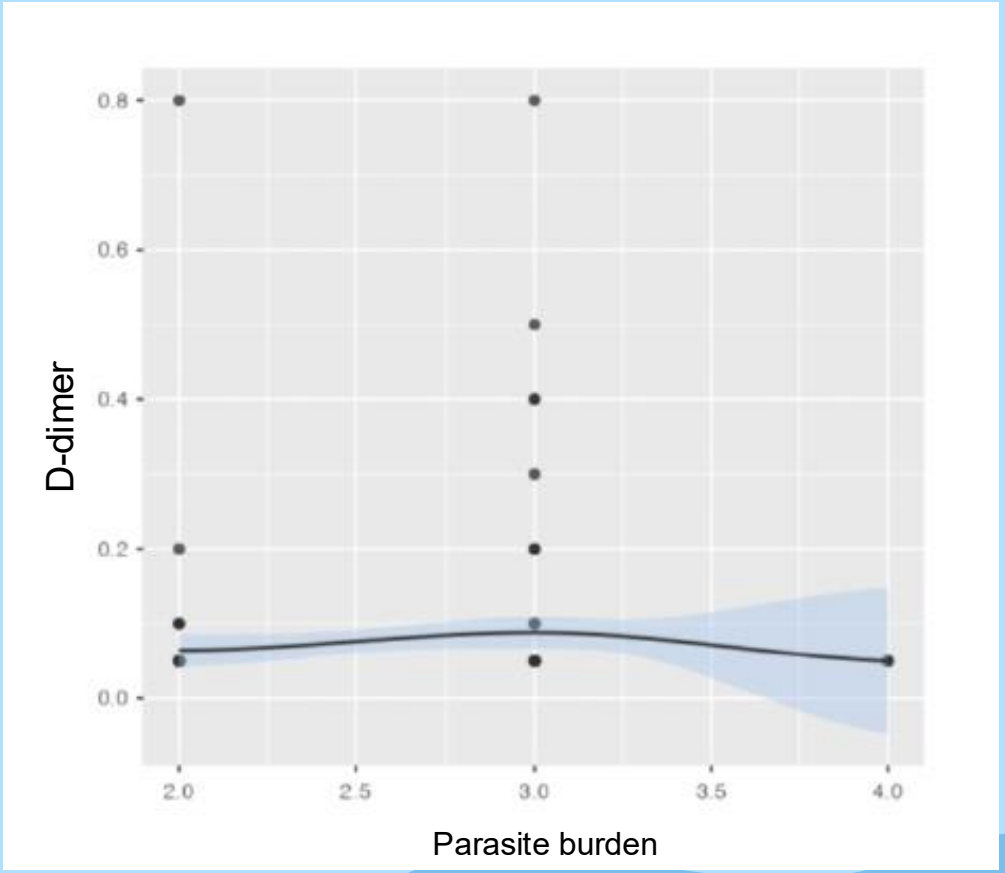


p=0.00937

Statistically significant differences

RESULTS: Parasite burden

No statistically significant differences



p=0.782

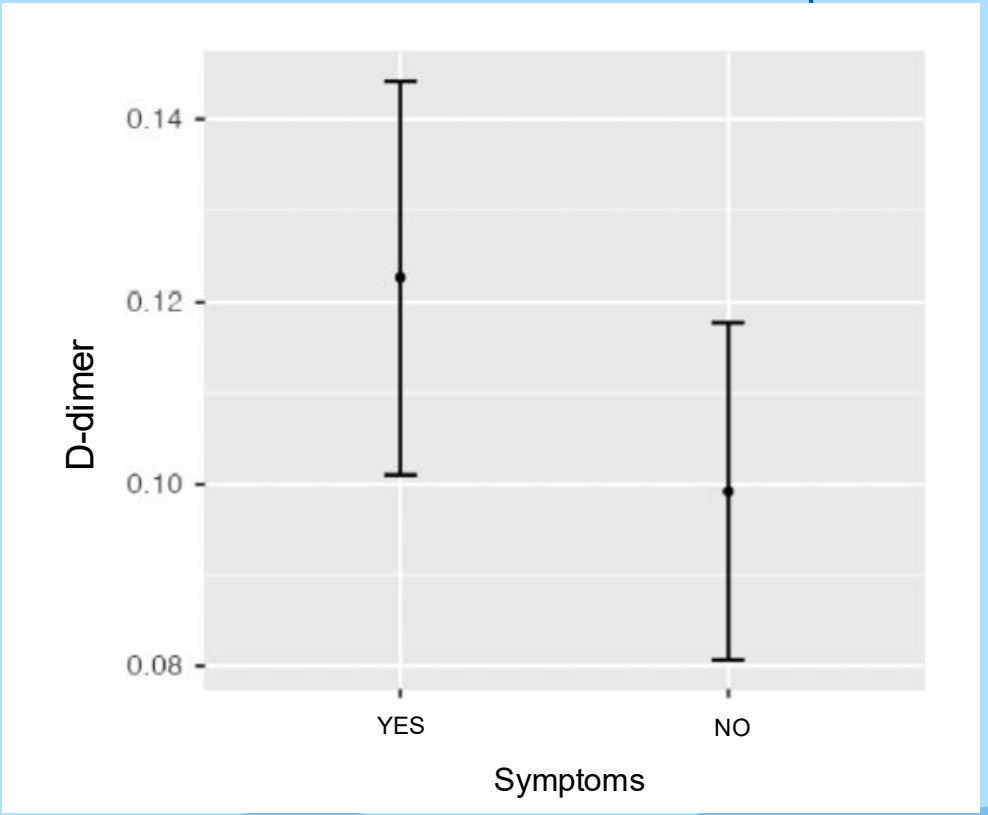
RESULTS: Symptoms

YES: 0.10 µg/mL – 0.14 µg/mL

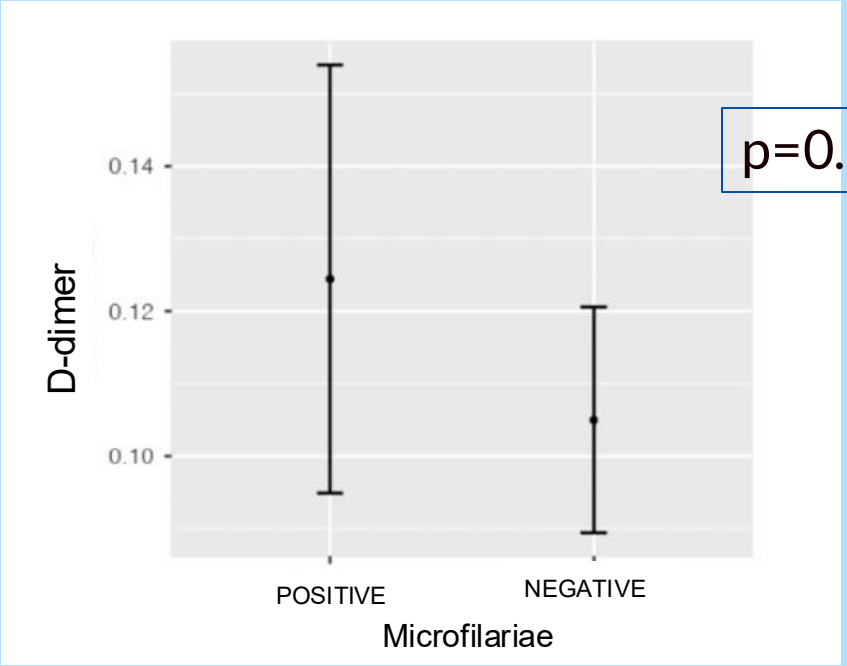
NO: 0.08 µg/mL – 0.12 µg/mL

No statistically significant differences

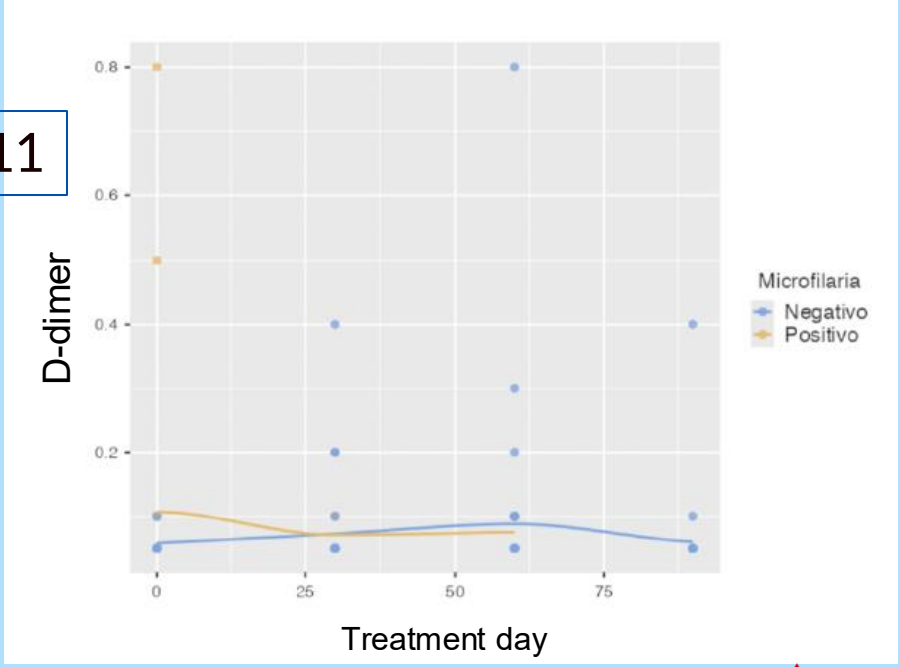
p=0.446



RESULTS: Microfilariae



p=0.811

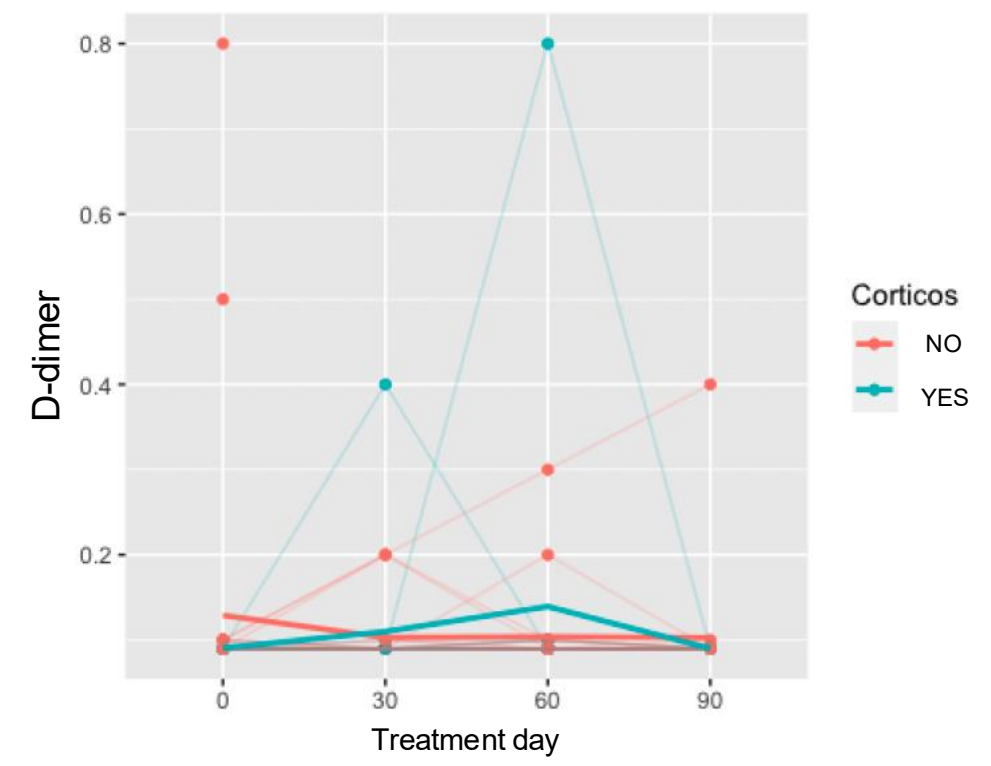


+ : 0.10 µg/mL – 0.15 µg/mL

- : 0.09 µg/mL – 0.12 µg/mL

No statistically significant differences

RESULTS: Corticosteroids

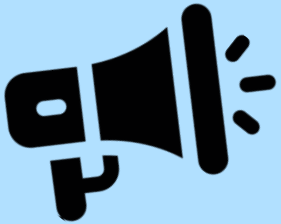


Corticosteroids	Day 0	Day 30	Day 60	Day 90
No	0.13 (±0.15)	0.10 (±0.04)	0.10 (±0.05)	0.10 (±0.06)
Yes	0.09 (±0.00)	0.11 (±0.08)	0.14 (±0.18)	0.09 (±0.00)

No statistically significant differences

$p > 0.05$

DISCUSSION: Age



Out of range elevation of D-dimer in older dogs (>11 years)

As in human medicine, D-dimer increases physiologically with age

Utilidad del dímero-d ajustado por edad en el diagnóstico de trombosis venosa profunda

Autores: Diana Piñar
Directores de la Tesis: A. Javier Trujillo-Santos (dir. tes.)
Lectura: En la Universidad Católica San Antonio de Murcia (España) en 2017

DISCUSSION: Parasite burden

Increase in error/standard deviation → Load 4

- Concentrations in low burden → within values
- Concentrations in high burden → high values

- ⬆ burden →⬆ thromboembolic risk caused by dead worms
- Mechanical obstruction →⬆ risk of PTE →⬆ D-dimer

EVALUACIÓN LABORATORIAL DE LA HIPERCOAGULABILIDAD EN PERROS CON DIROFILARIA IMMITIS

NOELIA COSTA RODRÍGUEZ, SARA NIEVES GARCÍA RODRÍGUEZ, JORGE ISIDORO MATOS RIVERO, RODRIGO MORCHON GARCÍA, JOSÉ ALBERTO MONTOYA ALONSO, ELENA CARRETÓN GÓMEZ

DISCUSSION: Symptoms

Correlation between D-dimer and severity of symptoms

- Both increase shortly after adulticide treatment → decrease with resolution
- Diagnosis of PTE overlooked → non-specific signs → prevalence of 0.9% → probably higher

J Vet Emerg Crit Care (San Antonio). 2022 May;32(3):289-314. doi: 10.1111/vec.13204. Epub 2022 May 2.

2022 Update of the Consensus on the Rational Use of Antithrombotics and Thrombolytics in Veterinary Critical Care (CURATIVE) Domain 1- Defining populations at risk

Armelle deLaforcade [1], Lenore Bacek [2], Marie-Claude Blais [3], Corrin Boyd [4], Benjamin M Brainard [5], Daniel L Chan [6], Stefano Cortellini [6], Robert Goggs [7], Guillaume L Hoareau [8], Amy Koenigshof [9], Ron Li [10], Alex Lynch [11], Alan Ralph [12], Elizabeth Rozanski [1], Claire R Sharp [4]

DISCUSSION: Microfilariae

Increased levels in + dogs
With treatment initiation D-dimer decrease

- Attributed to elimination of microfilariae → treatment's succes → first to be eliminated
- Source of biomarker → presence of D-dimer in lung and kidney using immunohistochemistry

› Vet Parasitol. 2013 Jan 16;191(1-2):182-6. doi: 10.1016/j.vetpar.2012.08.008. Epub 2012 Aug 20.

D-dimer deposits in lungs and kidneys suggest its use as a marker in the clinical workup of dogs with heartworm (Dirofilaria immitis) disease

E Carretón [1], J González-Miguel, J A Montoya-Alonso, R Morchón, F Simón, B Passeri, A M Cantoni, L Kramer

DISCUSSION: Corticosteroids

Several studies, but no unanimous results

Indicated for pulmonary parenchymal complications and treatment/prevention of adverse reactions

No significant differences were found between taking corticosteroids or not

DISCUSSION: Corticosteroids

- Initial research → corticosteroids over several weeks or after adulticide treatment decreased pulmonary blood flow and worsened intimal disease → procoagulant

The effect of oral, low-dose prednisolone on the extent of pulmonary pathology associated with dead Dirofilaria immitis in a canine lung model.

R. Atwell, J. Tarish, +1 author D. Knight • Published 1995 • Medicine

- Studies from 1990s
- In this study dogs were treated during 90 days without high D-dimer levels

DISCUSSION: Corticosteroids

- PTE risk associated with disease exacerbation wich are treated with corticosteroids

Randomized Controlled Trial > J Thromb Haemost. 2016 Apr;14(4):716-23.
doi: 10.1111/jth.13265. Epub 2016 Feb 18.

The influence of corticosteroids on hemostasis in healthy subjects

C J Majoor [1], M M S Sneeboer [1], A de Kievit [1], J C M Meijers [2 3], T van der Poll [4], R Lutter [1 5], E H Bel [1], P W Kamphuisen [6]

Associated to exacerbation directly → wrongly correlated?

- Hypercoagulability in humans → large doses of corticosteroids or ACTH

Published: 22 September 1962

Effects of Corticosteroids on Coagulation of the Blood

SINASI OZSOYLU, HERBERT S. STRAUSS & LOUIS K. DIAMOND

No high amounts → not immunosupressive action, but anti-inflammatory (0,5 mg/kg/12h prednisone)

DISCUSSION: Corticosteroids

- Glucocorticoids decrease pulmonary eosinophilic infiltrate and peri-/arteritis

- ***D. immitis*** posseses molecules with anticoagulant properties in antigens
  → alter activity of factor Xa

- Corticosteroids can control pulmonary inflammation and thromboembolic events

- High microfilarial load → prior treatment with antihistamines and glucocorticoids
  → minimize reactions


TVP Clarke Atkins, DVM, Diplomate ACVIM (Internal Medicine & Cardiology)
PARASITOLOGY
Treating Heartworm Disease: Ancillary Corticosteroid Therapy


Dirofilaria immitis possesses molecules with anticoagulant properties in its excretory/secretory antigens
Published online by Cambridge University Press: 29 January 2020
Alicia Diosdado, Fernando Simón, Rodrigo Morchón and Javier González-Miguel

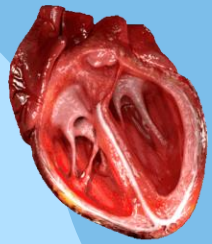

Veterinary Clinics of North America: Small Animal Practice
Volume 39, Issue 6, November 2009, Pages 1127-1158
Heartworm Biology, Treatment, and Control
Dwight D. Bowman MS, PhD, Clarke E. Atkins DVM

CONCLUSIONS

There was no significant fluctuation of D-dimer values between groups ($p>0.05$), suggesting that there is no increased risk of PTE due to the use of corticosteroids during heartworm disease treatment. Furthermore, anti-inflammatory doses of prednisone improved general symptoms, reduced local inflammation at the melarsomine inoculation site, and contributed to a faster recovery of affected dogs.

Further studies with larger sample sizes are necessary to confirm these findings and determine optimal cut-off values for diagnosis and prognosis in heartworm disease treatment.

Thank you for your attention!



Thanks team!