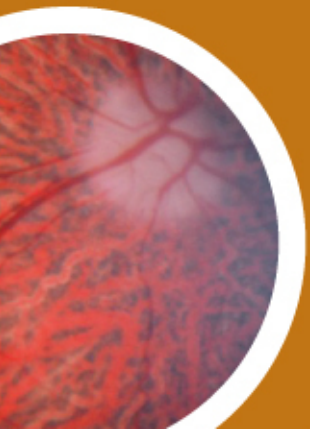
SMALL ANIMAL OPHTHALMOLOGY

WHAT'S YOUR DIAGNOSIS?

Heidi Featherstone
Elaine Holt



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What's Your Diagnosis?

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WILEY-BLACKWELL
A John Wiley & Sons, Ltd., Publication

This edition first published 2011 by Blackwell Publishing Ltd

Blackwell Publishing was acquired by John Wiley & Sons in February 2007. Blackwell's publishing program has been merged with Wiley's global Scientific, Technical and Medical business to form Wiley-Blackwell.

Registered office: John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial offices: 9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK
2121 State Avenue, Ames, Iowa 50014-8300, USA

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Library of Congress Cataloging-in-Publication Data

Featherstone, Heidi
Small animal ophthalmology : what's your diagnosis? / Heidi Featherstone, Elaine Holt.
p. ; cm.
Includes bibliographical references and index.
ISBN 978-1-4051-5161-0 (pbk. : alk. paper)
1. Veterinary ophthalmology. 2. Pet medicine. I. Holt, Elaine. II. Title.
[DNLM: 1. Eye Diseases–veterinary–Case Reports. 2. Eye Diseases–veterinary–Problems and Exercises. 3. Animals, Domestic–Case Reports. 4. Animals, Domestic–Problems and Exercises. 5. Diagnosis, Differential–Case Reports. 6. Diagnosis, Differential–Problems and Exercises. SF 891]
SF891.F43 2011
636.089'77–dc22
2010041328

A catalogue record for this book is available from the British Library.

This book is published in the following electronic formats: ePDF 9781444340013; ePub 9781444340020

Set in 10/12.5 pt MinionPro by Toppan Best-set Premedia Limited

1 2011

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Foreword

Welcome to one of the most useful and informative ophthalmology text-books to have been published in recent years. The authors are to be commended on creating a reference book that is unlike any other currently on the market. They are medical educators that have drawn from a wealth of private practice knowledge and experience to create a highly practical guide to some of the most common presentations of ophthalmic disease. This highly utilitarian and functional approach is exemplified by their overall organizational approach. Rather than assuming the traditional 'front to back' approach taught in most classroom settings, the purpose of this text can be first best reflected in its chapters' titles, whereby they encompass the most frequently encountered small animal patient complaints such as ocular discharge, the painful eye, the opaque eye, the abnormal pupil, blindness, and ocular trauma (to name just a few). The strength of this textbook is evident that all major topic areas have been presented using actual cases, which are both beautifully photodocumented and carefully organized. In addition to the numerous high quality coloured photographs, are clear illustrations, the results of advanced imaging modalities which in some cases utilize 3D reconstruction, and histopathology – all which dramatically strengthen the calibre of each case presentation.

The book will appeal to veterinary clinicians at all stages of the educational process, ranging from veterinary students and new graduates to board-certified ophthalmic specialists. The employment of case-based examples prompts the reader to hone his/her clinical acumen by working through relevant questions pertaining to differential diagnoses and the selection of appropriate diagnostic tests. Diagnosis, treatment, prognosis, and discussion are clearly provided. Importantly, the authors recognize that, depending on the reader's level of experience, different diagnostic and therapeutic strategies may, at times, be equally successful to those provided and thus ample opportunities for additional reading is provided by way of several appendices, glossaries, and extensive bibliographic material. As I have, I believe you will find this text one of the most enjoyable, informative, and 'user-friendly' practical approaches to small animal ophthalmology to have been published in many years.

Elizabeth A. Giuliano, DVM, MS
Diplomate, American College of Veterinary Ophthalmologists

Preface

Veterinary ophthalmology is a visual discipline – not because the eye is the organ of vision but because the evidence that is required to diagnose ocular disease in animals is often highly visible. In other veterinary specialities a problem typically requires extensive investigation, but in veterinary ophthalmology a thorough ocular examination and a few routine tests may well result in an accurate diagnosis. The challenge is to know what to look for, and then to interpret the clinical signs correctly. Techniques such as electroretinography and advanced diagnostic imaging have their place, but only in a small number of cases.

There are numerous textbooks in both the human and veterinary fields containing comprehensive information on all aspects of ophthalmology, from anatomy and physiology to the treatment of clinical disease. The aim of this book is to offer the reader a practical guide to diagnosis using a case-based, systematic approach. It is intended for anyone with an interest in veterinary ophthalmology, including the general practitioner and the veterinary student.

We are veterinary ophthalmologists working in busy referral practices, with experience in general practice and in undergraduate and postgraduate teaching. We have sought to provide a pragmatic approach to the diagnosis and management of ocular disease in small animals, and to share our thought processes, drawing on the broad spectrum of examples in our daily case loads, from extreme forms of common conditions to more complex ocular disease. Practical recommendations are supported by extensive photodocumentation, and an appendix of tips for interpreting the information obtained from ophthalmic examination.

Heidi Featherstone & Elaine Holt

Acknowledgements

As with any book, the finished work is possible only with the help of many people. We are indebted to numerous colleagues, not only for generously contributing case material, but also for their time and advice. For their ophthalmology expertise, we thank Peter Renwick, Christine Heinrich, John Mould, Mike Rhodes, Barbara Braus, Sue Manning, Elizabeth Giuliano, Ellison Bentley, Marnie Ford and David Gould. Peter Renwick and Christine Heinrich deserve special thanks for their generosity in sharing their library of photographs, built up over many years. John Mould also deserves special thanks for his exceptional photographic skills, and for his readiness to share his photographs. With respect to imaging, we are grateful to Paul Mahoney for his tireless help and advice on advanced imaging techniques, and to Ruth Dennis and Rob White for sharing their case material. Emma Scurrell has provided invaluable expertise, along with enthusiasm, on ophthalmic pathology, supported by excellent gross and histological photographs. Simon Scurrell has worked skilfully and painstakingly on the annotated diagrams. Photographing the eyes of conscious dogs and cats is a challenge that requires excellent handling skills and patience: special thanks to David Hindley, Stephanie Ascott, Tom Buckley, Nicola Millington, Lou Hadley and the nursing team at Willows Veterinary Centre and Referral Service. Sue Jenkins' non-veterinary editing expertise has been invaluable throughout.

Not least, we would like to thank the animals, their owners, and the referring veterinary surgeons, without whom this book would not have been possible.

List of Abbreviations

ACTH adrenocorticotrophic hormone (adrenocorticotropin)

ALT alanine aminotransferase

AP alkaline phosphatase

CCT corneoconjunctival transposition

CDV canine distemper virus

CNS central nervous system

CT computed tomography

CTT corneal touch threshold

DIM diffuse iris melanoma

EOM extraocular polymyositis

ERG electroretinography

FCV feline calicivirus

FeLV feline leukaemia virus

FHV-1 feline herpesvirus-1

FIV feline immunodeficiency virus

FNA fine-needle aspiration

H&E haematoxylin and eosin

HF-UBM high-frequency ultrasound biomicroscopy

ICLE intracapsular lens extraction

IMR immune-mediated retinitis

IOP intraocular pressure

IVIg intravenous therapy with human immunoglobulin

KCS keratoconjunctivitis sicca

LIU lens-induced uveitis

MMM masticatory muscle myositis

MRI magnetic resonance imaging

Nd:YAG neodymium-doped yttrium aluminium garnet

NGE nodular granulomatous episclerokeratitis

NSAID non-steroidal anti-inflammatory drug

OD oculus dextor, right eye

OS oculus sinister, left eye

OU oculi unitas, both eyes

PCR polymerase chain reaction

PDT parotid duct transposition

PHPV persistent hyperplastic primary vitreous

PLR pupillary light reflex

PPM persistent pupillary membrane

PRA progressive retinal atrophy

prcd progressive rod-cone degeneration

q quisque, every, e.g. q4 hours means 'every four hours' (six times daily)

RPE retinal pigment epithelium

RPED RPE dystrophy

SARDS sudden acquired retinal degeneration syndrome

SFT swinging flashlight test

STT Schirmer tear test

TEL third eyelid

TBUT tear film break-up time

TPA tissue plasminogen activator

UBM ultrasound biomicroscopy

VOR vestibulo-ocular reflex

CHAPTER 1

Abnormalities of Globe Size and Position

Introduction

It can be a challenge to differentiate between a change in size and a change in position of the eye. An abnormally small eye (microphthalmos) may be confused with a normal-sized eye that is recessed in the orbit (enophthalmos); an enlarged eye (buphthalmos) may have a similar appearance to a normal-sized eye that is anteriorly displaced (exophthalmos). Assessing the size of the palpebral fissure, position of the third eyelid (TEL) and corneal diameter, looking at the eye from different angles, careful comparison with the other eye and concurrent clinical signs are helpful in differentiating between these conditions.

Small Animal Ophthalmology: What's Your Diagnosis? First Edition. Heidi Featherstone, Elaine Holt.

CASE STUDY 1

History

A 12-year-old female neutered domestic shorthaired cat is presented because of a sudden redness in the right eye. The left eye had looked abnormal for several weeks but appeared comfortable. The cat has recently lost weight and is lethargic.

Questions

1. Describe the abnormalities in Figs. 1.1a, b, and c.
2. What differential diagnoses should be considered for this presentation?
3. What tests could you perform to make the diagnosis?

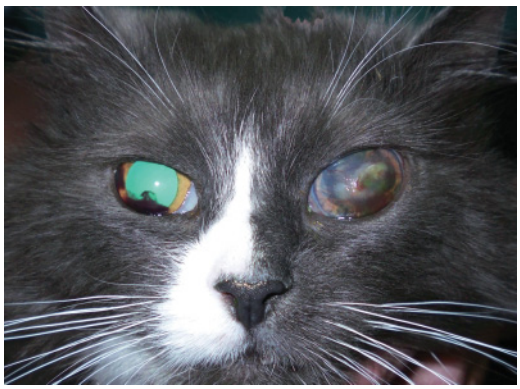
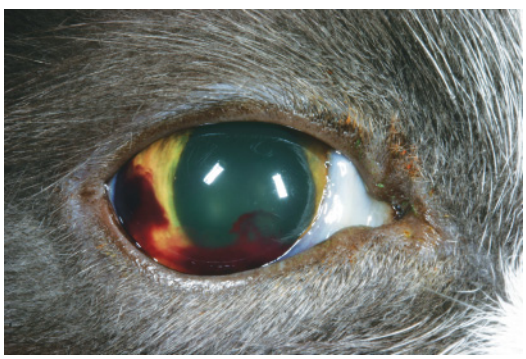


Fig. 1.1a



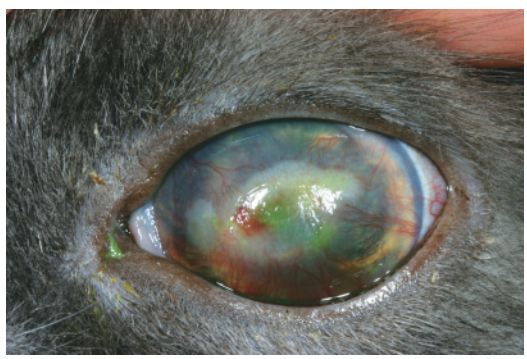


Fig. 1.1b

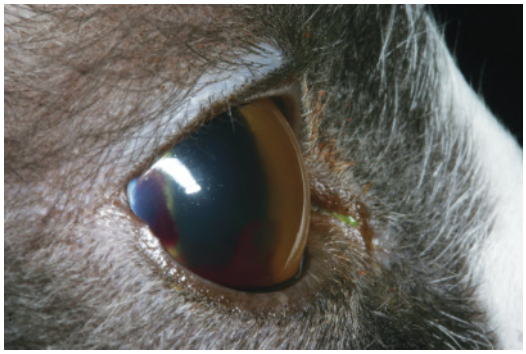
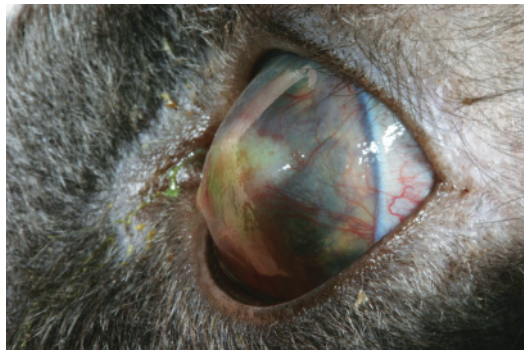



Fig. 1.1c

Answers

1. What the figures show

Fig. 1.1a The left eye appears larger than the right eye; a wide palpebral fissure, increased corneal diameter and clearly visible medial and lateral regions of the limbus are consistent with buphthalmos. There is a generalised corneal opacity which is most dense axially; a tapetal reflection is not visible. In the right eye, the green tapetal reflection is obstructed ventrally by a red/black irregular opacity which appears to be in front of the iris, and there is a similar coloured opacity overlying the iris at the 9 o'clock position. The pupil is moderately dilated.

Fig. 1.1b In the left eye, the Purkinje images are disrupted. There is generalised corneal vascularisation and a stippled area of fluorescein stain uptake axially. The conjunctival vessels overlying the sclera on the lateral aspect of the globe are congested. The iris is difficult to see well but appears darker (medially) and possibly thickened. In the right eye, there is hyphaema; the regions of the iris that are visible appear normal.

Fig. 1.1c Oblique view from the lateral aspect of both eyes. In the left eye there is an irregular contour and anterior protrusion of the cornea (OS > OD). There is increased exposure of the sclera and conjunctiva, and episcleral congestion. The anterior chamber is obliterated by abnormal iris tissue which appears to be displaced anteriorly. In both eyes fluorescein dye is visible on the periocular hair at the medial canthus.

2. Differential diagnoses

Given the history and the appearance of the left eye, the following conditions should be considered:

- **Chronic glaucoma** In contrast to the dog, primary glaucoma in the cat is rare, and secondary glaucoma is more common. The most common causes of secondary glaucoma in the cat are chronic idiopathic lymphocytic-plasmacytic uveitis and primary intraocular neoplasia, most notably diffuse iris melanoma. Typical clinical signs include buphthalmos, conjunctival and episcleral congestion, corneal oedema, mydriasis, and impaired or absent vision. Buphthalmos can be difficult to discern in the cat and assessment of the size of the palpebral fissure can be helpful because it becomes wider as the size of the eye increases. Glaucoma in cats is typically insidious in onset and is often difficult to recognise. This is in contrast to canine primary glaucoma which is characterised by peracute pain, episcleral congestion, marked corneal oedema, mydriasis and blindness (*Ch. 6, case 2*).
- **Exophthalmos** Anterior displacement of the globe within the orbit. Common causes of exophthalmos in the cat include orbital neoplasia, orbital cellulitis/abscess and orbital trauma

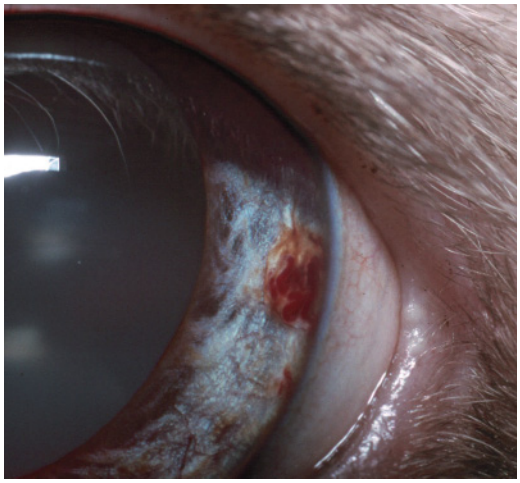


Fig. 1.1d Aneurysm within the lateral region of the major arterial circle in the left eye of a cat with systemic hypertension.

(haematoma, emphysema, fracture, foreign body). Primary malignant neoplasia and abscesses secondary to dental disease are more likely in old cats, whereas head trauma and orbital foreign bodies are more common in young cats (*Ch.12, case 2*).

Given the appearance of the right eye, the following conditions should be considered:

- **Systemic hypertension** Sustained systemic hypertension is commonly associated with ocular manifestations which primarily involve the posterior segment but also affect the anterior segment. Abnormalities in the posterior segment involve the retina, choroid and vitreous humour and appear as retinal oedema and bullae, retinal and intravitreal haemorrhages, retinal detachment and increased tortuosity of the retinal arterioles. Intraocular haemorrhage can occur as a result of haemorrhage from the iris (Fig. 1.1d), ciliary body, retina, and choroid. Extensive hyphaema can lead to the formation of anterior and posterior synechiae and secondary glaucoma.
- **Coagulopathy and platelet disorders** Ocular haemorrhage can be a clinical sign of a coagulopathy or a platelet disorder. Ocular haemorrhage typically occurs when the platelet count is <50 000 cells/µl.
- **Uveitis** When there is a breakdown of the blood-aqueous barrier during inflammation, red blood cells can enter the anterior chamber (hyphaema). The blood may form either a homogenous layer in the ventral anterior chamber or a clot, as in this cat.
- **Trauma** Ocular haemorrhage may result from both blunt and penetrating ocular trauma (*Ch. 12, cases 2 and 3*).
- **Pre-iridal fibrovascular membrane (PIFM)** The formation of fibrovascular membranes on the anterior iris is usually a consequence of intraocular inflammation, haemorrhage and/or hypoxia due to the release of vasoactive substances. Hence the formation of PIFMs is common in eyes with chronic uveitis, intraocular haemorrhage, retinal detachment, glaucoma, and neoplasia. The newly formed blood vessels within the membranes are fragile and can cause spontaneous and recurrent hyphaema. PIFMs can extend into the filtration angle and result in secondary glaucoma. Fibrovascular membranes are not restricted to the surface of the iris – they can also form on the retina and optic disc and in the vitreous.
- **Neoplasia (primary or secondary)** Intraocular haemorrhage may occur in eyes affected with primary or secondary neoplasia, either originating from a PIFM or as a result of the direct effect of neoplasia (e.g. adverse effect on clotting function).
- **Congenital anomalies** These include persistent hyaloid artery and persistent hyperplastic primary vitreous, both of which are rare conditions in the cat.

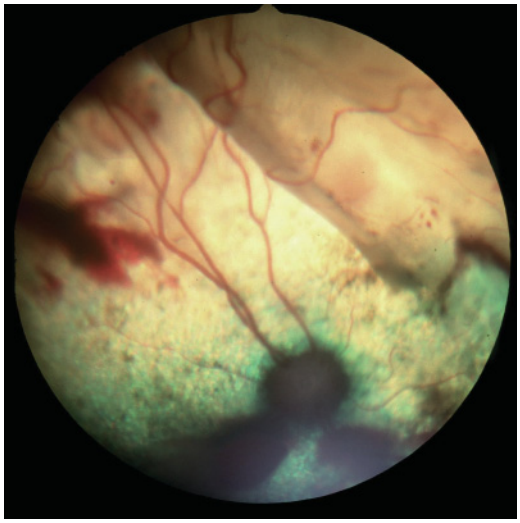


Fig. 1.1e Extensive dorsal retinal detachment and multiple retinal haemorrhages throughout the tapetal fundus and ventral to the optic disc.

3. Appropriate diagnostic tests

- Ocular reflexes
  - Pupillary light reflex – the left pupil is not visible. Negative consensual OS (from left to right eye); positive direct OD, albeit slow and incomplete.
  - Dazzle reflex – negative OS, positive OD
  - Palpebral reflex – positive OU, OS < OD
  - Corneal reflex – positive OU, OS < OD
- Menace response – negative OS, equivocal OD

In this cat, these results are consistent with blindness, reduced corneal sensation and lagophthalmos in the left eye, and reduced vision in the right eye.

- Examination with a focal light source – in the left eye, slit-lamp biomicroscopy reveals extensive superficial and deep corneal vascularisation, and generalised corneal oedema and fibrosis which is most marked axially.
- Ophthalmoscopy – in the right eye, this reveals an extensive dorsal retinal detachment, most marked within the medial quadrant, and multiple retinal haemorrhages of different sizes throughout the tapetal fundus and ventral to the optic disc (Fig. 1.1e).
- Schirmer tear test – 4 mm/min OS, 10 mm/min OD
- Fluorescein dye – negative staining OD, positive staining in the superficial axial cornea OS. This is indicative of suboptimal ocular surface health in the left eye, most likely because of the lagophthalmos.
- Tonometry – IOP 35 mmHg OS, 20 mmHg OD

There is increased resistance to retropulsion of the left eye; retropulsion of the right eye is normal. The remainder of the ophthalmic examination reveals no additional abnormalities. A general physical examination reveals an underweight body condition and mild dental disease.

The degree of resistance to retropulsion of the eye varies amongst species and between breeds. The normal feline globe is generally retropulsed less than the normal canine globe because of close apposition between the globe and the orbit in the cat. The degree of retropulsion in brachycephalic breeds is less than in other breeds because of the shallow orbit, in both cats and dogs.

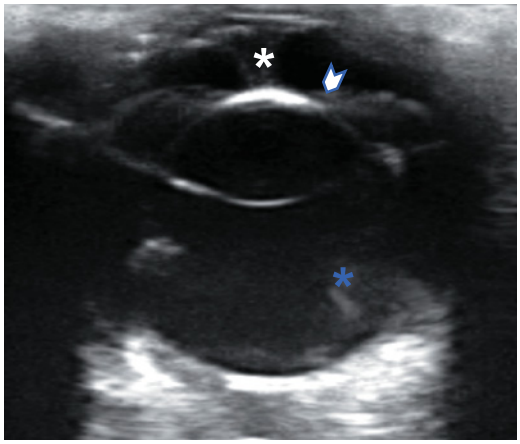


Fig. 1.1f Horizontal B-mode ultrasound scan (left eye). There is hyperechoic material spanning the anterior chamber (white asterix) and within the vitreous body (blue asterix); convex iris leaflets contact the anterior surface of the lens (arrow). In this cat, these changes are consistent with intraocular haemorrhage, anterior synechiae, and iris bombé.

Further diagnostic tests

- B-mode ocular ultrasound – this is indicated to evaluate the posterior segment when the anterior segment is opaque, and to take measurements. Axial globe length is the distance between the centre of the cornea and the posterior pole.

  The ultrasound scan reveals an axial globe length of 22 mm OS and 19 mm OD (within normal limits), which confirms buphthalmos in the left eye. Additional abnormalities in the left eye include hyperechoic material spanning the anterior chamber (consistent with blood, fibrin or anterior synechiae), hyperechoic material within the vitreous (consistent with vitreal degeneration, intravitreal haemorrhage, neoplasm), and convex iris leaflets which contact the anterior lens capsule (consistent with iris bombé, *Ch. 9, case 4*) (Fig. 1.1f).
- Laboratory tests – results of routine haematology, biochemistry (including electrolytes), urine analysis and thyroid function are consistent with chronic renal failure.
- Systemic blood pressure measurement – indirect assessment with a Doppler sphygmomanometer (ultrasonic detection device) reveals a systolic blood pressure of 220 mmHg (upper limit for systolic blood pressure in the cat is 160–170 mmHg).

Diagnosis

Based on the information available, a diagnosis of systemic hypertension is made. The ocular manifestations are hyphaema and hypertensive retinopathy in the right eye, and glaucoma secondary to intraocular haemorrhage in the left eye.

Treatment

The preferred first-line treatment for feline systemic hypertension is amlodipine besylate (a calcium channel blocker) at a dose of 0.625–1.25 mg *per os* q24 hours. The aim of treatment is to lower the systolic blood pressure to a safe range, i.e. ≤160–170 mmHg. Some cats need more frequent dosing (amlodipine besylate q12 hours) and others require the addition of benazepril to become normotensive. Adverse effects of amlodipine besylate are uncommon but include azotaemia, lethargy, hypokalaemia, reflex tachycardia and weight loss.

Symptomatic treatment for hyphaema can be considered with topical corticosteroid therapy, e.g. 1% prednisolone acetate q8–12 hours. Enucleation of the left eye in this cat is indicated because of pain, irreversible blindness and to prevent complications arising from progressive corneal disease.

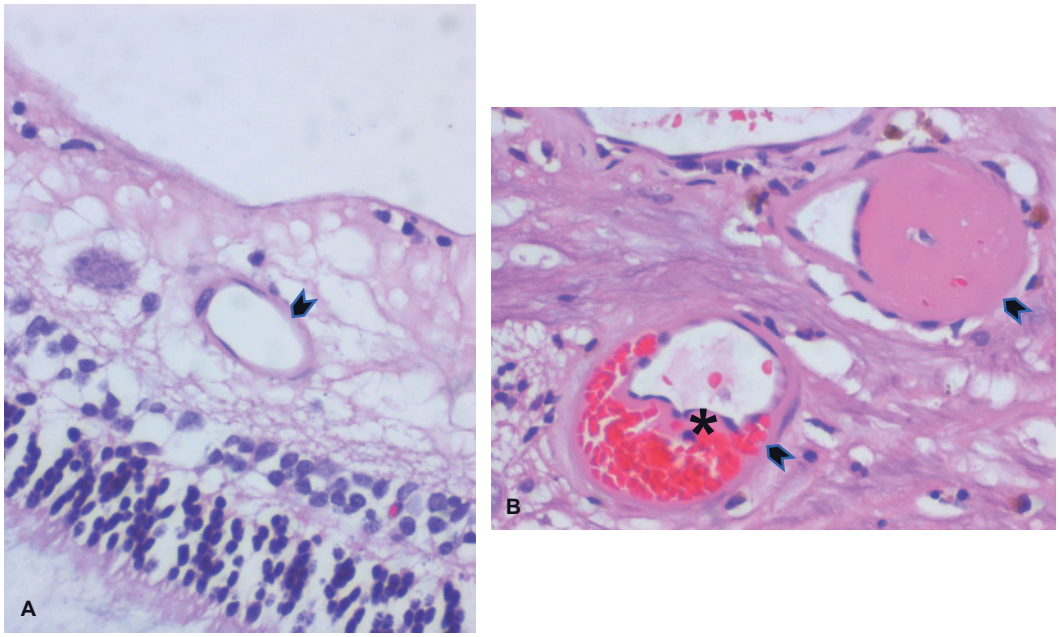


Fig. 1.1g (A) H&E section of a normal feline retina demonstrating a normal retinal arteriole (arrow) (×200). (B) H&E section of the detached retina in this hypertensive cat demonstrating two abnormal retinal arterioles (arrows) (×400). The arteriolar walls are diffusely expanded by a bright pink homogenous matrix. This is referred to as hyalinisation and results from the leakage of plasma products into the vessel wall secondary to endothelial damage. Note the haemorrhage dissecting the vessel wall (asterix) and the perivascular haemorrhage. Thickening of the vessel walls has resulted in extreme narrowing of the blood vessel lumens which are now barely visible; this degree of narrowing could result in ischaemic injury. The histopathological diagnosis is retinal and choroidal hyalinising arteriolosclerosis with intraocular haemorrhage characteristic of hypertensive retinopathy. Reproduced with permission from EJ Scurrell.

A transconjunctival procedure is performed. In addition to the clinical findings, ocular histopathology reveals retinal detachment and confirms the clinical diagnosis of glaucoma secondary to extensive intraocular haemorrhage caused by the systemic hypertension (Fig. 1.1g).

Repeated thorough physical and ophthalmic examinations as well as blood pressure measurements are recommended, e.g. every 3–6 months.

All enucleated globes should be submitted for ocular histopathology. For routine diagnostic purposes, fixation of the globe in 10% formalin is generally appropriate, although confirmation with the chosen laboratory is recommended. Prior to fixation, as much excess extraocular tissue as possible should be removed, and the optic nerve should be left as long as possible.

Prognosis

The prognosis is good for retinal detachment secondary to systemic hypertension in that most retinas reattach if antihypertensive therapy is successful at lowering the blood pressure sufficiently. The prognosis for vision is variable because it depends on the extent and duration of retinal detachment

prior to treatment, as well as the severity of any associated haemorrhage. There is evidence to suggest that the feline retina begins to degenerate within the first week of detachment. However, most cats only present when they are severely visually impaired or blind, by which stage both eyes are affected. The retinal pathology is often chronic in the eye that is affected first but is only noted when the fellow eye develops significant disease. Even if vision is not restored, continued treatment of the systemic hypertension is imperative to minimise progressive disease of other target organs (brain, heart, kidney).

Discussion

Systemic hypertension is a relatively common disease in cats older than 10 years and is usually associated with chronic renal failure, and less frequently, with hyperthyroidism and Conn's syndrome. As the eye is a target organ for hypertensive damage, the most common reason for presentation is acute blindness secondary to retinal detachment. Neurological deficits may be present and are generally the result of cerebrovascular disease. Prolonged hypertension initially leads to arteriolar vasoconstriction, manifested as narrowing and increased tortuosity of the retinal arterioles, and finally to compromise of the vascular integrity. This in turn leads to intraocular haemorrhage as well as retinal oedema and an accumulation of serous fluid which separates the neurosensory retina from the underlying retinal pigment epithelium. The ocular changes progress over several months and early diagnosis of 'at risk' cats is important in preventing blindness. Ideally any geriatric cat should have an annual blood pressure assessment together with a complete ocular examination including fundic examination. Cats with e.g. renal disease or hyperthyroidism should be monitored particularly closely.

Further reading

See Appendix 2.

CASE STUDY 2

History

A 9-month-old male Labrador Retriever is presented because both eyes have looked different for several months. There has been no evidence of ocular discomfort and the dog catches balls well. The dog has received his primary vaccination course and routine anthelmintic treatment and is reported to be clinically well.

Questions

1. Describe the abnormalities and pertinent normal features in Figs. 1.2a and b.
2. What differential diagnoses should be considered for this presentation?
3. What tests could you perform to make the diagnosis?

Fig. 1.2a

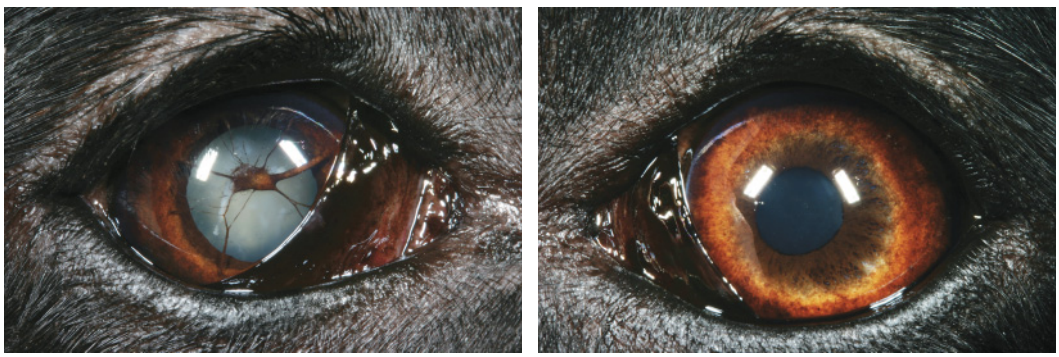


Fig. 1.2b Right eye has received a topical mydriatic agent (tropicamide).

Answers

1. What the figures show

Fig. 1.2a Left eye – is normal and shows an iris colour variation consisting of a mid brown outer zone and a dark brown pupillary zone. Right eye – has a small palpebral fissure; there is protrusion of the TEL. The pupil is small which creates a subtle anisocoria (OD < OS). The iris is slightly dark compared to the left eye. A tapetal reflection is not visible.

Fig 1.2b Both eyes are shown – the right pupil has been artificially dilated with tropicamide. Right eye – there is a structure which comprises multiple strands of iris tissue. The strands originate from the iris collarette and join at a single focal point. A cataract is present, resulting in leukocoria (white pupil).

2. Differential diagnoses

Given the history and appearance of the right eye, the following conditions should be considered:

- **Microphthalmos** This is a congenital anomaly in which the eye is abnormally small and deeply set within the orbit and has a range of concurrent defects including persistent pupillary membrane (PPM) remnants, cataract, retinal dysplasia, staphyloma, and nystagmus.
- **Nanophthalmos** A congenital anomaly in which the eye is abnormally small but otherwise normal.
- **Phthisis bulbi** Acquired end-stage atrophy of the eye following severe inflammation, ocular trauma or glaucoma. Typical features include an absence of visible signs of inflammation, an opaque cornea which prevents intraocular examination and marked hypotony (Fig. 1.2c).
- **Enophthalmos** An eye that is recessed in the orbit, causes of which include:
  - **Pain** Stimulation of the ophthalmic branch of the trigeminal nerve results in globe retraction by the retractor bulbi muscle which leads to enophthalmos and passive TEL protrusion. Conditions such as entropion and corneal ulceration often cause enophthalmos secondary to ocular surface pain. Ocular surface pain is also manifested by blepharospasm and increased lacrimation (*Ch. 5*).
  - **Horner's syndrome** Interruption of the sympathetic innervation of the eye, eyelids and orbital smooth muscle resulting in miosis, anisocoria, ptosis, narrow palpebral fissure, enophthalmos, and TEL protrusion (*Ch. 10, case 1*).
  - **Reduced volume of orbital tissue** This can arise because of dehydration, weight loss (reduction in orbital fat) or fibrosis of orbital tissues following orbital inflammation or surgery.

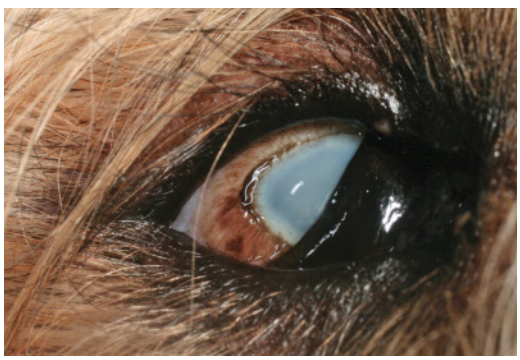


Fig. 1.2c Phthisis bulbi secondary to chronic uveitis in the right eye of a Tibetan Terrier. Note the third eyelid protrusion, increased scleral show, absence of external signs of inflammation, and diffuse corneal fibrosis.

3. Appropriate diagnostic tests

- Ocular reflexes
  - Pupillary light reflex – positive direct and consensual OU
  - Dazzle reflex – positive OU
- Menace response – positive OS, negative OD

In this dog, these results are consistent with absent vision but some retinal and optic nerve function in the right eye.

- Examination with a focal light source – in the right eye, slit-lamp biomicroscopy shows that the structure originating at the iris collarette converges at a focal point on the anterior lens capsule, consistent with a PPM.
- Tonometry – IOP 15 mmHg OU
- B-mode ocular ultrasound – this is indicated to evaluate the posterior segment when the anterior segment is opaque, and to take measurements. Axial globe length is the distance between the centre of the cornea and the posterior pole. Axial lens length is the distance between the centre of the anterior and posterior lens capsules.

  The ultrasound reveals an axial globe length of 20.8 mm OS (within normal limits) and 18.5 mm OD, which confirms microphthalmos in the right eye (Fig. 1.2d). The right lens is hyperechoic and slightly smaller than the left lens (axial length 7.1 mm compared to 7.3 mm, both within normal limits); the hyperechogenicity is consistent with a cataract.

There is no change in the appearance or apparent comfort level of the right eye following the application of topical anaesthetic eye drops, which rules out enophthalmos because of ocular surface pain. The position of the TEL in the right eye does not change following the application of topical 1% phenylephrine, which makes Horner's syndrome an unlikely cause of the TEL protrusion (*Ch. 10, case 1*). The remainder of the ophthalmic examination reveals no additional abnormalities and a general physical examination is unremarkable.

A single drop of a topical anaesthetic will anaesthetise the ocular surface (conjunctiva and cornea) within approximately 10 s. Anaesthesia lasts for about 45 min in the normal dog eye (25 min in the cat). The depth and duration of anaesthesia can be increased by the repeat application of the topical anaesthetic, e.g. one drop applied twice over one minute. The application of a topical anaesthetic can be a simple way of differentiating surface ocular pain from pain caused by intraocular or orbital disease.

Diagnosis

Based on the information available, a diagnosis of microphthalmos in the right eye is made.

Treatment

No treatment is indicated for the majority of eyes affected with microphthalmos. In a small number of dogs, recurrent conjunctivitis may develop because of poor tear drainage and/or entropion because of poor eyelid-to-globe apposition. Conjunctivitis is usually managed conservatively with topical lubricant and antibiotic therapy; entropion should be surgically corrected. Congenital cataract associated with microphthalmos is typically non-progressive, and cataract removal in a

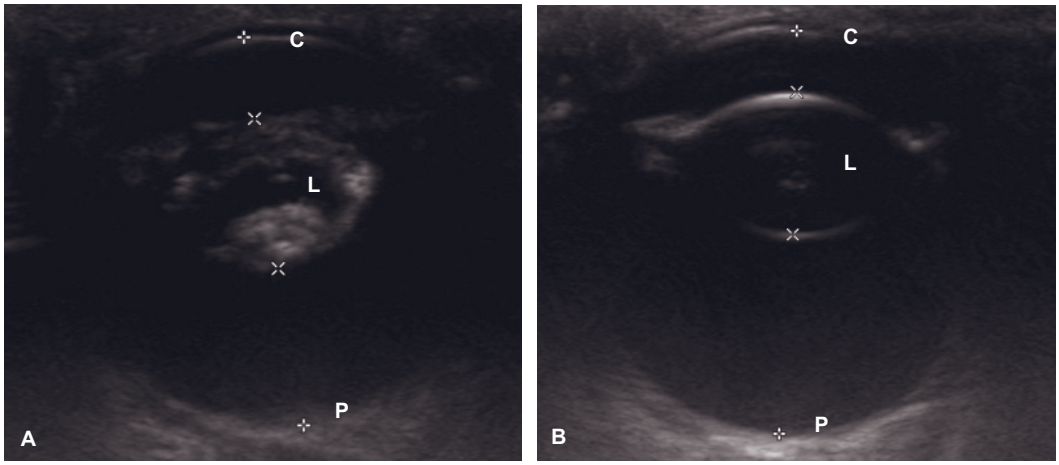


Fig.1.2d Horizontal B-mode ultrasound scan. (A) Right eye – axial globe length 18.5 mm, axial lens length 7.1 mm; hyperechoic lens. This is consistent with microphthalmos and cataract. (B) Left eye – axial globe length 20.8 mm, axial lens length 7.3 mm. C, cornea; L, lens; P, posterior limit of globe; 'x' and '+' represent points of measurement for the axial length of lens and globe respectively.

microphthalmic eye is associated with an increased risk of complications. Cataract removal is not considered in this dog because vision in the left eye is considered to be normal.

Prognosis

Most microphthalmic eyes remain stable as the associated ocular abnormalities are typically non-progressive. The prognosis for the right eye is therefore considered to be good.

Discussion

Microphthalmos is described in many species and in many different dog breeds. Although typically unilateral it may be bilateral but not necessarily symmetrical. Abnormalities range from mild to severe and vision may be normal, reduced or absent. In addition, microphthalmic eyes commonly have clinically insignificant iris hypoplasia seen as miosis (because of hypoplasia of the iris dilator muscle) and a darkened iris, as in this dog. Miosis and darkening of the iris can also occur with anterior uveitis and should be ruled out on the basis of other clinical signs (*Ch. 7, case 1, Fig. 7.1e*). Although the cause of microphthalmos is often unknown, a heritable basis is described in several dog breeds including the Dobermann Pinscher, Miniature Schnauzer, English Cocker Spaniel and the Australian Shepherd. Animals with reduced pigment (melanin) in the body (subalbinism) are also commonly affected, e.g. merle collies. Regardless of the severity of the defect, affected animals should not be used for breeding.

Further reading

See Appendix 2.