

**Unilateral Idiopathic Anterior Uveitis and Secondary Rubeosis Iriditis and
Glaucoma in a Cat**

INTRODUCTION

The anterior uveal tract consists of the iris and ciliary body.¹ Anterior uveitis is inflammation of the iris and ciliary body and can occur unilaterally or bilaterally.¹ Anterior uveitis is caused by numerous endogenous and exogenous factors, however, the most common cause is idiopathic.² In one retrospective study of 92 cats, 45.7% of the anterior uveitis cases were found to be idiopathic and 55.4% were unilateral.² Idiopathic anterior uveitis is considered to be immune-mediated due to the response to immunosuppressive therapy.² The most common type of inflammation associated with feline anterior uveitis is a lymphoplasmacytic infiltrate and can be diffuse or nodular.³ The diagnosis of idiopathic anterior uveitis is made by exclusion of other identifiable pathologies.²

Male cats are over-represented in cases of anterior uveitis.² The mean age in one study was 5.42 years with a range of one month to 17 years.² Typical clinical signs and physical exam findings can include varying signs of blepharospasm, epiphora, episcleral vascular injection, corneal edema, aqueous flare, anterior chamber precipitates, keratic precipitates, hypopyon, hyphema, miosis, decreased intraocular pressure (IOP), anterior or posterior synechiae, iriditis, iris hyperpigmentation, haze or opacity to the anterior chamber, and rubeosis iridis.¹ Rubeosis iridis is a fine capillary growth across the iris and is associated with chronic uveitis.⁴ Although a decreased IOP is commonly found in

anterior uveitis, a secondary glaucoma can occur.³ Greater than 90% of secondary glaucoma cases are caused by uveitis or intraocular neoplasia.³

Differential diagnoses include, but are not limited to, feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), feline infectious peritonitis (FIP), herpesvirus, trauma, deep corneal ulceration, bacterial infections, *Toxoplasma gondii*, *Coccidioides* spp., *Blastomyces* spp., *Cryptococcus* spp., *Histoplasma capsulatum*, *Candida albicans*, lens-induced uveitis from cataracts, systemic hypertension, coagulopathies, idiopathic, parasitic infections, toxins, immune-mediated diseases, and neoplasia especially lymphosarcoma and melanoma.

The diagnostic approach for idiopathic uveitis involves ruling out the tangible pathologies. Specific ocular tests include Schirmer tear test (STT), corneal fluorescein staining, and tonometry.⁴ A topical anesthetic such as 0.5% proparacaine should be placed after the STT but before the fluorescein staining and tonometry.⁴ The eyes need to be dilated with a mydriatic agent for a complete fundic examination with an indirect ophthalmoscope.⁴ In cases with corneal or conjunctival abnormalities, a cytology sample should be obtained.⁴

A minimum database consists of a complete blood count (CBC), serum chemistry, and urinalysis.¹ Serology testing for FeLV, FIV, *Toxoplasma gondii*, *Bartonella* spp. should be obtained.¹ Serology testing and/or antigen for *Coccidioides* spp., *Blastomyces* spp., *Cryptococcus* spp., and *Histoplasma capsulatum* is done based on geographic location and travel history.¹ Thoracic radiographs should minimally be obtained, but in cases where an infectious or neoplastic process is suspected, computed tomography (CT) scans and abdominal ultrasonography should be performed.²

TREATMENT/MANAGEMENT/PROGNOSIS

The treatment for idiopathic anterior uveitis in cats is to control the inflammation and pain and reduce IOP in cases of secondary glaucoma.³ Topical corticosteroid therapy is the main treatment for idiopathic anterior uveitis.¹ Either a 1% prednisolone acetate or 0.1% dexamethasone solution is initially applied at a dose of one drop q4-6h.¹ The frequency is based on the severity of anterior uveitis present.¹ The duration and frequency of therapy and the rate the dose is tapered is tailored to the individual patient.¹ The tapering is done over several months until resolution of inflammation.¹

Pain management is achieved with systemic and/or topical medications.¹ Systemic medications such as transmucosal buprenorphine and oral meloxicam or robenacoxib can be used to manage pain.⁵ Meloxicam and robenacoxib are non-steroidal anti-inflammatory drugs (NSAID) and care must be used if renal disease is present and should not be used in cases of dehydration.⁵

Topical atropine is used to reduce pain in the eye.¹ Atropine paralyzes the smooth muscles of the iris sphincter and ciliary body, thus decreasing spasms.¹ A 1% atropine ophthalmic solution is given at 1 drop as needed to effect (monitoring the mydriasis of the eye) since it can last several days in some patients.¹ Due to its bitter nature, atropine may induce hypersalivation when it reaches the oral cavity through the nasolacrimal duct.¹ Atropine can increase IOP, therefore, careful monitoring with tonometry is required to detect a secondary glaucoma.¹

Most secondary glaucoma cases due to anterior uveitis will have moderate IOP values between 30-40 mmHg.³ Glaucoma is best managed using a combination of a carbonic anhydrase inhibitor such as dorzolamide and a beta-adrenergic antagonist such as timolol.³ These drugs are dosed as needed to keep the IOP between 13-20 mmHg.³ When using multiple topical therapies, a five-minute wait time in between drops must be instituted.¹

Patients need to be monitored closely with examinations and tonometry for the first few weeks and then if stabilized at least monthly while tapering is occurring.¹ Therapy is discontinued or maintained long term based on clinical response.¹ Recurrence is common, therefore cats need to be rechecked at least on a semi-annual basis.³

CASE HISTORY AND PRESENTATION

A four-year old neutered male domestic shorthair cat presented for semi-annual exam and rabies vaccination. Owners had no concerns. The patient lived 100% indoors, was on topical selamectin/sarolaner^a monthly, and no other medications or supplements.

Abnormal physical exam findings included mild dental calculus and gingivitis except over 307, 407, and 309 where gingivitis was moderate. On ocular exam with a direct ophthalmoscope, the left eye (OS) had an aqueous flare with moderate cells and significant keratic precipitates. Rubeosis iridis and decreased menace response were present OS. The right eye (OD) was unremarkable. See Table 1 for vital signs.

Anterior uveitis was suspected and the initial diagnostic plan consisted of IOP, fundic exam, STT, corneal fluorescein staining, systolic blood pressure, CBC, serum chemistry,

urinalysis, retroviral testing, fecal centrifugation, upper respiratory disease PCR panel, serology test for Bartonella, Cryptococcus titer, *Toxoplasma* IgM and IgG levels, and thoracic radiographs. The rabies vaccination was postponed.

STT measurements were normal at 20 mm/60 seconds OD and 19 mm/60 seconds OS. One drop of 0.5% proparacaine^b and one drop of 1% atropine^c ophthalmic solutions were placed in each eye (OU). Tonometry^d measurements were 14 mmHg OD and 19 mmHg OS. The fundic exam OD showed no significant findings and the fundus OS was not well visualized given the precipitates in the anterior chamber. Fluorescein staining showed no uptake OU. A Doppler systolic blood pressure obtained from the tail measured normally at 125 mmHg. Three-view thoracic radiographs showed no significant abnormalities (Image 1, 2, 3).

The CBC, serum chemistry, urinalysis, retroviral testing, fecal centrifugation, upper respiratory disease PCR panel, Bartonella serology, Cryptococcus titer, and toxoplasma titer were submitted to laboratories (Table 2, 3, 4, 5, 6). Testing for other fungal agents was not performed due to geographic location and lack of patient travel.

The patient was discharged with 1% prednisolone acetate^e ophthalmic solution at a dose of one drop OS q6h. The patient was scheduled for a recheck in one week.

CASE MANAGEMENT AND OUTCOME

The CBC, serum chemistry, and urinalysis had no significant findings. The fecal centrifugation, upper respiratory PCR panel, Bartonella serology, Cryptococcus titer, and toxoplasma IgM and IgG were negative. The patient was rechecked one week after the

initial visit. The owner was successfully medicating the patient and had no concerns. The aqueous flare was mild with cells and keratic precipitates and the rubeosis iridis was still present OS. See Table 1 for vital signs. The eyes were dilated with one drop of 1% atropine and fundic exams were unremarkable OU. Tonometry measurements were 16 mmHg OD and 42 mmHg OS. Owners were instructed to continue the prednisolone acetate drops and to begin dorzolamide/timolol^f ophthalmic solution at a dose of one drop OS q8h. There was to be a five-minute wait period between each drop.

Patient was rechecked in a week for IOP readings. Owners were successfully medicating the patient. Tonometry measurements were 13 mmHg OD and 10 mmHg OS. The 1% prednisolone acetate solution was decreased to one drop OS q8h. Patient was scheduled for a recheck and dental COHAT (to address any source of inflammation) in three weeks.

At the three week recheck the aqueous flare was minimal and the rubeosis iridis was resolving OS. See Table 1 for vital signs. The patient was given 6 mg maropitant^g and 100 mg gabapentin^h PO two hours before premedication with 0.03 mg dexmedetomidine hydrochlorideⁱ, 1.0 mg butorphanol^j, and 5 mg ketamine^k IM. A 22-gauge IV catheter was placed and IV LRS^l fluids at a rate of 22 ml/hour was administered. He was intubated and maintained on isoflurane^m and oxygen.

A comprehensive oral exam and dental radiographs was performed. Radiographs revealed 102, 107, 308, and 408 had resorptive lesions. Dental nerve blocks with 1.25 mg bupivacaineⁿ and 0.012 mg buprenorphine^o were placed and complete extractions were performed. Gingiva was opposed with 5-0 Monocryl^p in a simple interrupted pattern. Fluoride^q was applied and a therapeutic laser was used on the extraction sites. The

patient was given 0.09 mg buprenorphine IV before extubation. He was discharged with 0.09 mg submucosal buprenorphine q12h for 5 days and 3 mg robenacoxib^r PO q24h for 3 days. The prednisolone acetate drops were reduced to one drop OS q12h and the dorzolamide/timolol drops were continued at the current dose.

The patient's extraction sites were rechecked in one week and were healing normally. He was reported to be doing well at home.

Patient was rechecked one month later and reported to be doing well. The aqueous flare, keratic precipitates, and rubeosis iridis OS had resolved. See Table 1 for vital signs. Tonometry measurements were 14 mmHg OD and 15 mmHg OS. Fundic exam was normal OU. The dorzolamide/timolol drops were continued and the prednisolone acetate drops were decreased to one drop OS q48h.

Patient was rechecked three weeks later and reported to be doing well. Physical exam revealed no significant findings. See Table 1 for vital signs. Tonometry measurements were 14 mmHg OD and 16 mmHg OS. A rabies^s vaccine was given subcutaneous in the right rear limb at the level of the stifle. No changes were made with topical medications. Plans were made for routine physical examinations with IOP and fundic exams every six months.

REFERENCES

1. Miller PE. Diseases of the Uvea. In: Maggs DJ, Miller PE, Ofri R. *Slatter's Fundamental of Veterinary Ophthalmology*. 6th ed. St. Louis, MO: Elsevier, 2018: 254-277
2. Wegg M, Jeanes E, Pollard D, et al. A Multicenter Retrospective Study into Endogenous Causes of Uveitis in Cats in the United Kingdom: Ninety two cases. *Vet Ophthal* 2021;24:591-598
3. Grahn B. Feline Glaucoma. *Vet Clin North Am Small Anim Pract* 2023;53(2):367-387
4. Stiles J, Kimmitt B. Eye Examination in the Cat: Step-by-Step Approach and Common Findings. *J Feline Med Surg* 2022;18(9):702-711
5. Steagall P, Robertson S, Simon B, et al. 2022 ISFM Consensus Guidelines on the Management of Acute Pain in Cats. *J Feline Med Surg* 2016;24(1):4-30

ENDNOTES

^a Selamectin and Sarolaner Topical Solution, Revolution Plus, Zoetis Inc., Kalamazoo, MI.

^b 0.5% proparacaine, Bausch + Lomb, Bridgewater, NJ.

^c 1% atropine sulfate ophthalmic solution, Bausch + Lomb, Bridgewater, NJ.

^d Tonopen, Reichert, Inc., Depew, NY.

^e 1% prednisolone acetate ophthalmic solution, Sandoz Inc, Springfield Gardens, NY.

^f Dorzolamide/timolol ophthalmic 2% solution, Trusopt, Merck & Co. Inc., Whitehouse Station, NJ.

^g Maropitant, Cerenia, Zoetis Inc., Kalamazoo, MI.

^h Gabapentin, Granules Pharmaceuticals, Inc., Chantilly, VA.

ⁱ Dexmedetomidine hydrochloride 0.5 mg/ml, Dexdomitor, Zoetis Inc., Kalamazoo, MI.

^j Butorphanol tartrate 10 mg/ml, Covetrus North America, Dublin, OH.

^k Ketamine hydrochloride 100 mg/ml, Covetrus North America, Dublin, OH.

^l Lactated Ringers Injection, ICU Medical Inc., Lake Forest, IL

^m Isoflurane, Fluriso, MWI, Boise, ID.

ⁿ Bupivacaine 0.5% HCl, AuroMedics Pharma LLC, Windsor, NJ.

^o Buprenorphine hydrochloride 0.3 mg/ml, Par Pharmaceutical, Chestnut Ridge, NY.

^p Monocryl Poliglecaprone 25, Ethicon LLC, Guaynabo, Puerto Rico.

^q Fluoride Foam, Dentalaire, Irvine, CA.

^r Robenacoxib 6 mg, Onsior, Elanco US Inc., Greenfield, IN.

^s Feline rabies vaccine, Purevax, Boehringer Ingelheim, Athens, GA.

LAB DATA/IMAGING

Table 1: Vital Signs

<u>Vital Sign</u>	Day 0	Day 7	Day 36	Day 80	Day 106
Body Weight (kg)	6.6 kg	6.6 kg	6.6 kg	6.6 kg	6.6 kg
Body Temperature (F)	100.2 F	99.8 F	100.4 F	100.8 F	101.0 F
Heart Rate (bpm)	190 bpm	196 bpm	184 bpm	190 bpm	196 bpm
Respiration Rate (rpm)	44 rpm	42 rpm	40 rpm	40 rpm	42 rpm
BCS	5/9	5/9	5/9	5/9	5/9
MCS	Normal muscle mass	Normal muscle mass	Normal muscle mass	Normal muscle mass	Normal muscle mass

Table 2: CBC, Serum Chemistry, Urinalysis, FeLV, FIV, Fecal Centrifugation

<u>Test</u>	<u>Day 0</u>	<u>Day 104</u>	<u>Reference Range</u>
<i>Hematology</i>			
RBC	8.16 M/uL	9.41 M/uL	7.12-11.46 M/uL
HCT	40.2%	49%	28.2-52.7%
HGB	12.3 g/dL	15.7 g/dL	10.3-16.2 g/dL
MCV	49 fL	52 fL	39-56 fL
MCH	15.1 pg	16.5 pg	12.6-16.5 pg
MCHC	30.6 g/dL	32.0 g/dL	28.5-37.8 g/dL
% Reticulocytes	0.1%	0.3%	
Reticulocytes	8 K/uL	28 K/uL	3-50 K/uL
Reticulocyte HGB	16.8 pg	18.6 pg	13.2-20.8 pg
WBC	8.7 K/uL	5.8 K/uL	3.9-19.0 K/uL
% Neutrophils	40.0%	56.0%	
% Lymphocytes	47.5%	34.8%	
% Monocytes	1.0%	3.1%	
% Eosinophils	11.3%	5.9%	
% Basophils	0.2%	0.2%	
Neutrophils	3.48 K/uL	3.248 K/uL	2.62-15.17 K/uL
Lymphocytes	4.133 K/uL	2.018 K/uL	0.85-5.85 K/uL
Monocytes	0.087 K/uL	0.18 K/uL	0.04-0.53 K/uL
Eosinophils	0.983 K/uL	0.342 K/uL	0.09-2.18 K/uL
Basophils	0.017 K/uL	0.012 K/uL	0-0.1 K/uL

Platelets	319 K/uL	360 K/uL	155-641 K/uL
<i>Chemistry</i>			
Glucose	82 mg/dL	146 mg/dL	72-175 mg/dL
SDMA	9 ug/dL	12 ug/dL	0-14 ug/dL
Creatinine	1.2 mg/dL	1.4 mg/dL	0.9-2.3 mg/dL
BUN	17 mg/dL	26 mg/dL	16-37 mg/dL
BUN: Creatinine Ratio	14.2	18.6	
Phosphorus	3.3 mg/dL	3.0 mg/dL	2.9-6.3 mg/dL
Calcium	9.3 mg/dL	9.6 mg/dL	8.2-11.2 mg/dL
Sodium	151 mmol/L	151 mmol/L	147-157 mmol/L
Potassium	4.5 mmol/L	4.5 mmol/L	3.7-5.2 mmol/L
Na:K Ratio	34	34	29-42
Chloride	121 mmol/L	115 mmol/L	114-126 mmol/L
TCO2 (Bicarbonate)	20 mmol/L	22 mmol/L	12-22 mmol/L
Anion Gap	15 mmol/L	18 mmol/L	12-25 mmol/L
Total Protein	7.0 g/dL	7.9 g/dL	6.3-8.8 g/dL
Albumin	3.2 g/dL	3.6 g/dL	2.6-3.9 g/dL
Globulin	3.8 g/dL	4.3 g/dL	3.0-5.9 g/dL
Albumin: Globulin Ratio	0.8	0.8	0.5-1.2

ALT	30 U/L	53 U/L	27-158 U/L
AST	26 U/L	48 U/L	16-67 U/L
ALP	26 U/L	19 U/L	12-59 U/L
GGT	<1 U/L	1 U/L	0-6 U/L
Total Bilirubin	0.1 mg/dL	0.1 mg/dL	0-0.3 mg/dL
Unconjugated Bilirubin	0 mg/dL	0 mg/dL	0-0.2 mg/dL
Conjugated Bilirubin	<0.1 mg/dL	<0.1 mg/dL	0-0.2 mg/dL
Cholesterol	153 mg/dL	197 mg/dL	91-305 mg/dL
Amylase	832 U/L	1,078 U/L	623-2,239 U/L
Lipase	11 U/L	7 U/L	0-45 U/L
Hemolysis Index	N	N	
Lipemia Index	N	N	
FeLV Antigen by ELISA	Negative		
FIV Antibody by ELISA	Negative		
Heartworm Antibody by ELISA	Negative		
Fecal Centrifugation	No ova or parasites seen		

<i>Urinalysis</i>			
Collection	Cystocentesis	Cystocentesis	
Color	Yellow	Yellow	
Clarity	Clear	Clear	
Specific Gravity	1.049	1.045	
pH	6.5	7.0	
Urine Protein	Trace	Trace	
Glucose	Negative	Negative	
Ketones	Negative	Negative	
Blood/Hemoglobin	Negative	Negative	
Bilirubin	Negative	Negative	
Urobilinogen	Normal	Normal	
White Blood Cells	None seen	0-2/hpf	
Red Blood Cells	None seen	None seen	
Bacteria	None seen	None seen	
Epithelial Cells	None seen	0-1/hpf	
Mucus	None seen	None seen	
Casts	None seen	None seen	
Crystals	None seen	None seen	

Table 3: IDEXX upper respiratory disease PCR panel

<u>Test</u>	<u>Result</u>
<i>Chlamydia felis</i> RealPCR	Negative
Feline Calicivirus RealPCR	Negative
Feline Herpesvirus 1 Real PCR	Negative
<i>Bordetella bronchiseptica</i> RealPCR	Negative
H7N2 Influenza Virus RealPCR	Negative
Influenza A Virus RealPCR	Negative
<i>Mycoplasma felis</i> RealPCR	Negative

Table 4: Bartonella serology

<u>Test</u>	<u>Result</u>
<i>Bartonella vinsonii</i> IFA	1:32 (Seronegative)
<i>Bartonella henslae</i> IFA	1:32 (Seronegative)
<i>Bartonella koehlerae</i> IFA	1:32 (Seronegative)

Table 5: *Cryptococcus neoformans* titer from Auburn University

<u>Test</u>	<u>Result</u>
Cryptococcal Antigen Latex Agglutination	Negative

Table 6: Toxoplasma IgM and IgG

<u>Test</u>	<u>Result</u>
Toxoplasma IgG by ELISA	Negative
Toxoplasma IgM by ELISA	Negative

Image 1: Left Lateral Thoracic Radiograph

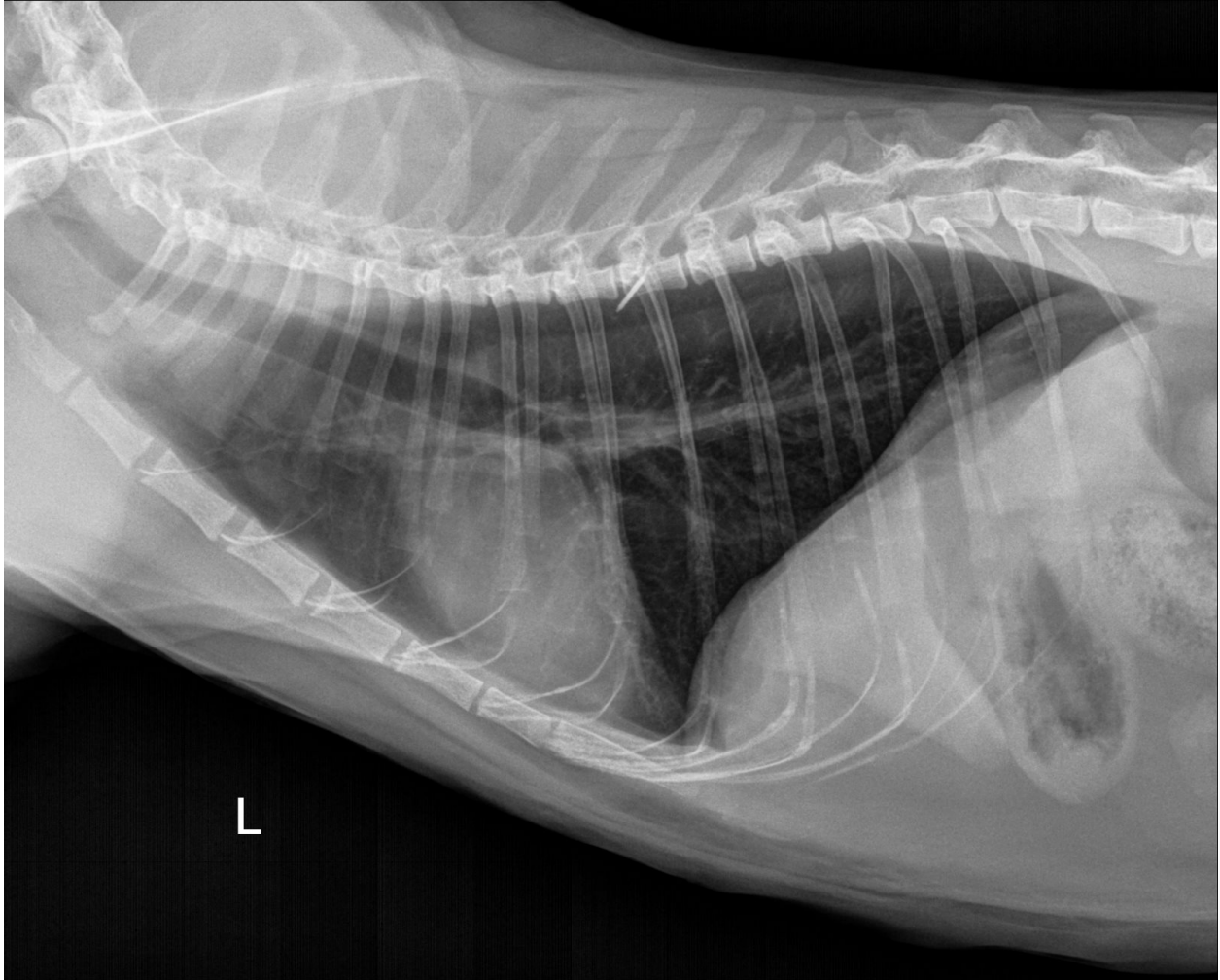


Image 2: Right Lateral Thoracic Radiograph

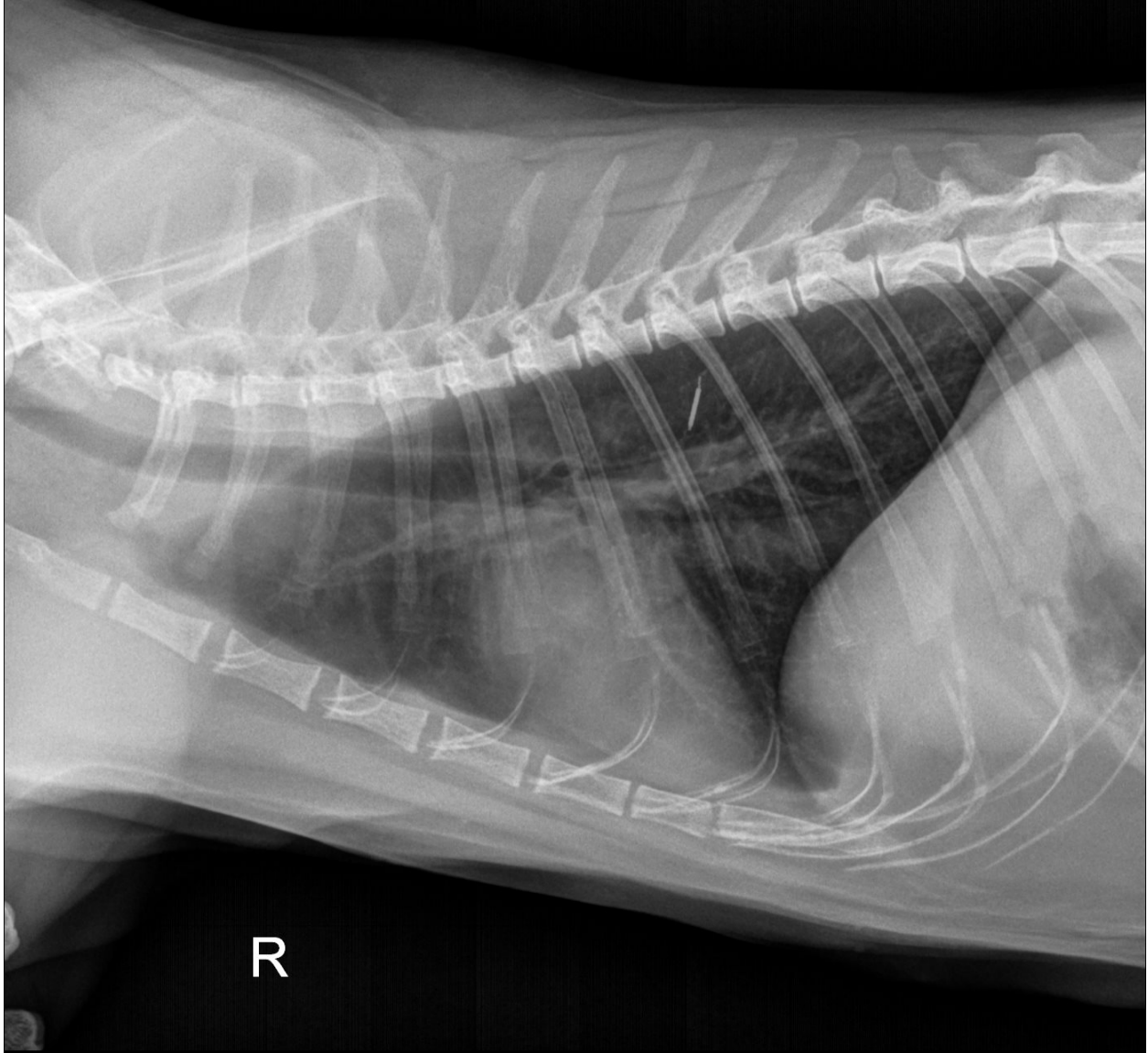


Image 3: VD Thoracic Radiograph

