



Posterior Segment and Orbital Neoplasia

Leandro Teixeira DVM, MSc, DACVP

Associate Professor, Richard R. Dubielzig Professor of Comparative Ocular Pathology and
Director of the Comparative Ocular Pathology Laboratory of Wisconsin - COPLOW
University of Wisconsin-Madison School of Veterinary Medicine

1



Outline

- Retinal/ON gliomas in dogs and cats
- Canine orbital lobular adenoma
- Canine orbital meningioma
- Canine orbital hibernoma
- Canine orbital rhabdomyosarcoma
- Feline restrictive orbital myofibroblastic sarcoma (FROMS)
- Other orbital lesions

2

Optic Nerve & Retinal Glioma

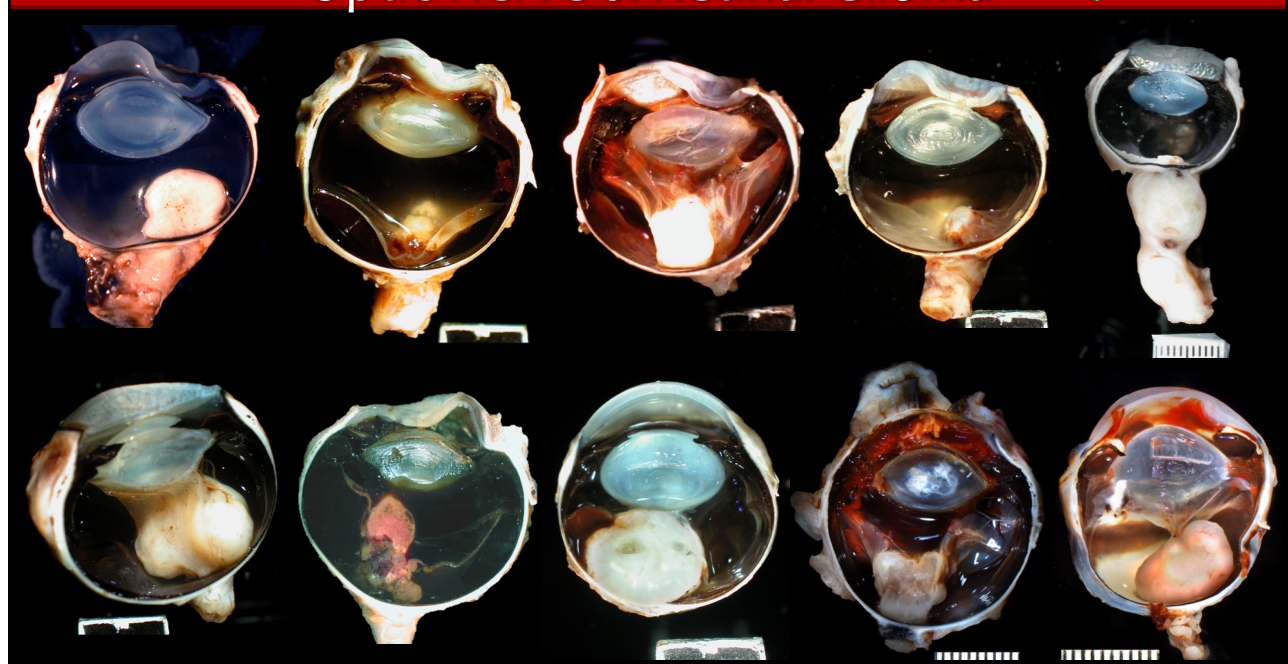
22 cases in COPLOW/5964 total tumors

- Definition
 - Uncommon neoplasms of glial cell origin that originates in the optic nerve and retina
- Dog > cats
- Astrocytic and/or oligodendroglial origin
 - GFAP and Olig-2 IHC, respectively
- Generally only threatens eye
 - Rare CNS extension
- Nodular, yellow-tan mass from ONH

1. Naranjo C, Schobert C, Dubielzig RR. (2008) Canine ocular gliomas: a retrospective study. *Vet. Ophthalmol.* 11 (6): 356-362.

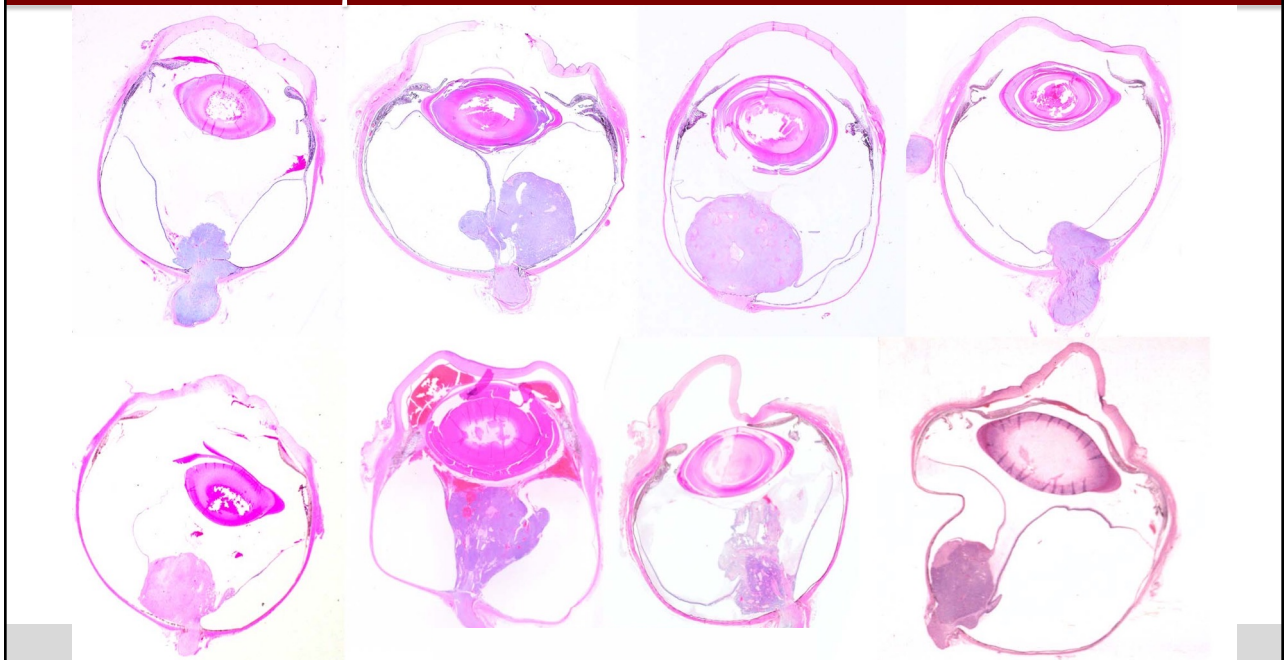
3

Optic Nerve & Retinal Glioma



4

Optic Nerve & Retinal Glioma



5

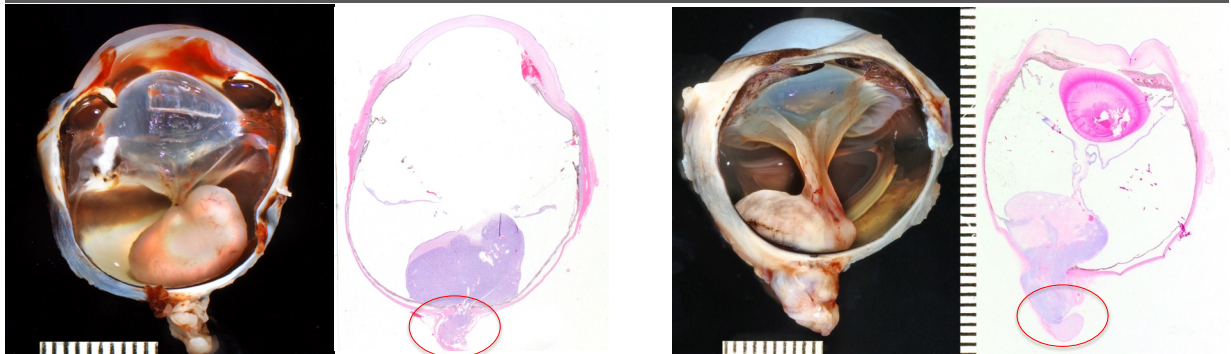
Optic Nerve & Retinal Glioma



Prognosis

- Optic nerve extension determines prognosis

Dirty Optic Nerve Surgical Margins

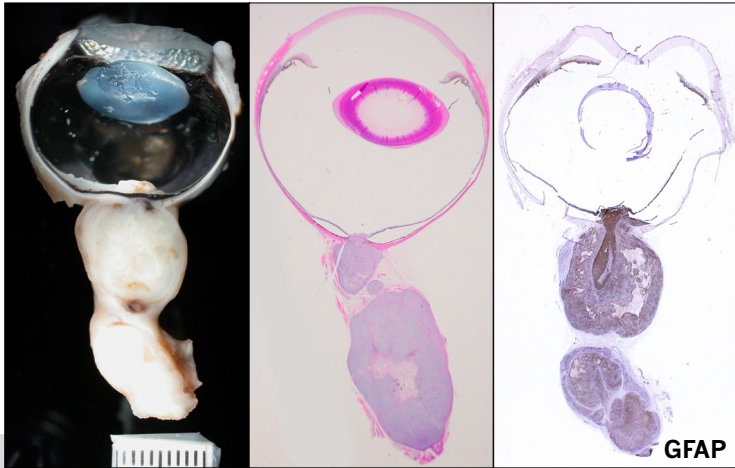


1. Naranjo C, Schobert C, Dubielzig RR. (2008) Canine ocular gliomas: a retrospective study. *Vet. Ophthalmol.* 11 (6): 356-362.

6

English Bulldog, MN, 12 yo

Deep optic nerve infiltration



Extension optic quiasm



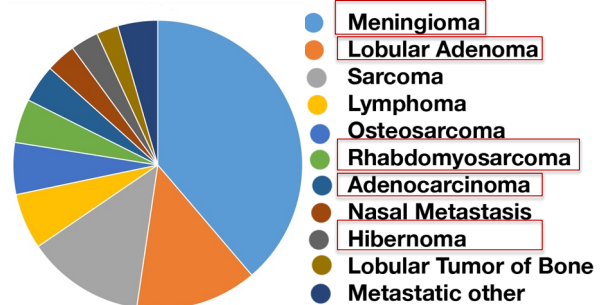
7

Orbital tumors in dogs

Anything in/near orbit can be origin

- Meninges (meningioma)
- Skeletal muscle (Rhabdomyosarcoma)
- Bone (osteosarcoma, multilobular osteo)
- Fat (Prolapse, lipoma, liposarcoma, hibernoma)
- Blood vessels (hemangiosarcoma)
- Glands (lacrimal, nictitating andenocarinoma)
- Inflammatory cells (histiocytic sarcoma, lymphoma)

Canine Orbital Neoplasia
n = 400



8

Canine Orbital Lobular Adenoma

- Definition
 - Benign glandular tumor
 - Unknown origin - 3rd eyelid, major lacrimal or diffuse
- 56 cases in the COPLOW database
 - Many dogs with bilateral disease



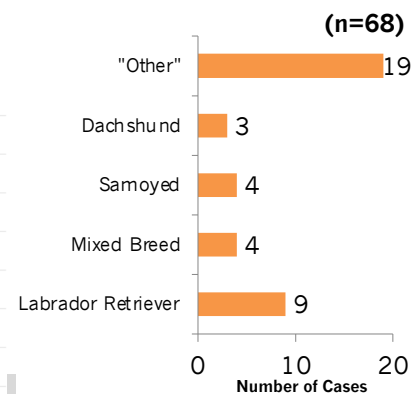
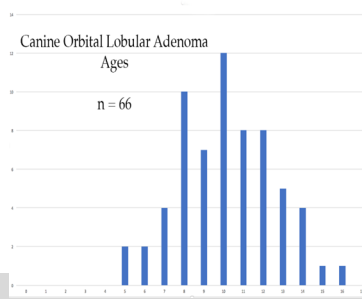
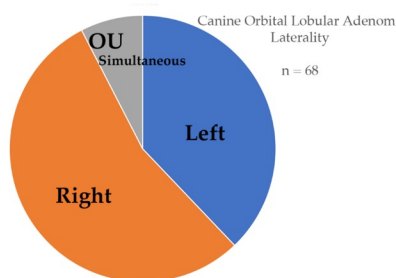
1. Headrick JF, Bentley E, **Dubielzig RR**. (2004) Canine lobular orbital adenoma: A report of 15 cases with distinctive features. *Vet. Ophthalmol.* 7: 47.

9

Canine Orbital Lobular Adenoma

Population

- Labrador retrievers overrepresented
- Middle-aged dogs
- A significant number of cases are bilateral at the first biopsy



10

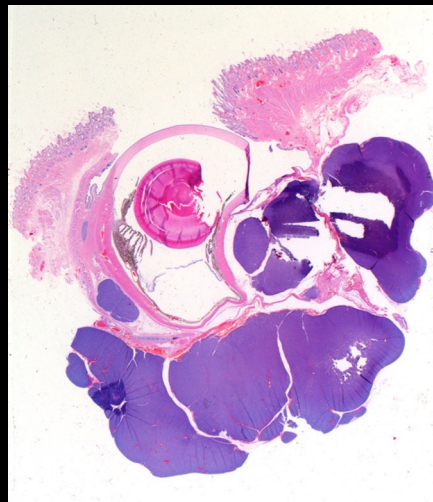
Canine Orbital Lobular Adenoma

Intraoperative picture



11

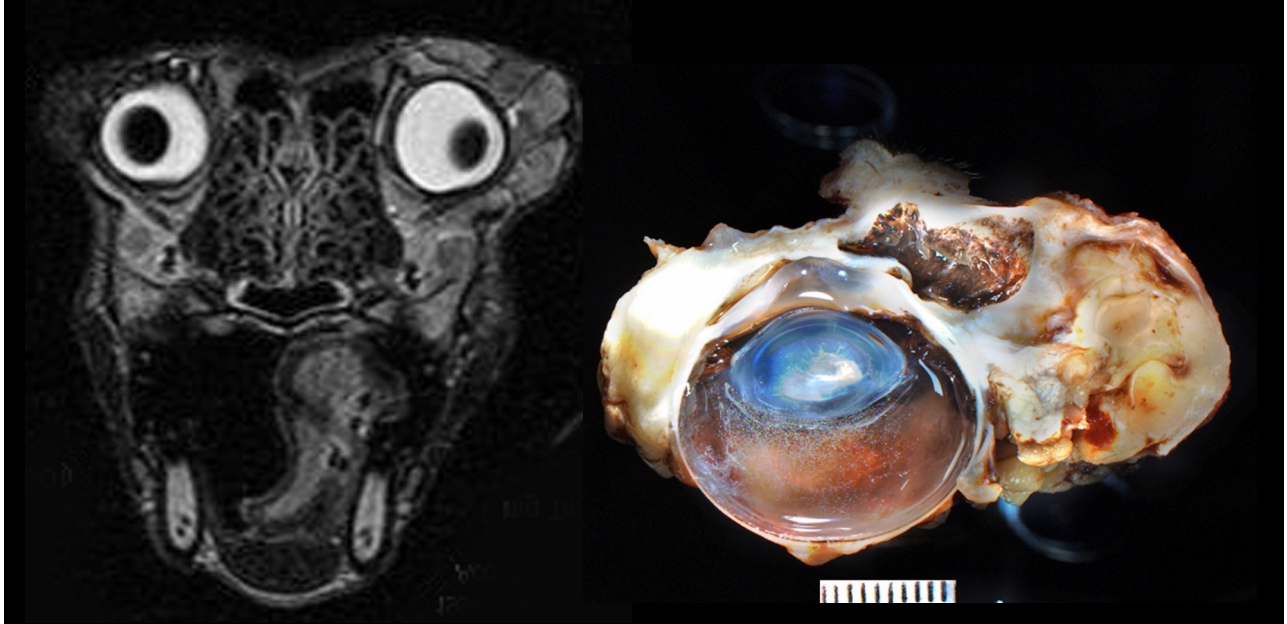
Canine Orbital Lobular Adenoma



Not the same case

12

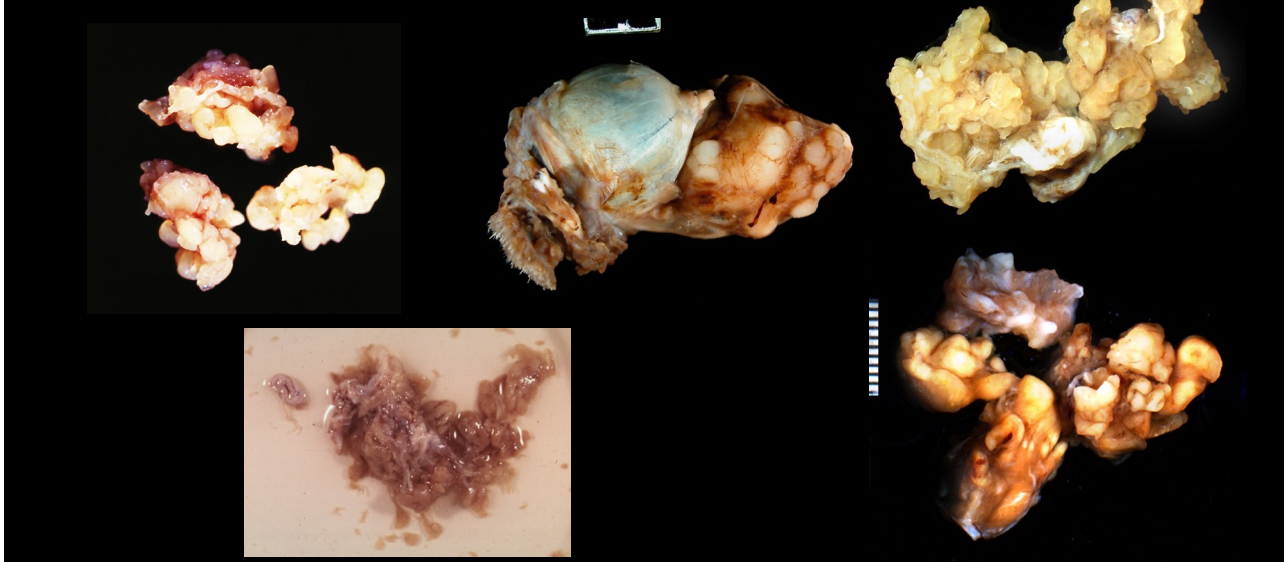
Canine Orbital Lobular Adenoma



13

Canine Orbital Lobular Adenoma

Typical lobular and friable appearance



14

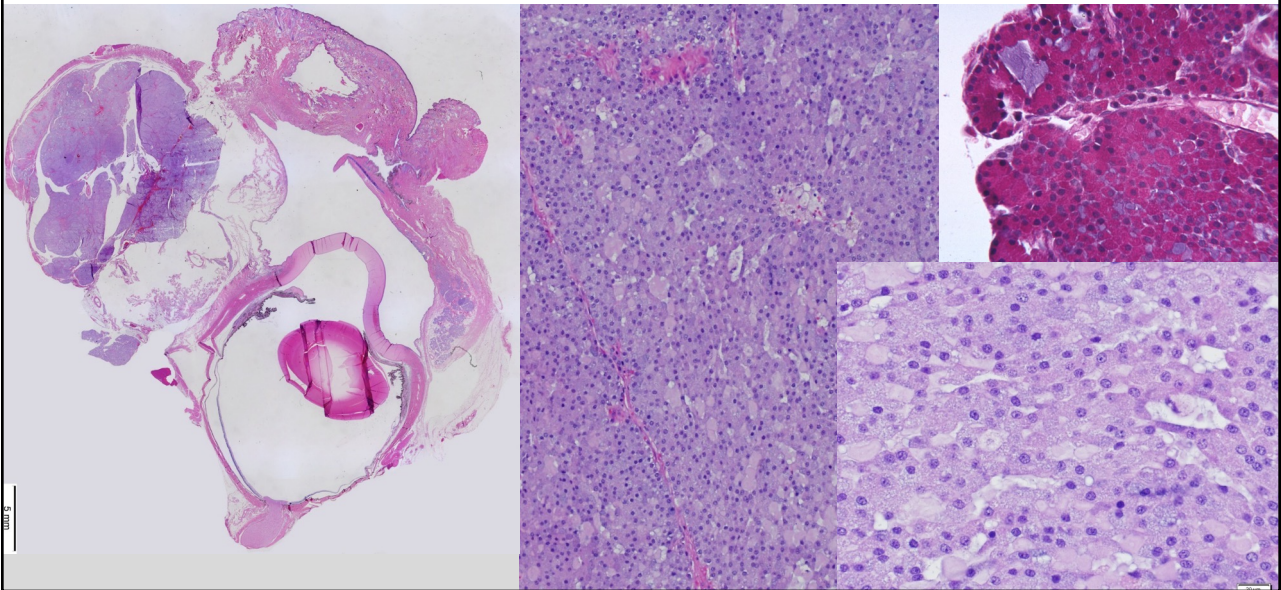
Canine Orbital Lobular Adenoma



Case from Dr. Cherlene Delgado

15

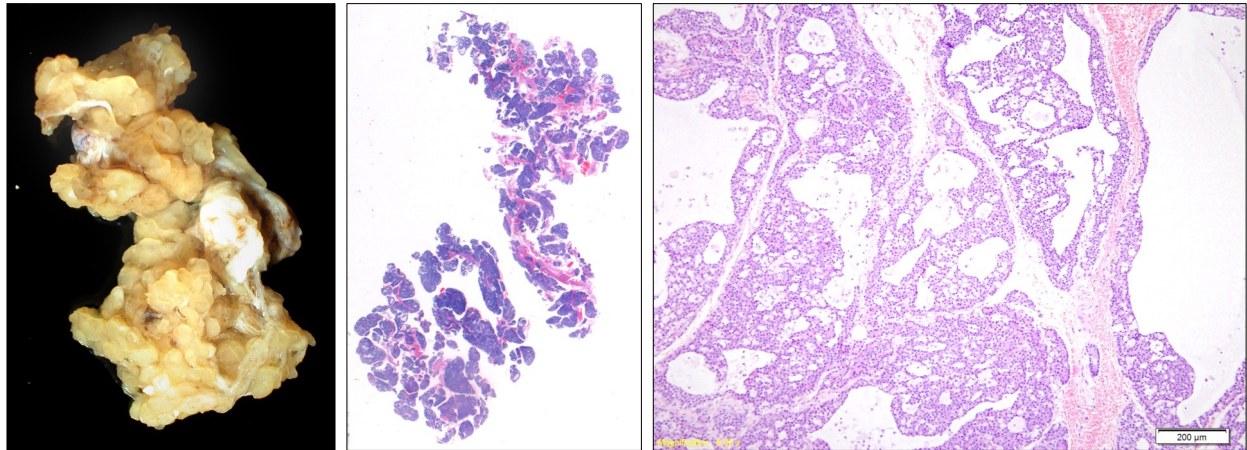
Canine Orbital Lobular Adenoma



16

Canine Orbital Lobular Adenoma

- Typical excisional biopsy tissue



17

10/13 cases with follow-up had at least one recurrence

Prognosis

- Most cases recur in one to two years
- Difficult to completely remove
- Multiple recurrences are common

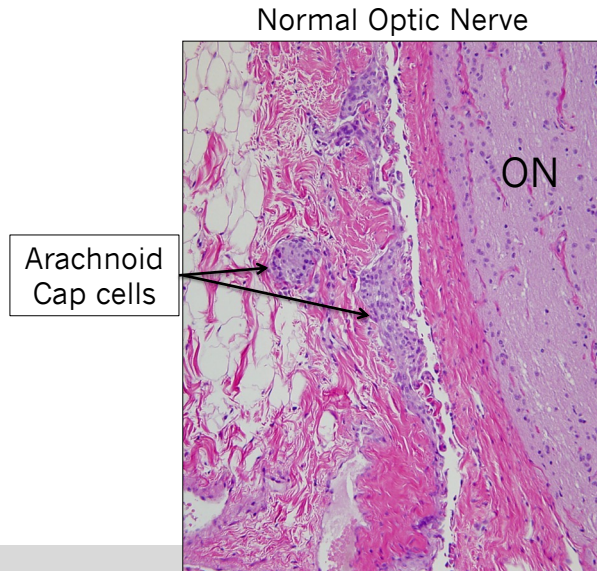
Time to recurrence

Case 1.....240 days
Case 3.....635d & 1300d (bilateral)
Case 5.....90d
Case 6.....365d & 515d & 995d (bilateral)
Case 7.....600d
Case 8.....Multiple (unknown periods)
Case 10.....660d
Case 13.....370d
Case 14.....315d
Case 15.....210d & 565d
Cases 2, 4, & 9 euthanized prior to recurrence
Cases 11 & 12 lost to follow-up

18

Canine Orbital Meningioma

- Tumor from optic nerve meninges
 - *Remember: The optic nerve is CNS*
- Thought to arise from arachnoid cap cells, near the optic nerve insertion
- Benign tumor in a bad place
 - Exophthalmos, exposure keratitis
 - Occasional retinal detachment
 - Compression atrophy of ON and vision loss

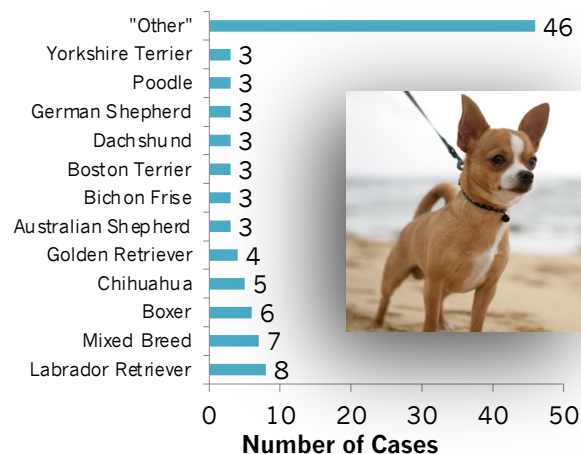


19

Canine Orbital Meningioma

153 cases in the COPLOW database

- 66 OD vs 44 OS
- 62 males vs 56 females
- The tumor surrounds the nerve in a conical manner.
- Slow growing, eventually grows into calvarium.
- Metaplastic bone, cartilage or myxoid tissue.



20

Canine Orbital Meningioma

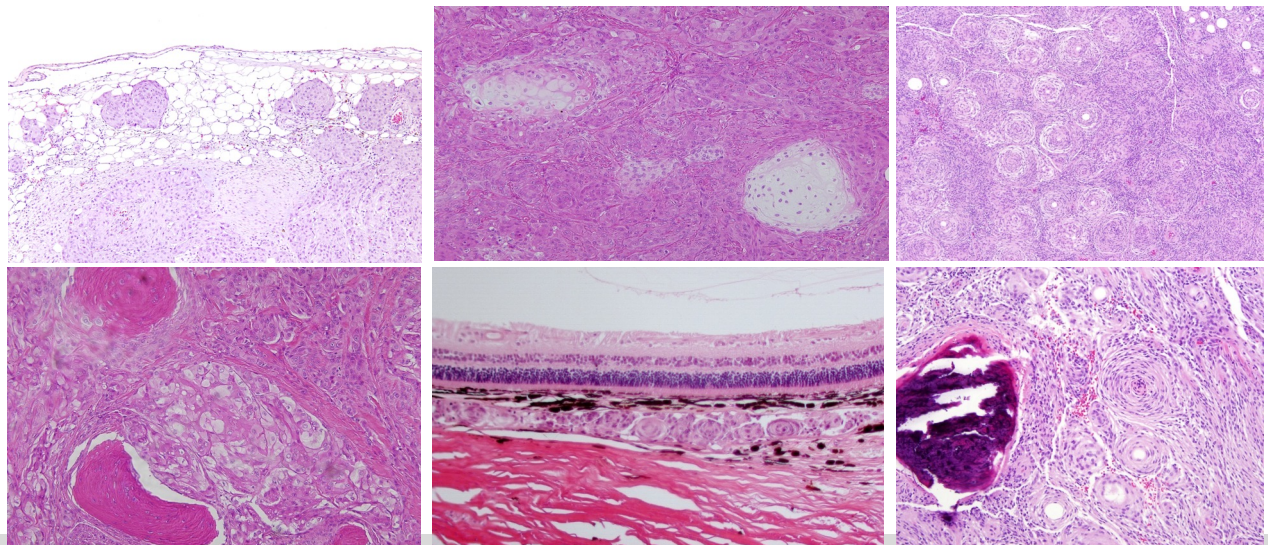
Gross appearance

- The tumor surrounds the nerve in a conical manner
- Slow growing, eventually grows into calvarium



21

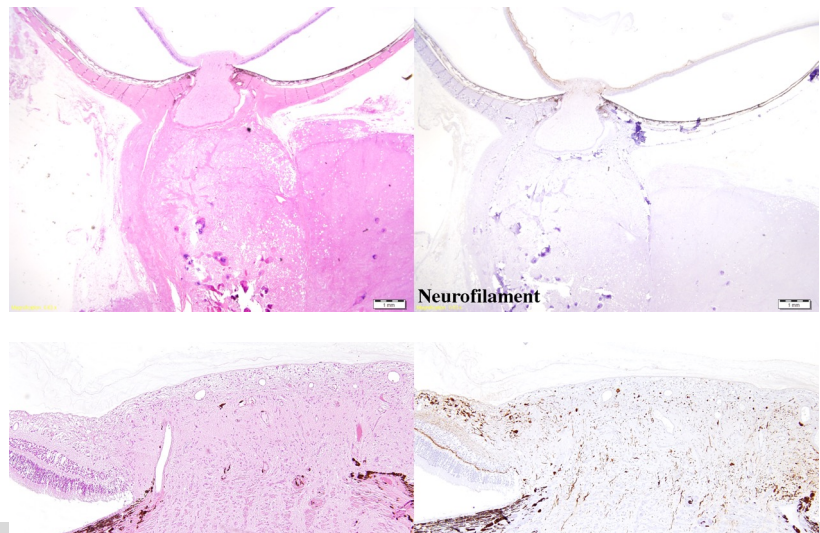
Canine Orbital Meningioma



22

Canine Orbital Meningioma

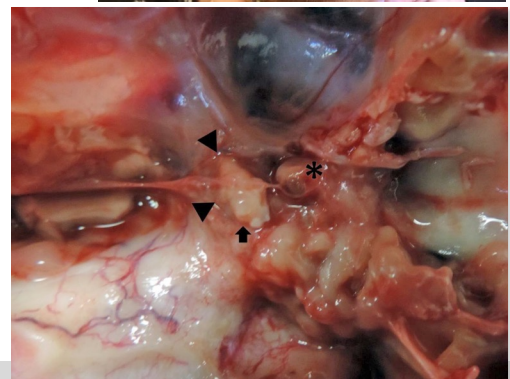
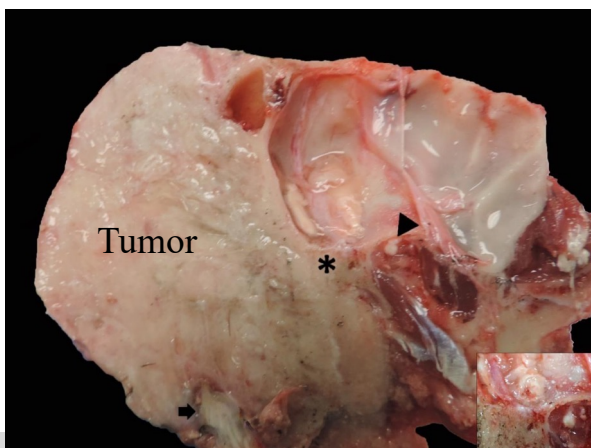
- Optic nerve compression atrophy
- Vision loss



23

Canine Orbital Meningioma

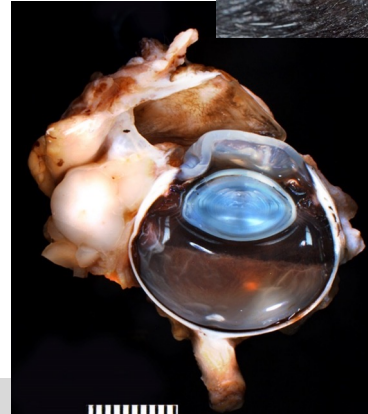
Recurrent tumor growing into the calvarium
4.5 years after enucleation



24

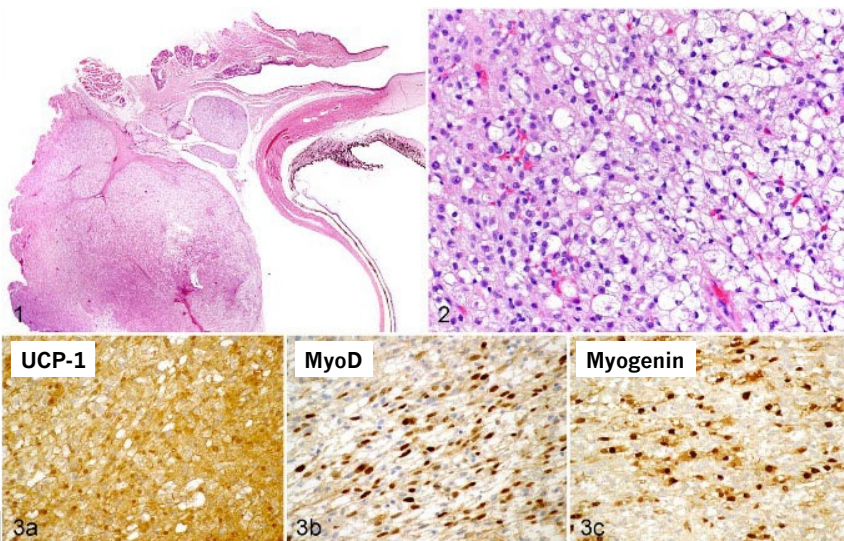
Canine Orbital Hibernoma: 13cases Tumor of Brown Fat

- Tumor of brown fat origin
- Characteristic IHC:
 - UCP-1 – Uncoupling protein-1
 - Mitochondrial protein
 - Enables brown fat to store energy
 - Some overlap with muscular antigens
 - Desmin, MyoD, myogenin



25

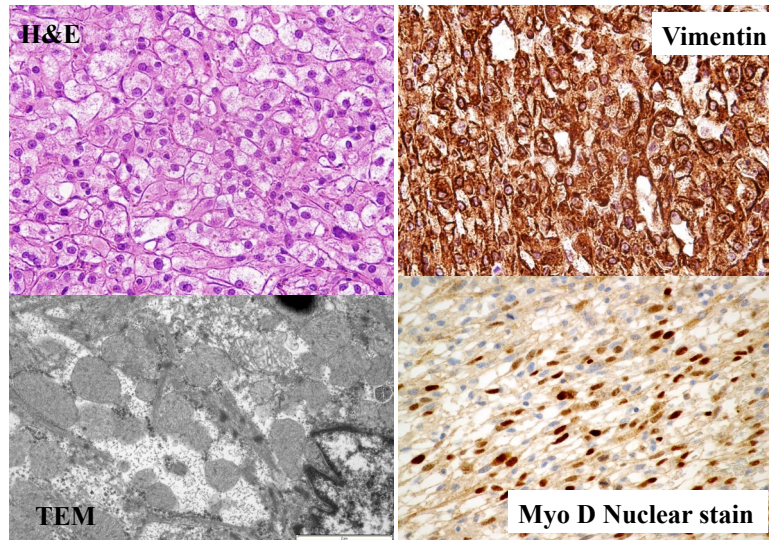
Canine Orbital Hibernoma



UCP-1 and Desmin
Markers for hibernoma

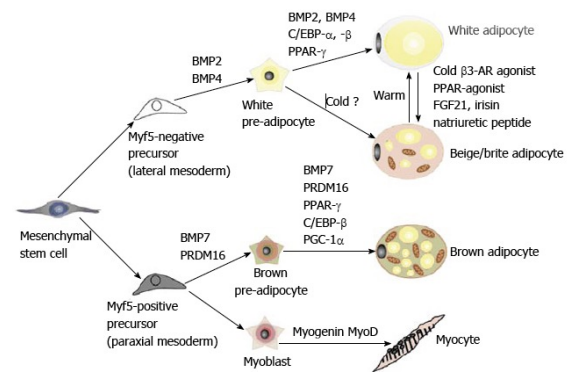
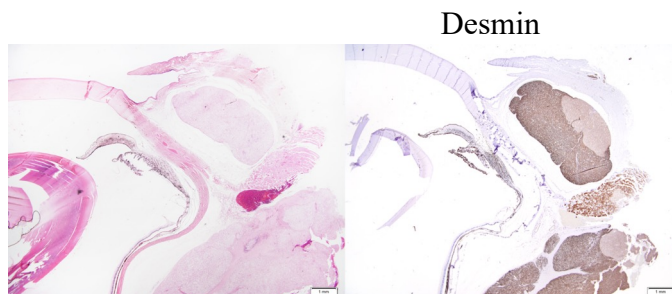
26

Canine Orbital Hibernoma



27

Brown Fat Shares a Progenitor Cell With Skeletal Muscle



Park et. al. World J Stem Cells 2014 January 26; 6(1): 33-42

28

Canine Orbital Rhabdomyosarcoma

Definition

- Uncommon mesenchymal neoplasms of skeletal muscle origin with varying myogenic differentiation.
- They are often metastatic
- Most aggressive of these tumors arising in juvenile dogs less than or equal to 2 years of age.
- We recently described Orbital rhabdomyosarcomas in dogs.

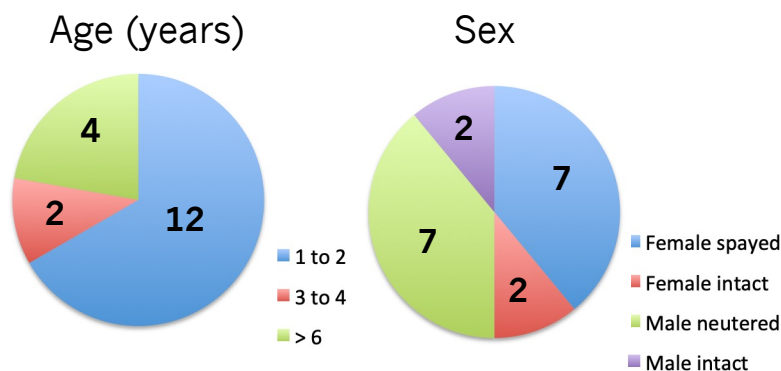


Scott EM, **Teixeira LBC**, Flanders DJ, Dubielzig RR, McLellan GJ. Canine orbital rhabdomyosarcoma: a report of 18 cases. *Vet Ophthalmol*, 2016. 19(2): 130–137.

29

Canine Orbital Rhabdomyosarcoma

COPLOW numbers



Represented Breeds

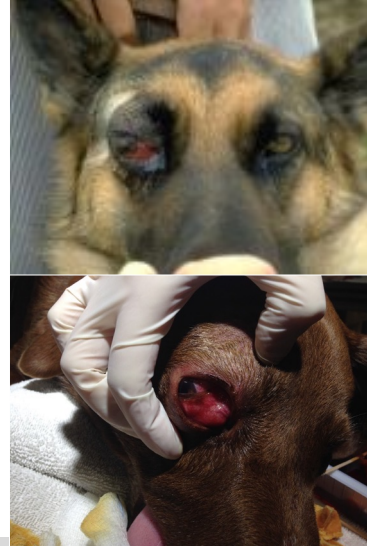
German Shepherd	4
Labrador Retriever	3
Mixed Breed	3
Border Collie	2
Beagle	1
Belgian Tervuren	1
Cocker Spaniel	1
Irish Wolfhound	1
Manchester Terrier	1
Yorkshire Terrier	1

30

Canine Orbital Rhabdomyosarcoma

Clinical presentation

- Exophthalmos (16/18)
- Dorsolateral deviation of globe (10/18)
- Thickened and elevated TEL (12/18)
- Medial subconjunctival mass (3/18)



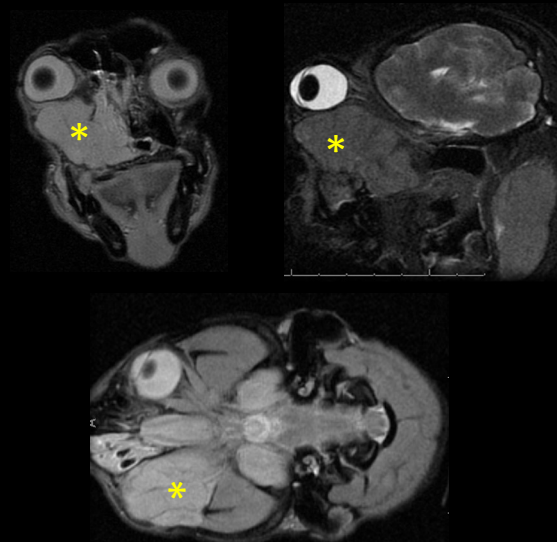
31

Imaging

Computed Tomography (8/18)

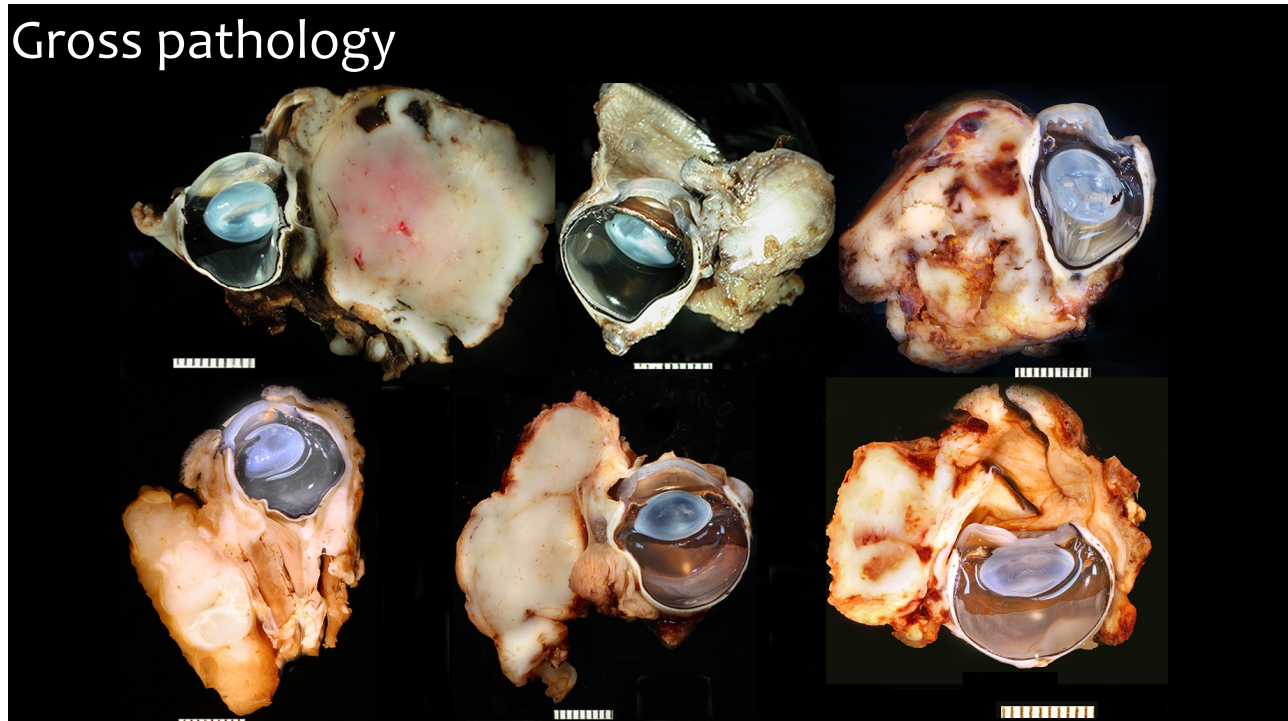


Magnetic Resonance (1/18)



32

Gross pathology



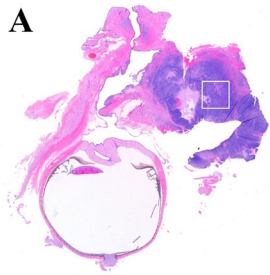
33

 School of Veterinary Medicine
UNIVERSITY OF WISCONSIN, MADISON

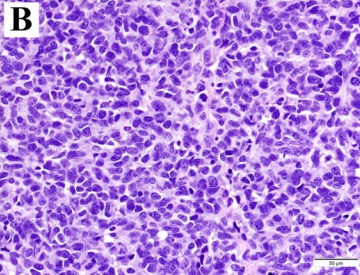
Canine Orbital Rhabdomyosarcoma

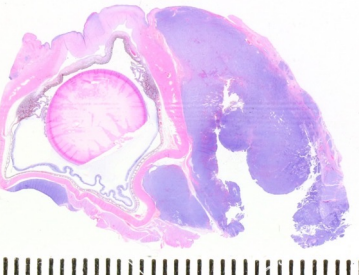
Diagnosis

A

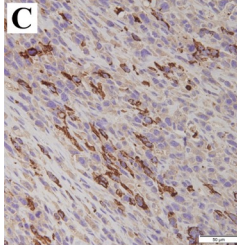


B



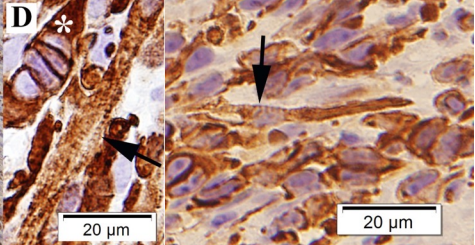


C



Skeletal Muscle Actin

D



Desmin

34

Canine Orbital Rhabdomyosarcoma

Prognosis

- Follow up information - 15/18 cases.
- Older dogs, 6-8 years, had no clinical signs of recurrence or metastasis 5-10 months post diagnosis (4/4).
- Most younger dogs, 1-2 years, were euthanized 0-6 months (median 2.5 months) after diagnosis due to extensive recurrence at the surgical site (5/8) and/or distant metastasis (6/8).

35

Feline Restrictive Orbital Myofibroblastic Sarcoma (FROMS)

Definition

- Locally invasive sarcoma
- Extent in the oral cavity and elsewhere in the head
- Severely restricts globe, eyelids and lips mobility
- Thickened and distorted eyelids
- Profound corneal disease
- Thickening +/- ulceration of lips
- Proliferative gingival lesions



Bell CM, Schwarz T, Dubielzig RR. (2011) Diagnostic Features of Feline Restrictive Orbital Myofibroblastic Sarcoma. *Vet Pathol.* 48: 742-750.

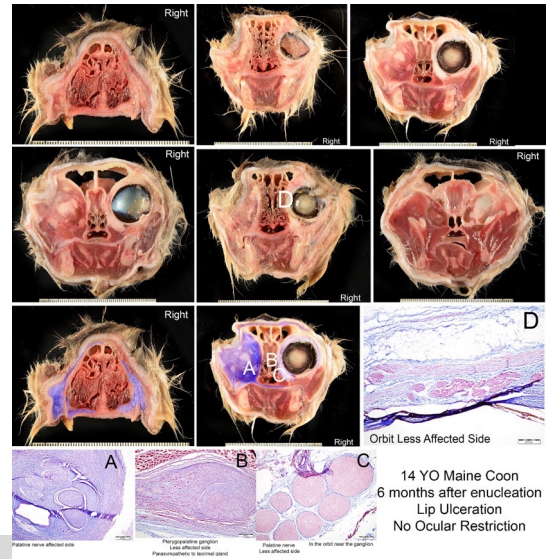
36

FROMS

Definition

- Seldom forms a mass lesion, lacks cellular atypia
- Diagnosis requires histopathology plus clinical picture
- Poor prognosis

Bell CM, Schwarz T, Dubielzig RR. (2011) Diagnostic Features of Feline Restrictive Orbital Myofibroblastic Sarcoma. *Vet Pathol.* 48: 742-750.

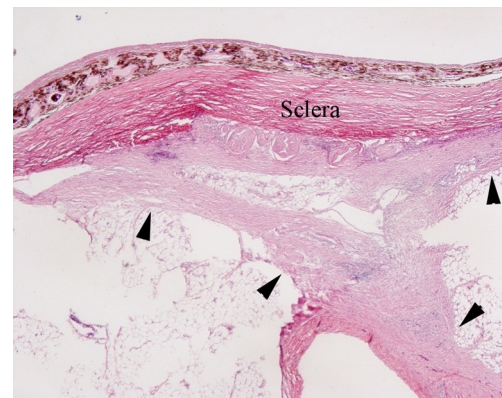


37

FROMS

Histopathology

- Poorly delineated
- Bland spindle cells w/ collagenous matrix
- Low mitotic activity
- Mild lymphoplasmacytic infiltrates
- Ulcerative keratitis (or sequestrum)



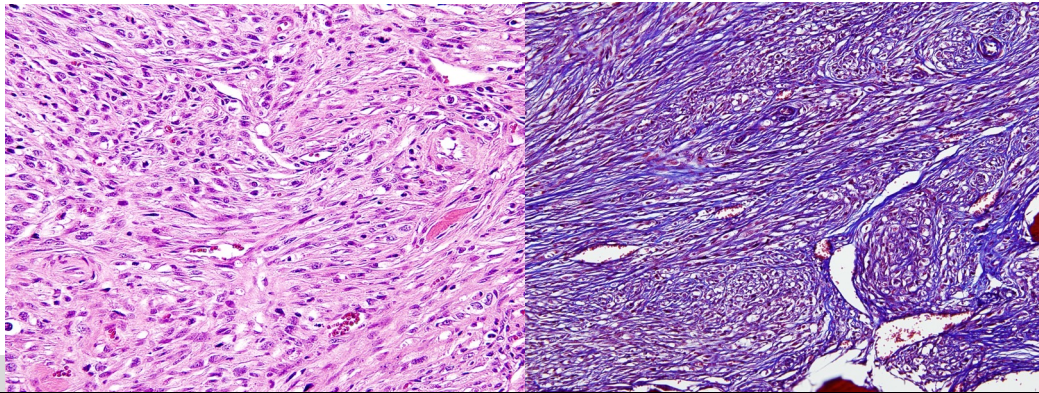
Bell CM, Schwarz T, Dubielzig RR. (2011) Diagnostic Features of Feline Restrictive Orbital Myofibroblastic Sarcoma. *Vet Pathol.* 48: 742-750.

38

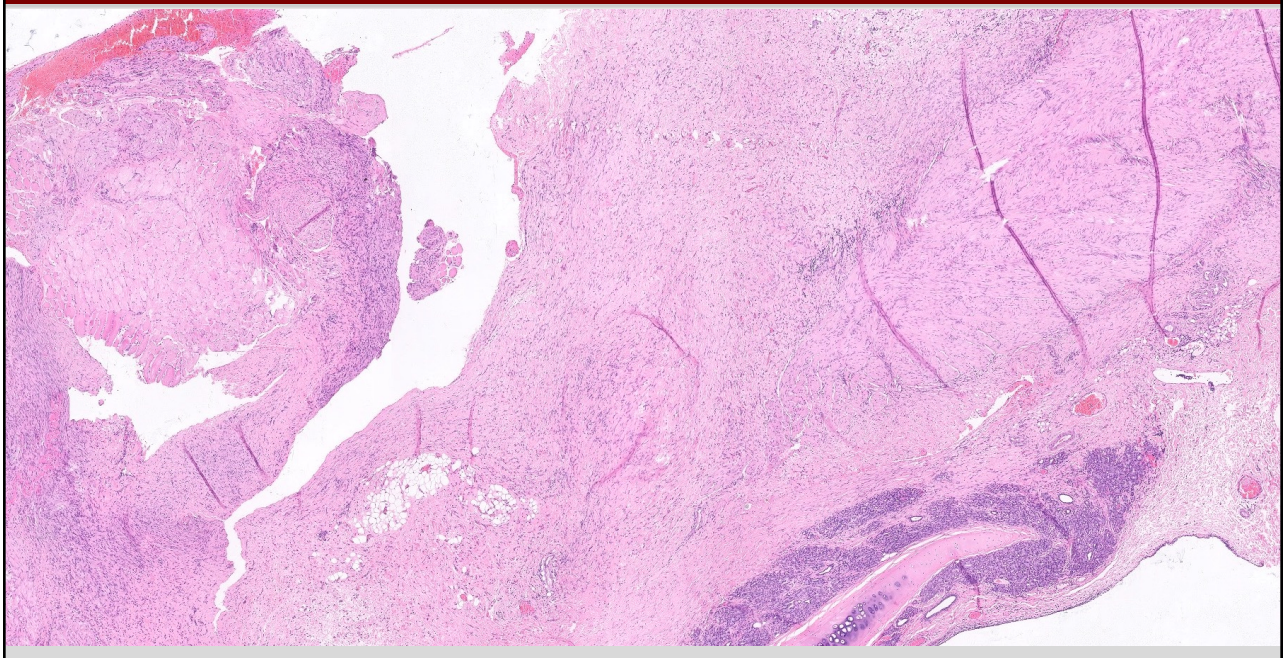
FROMS

- Spindle cells in irregular short bundles with collagenous matrix
- Bland nuclear profile
- Mitotic activity virtually absent

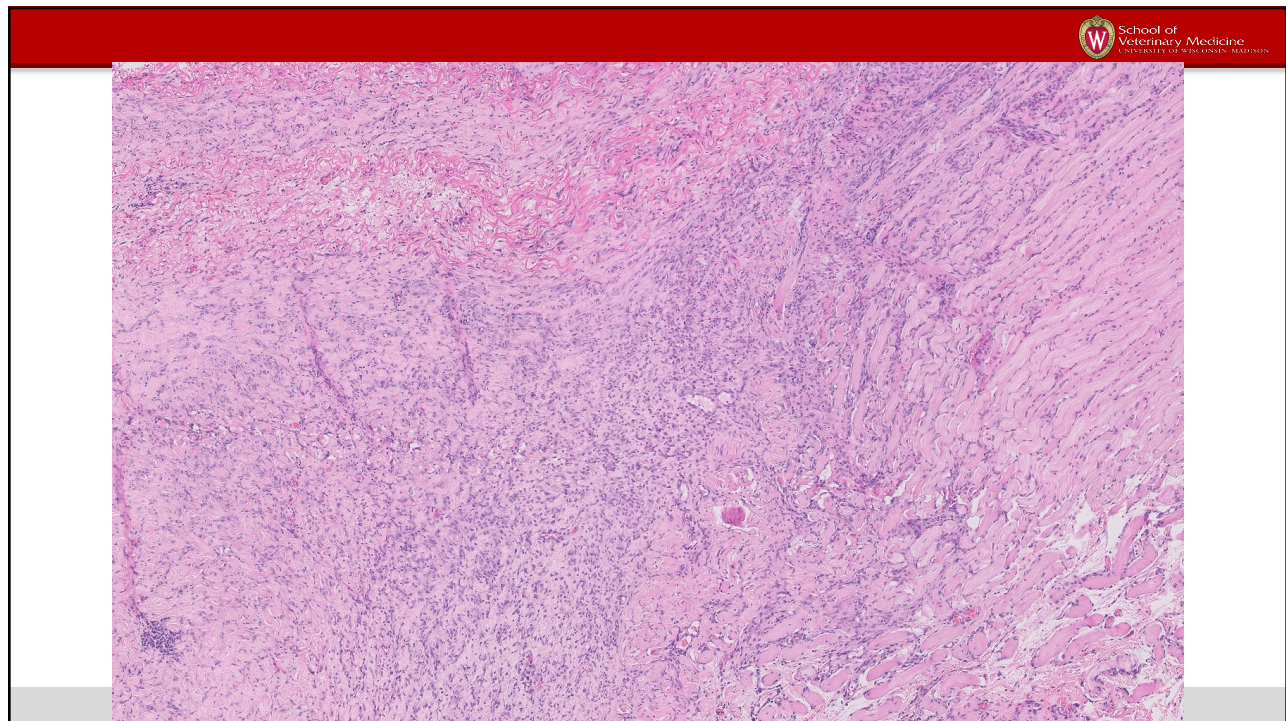
Trichrome



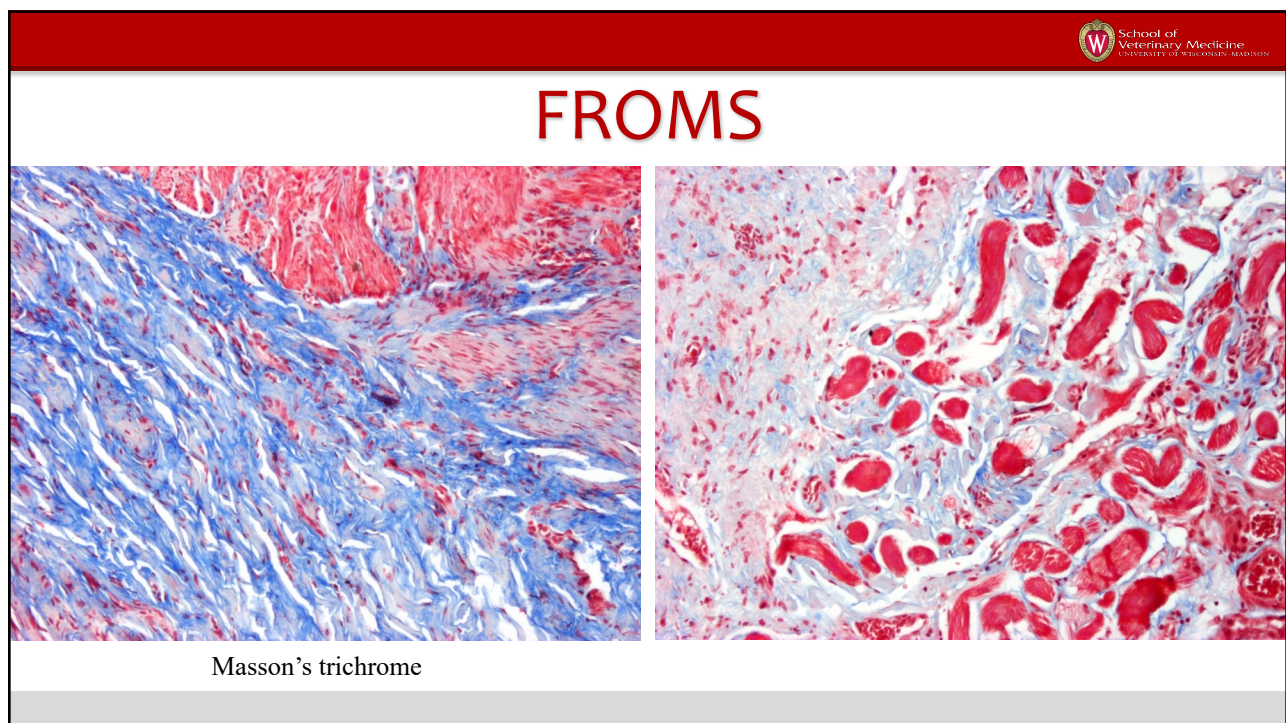
39



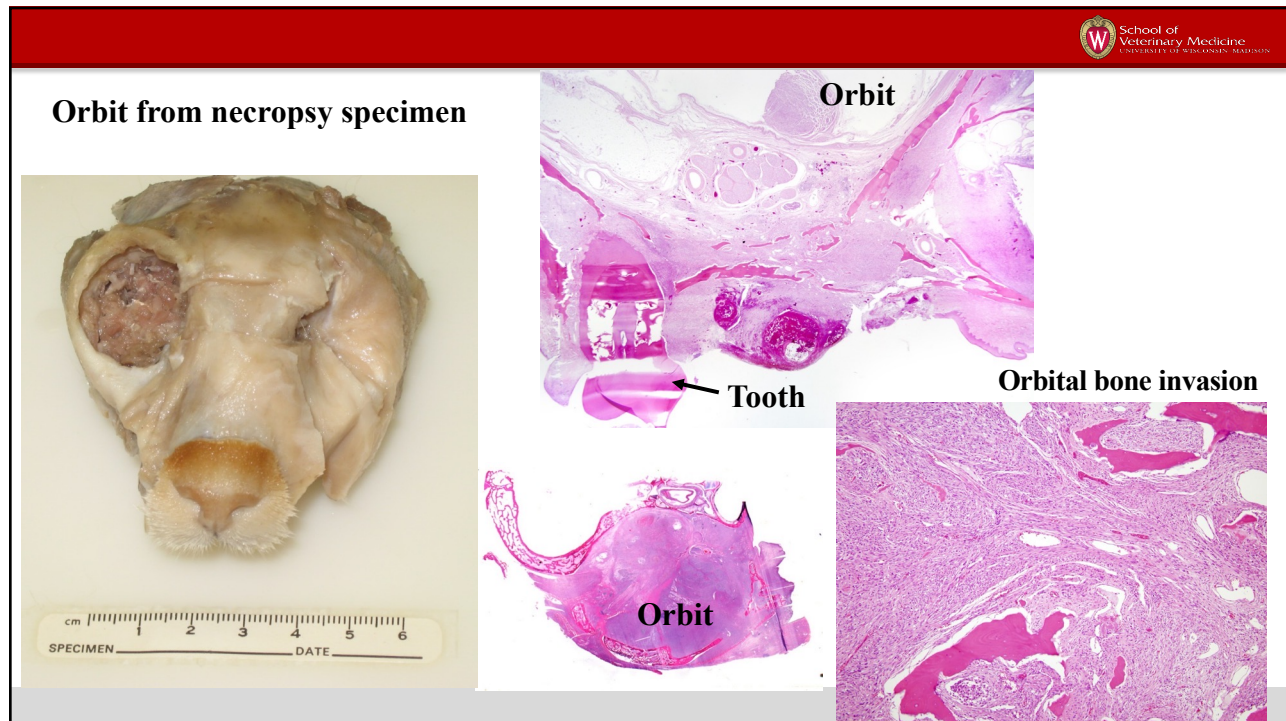
40



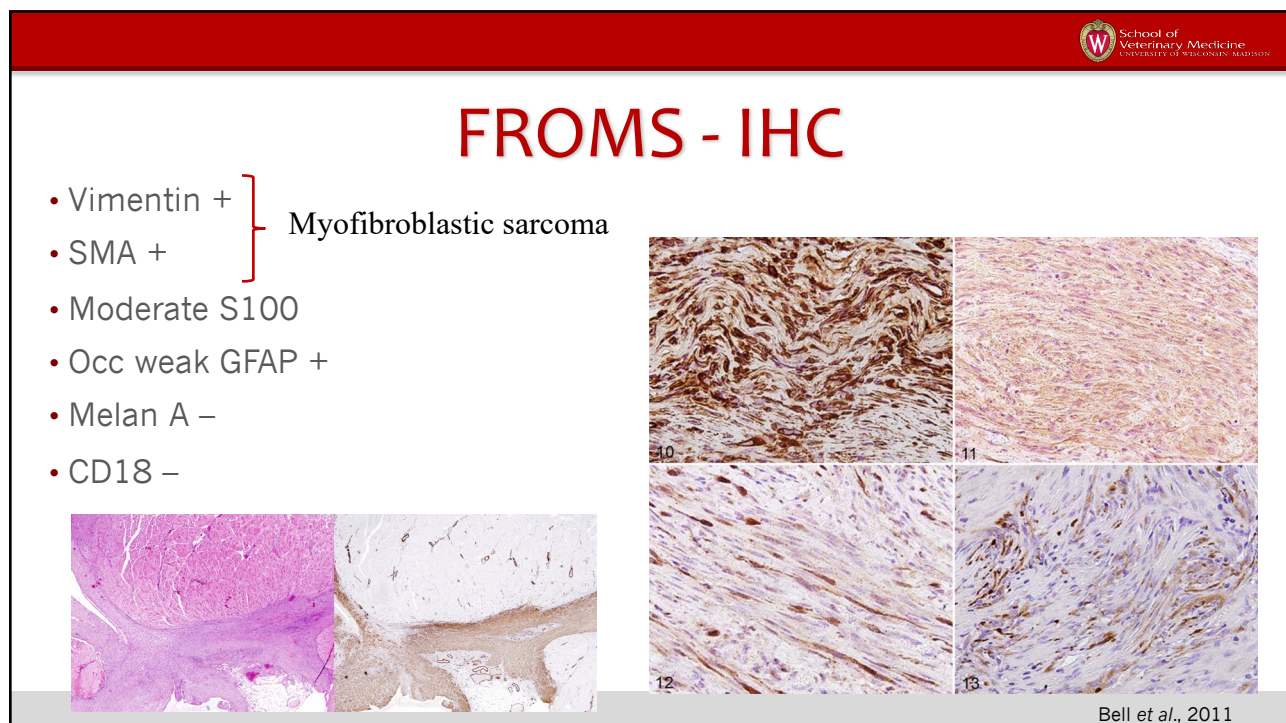
41



42



43



44

FROMS - DDxs

- Reactive fibroplasia / Granulation tissue:
 - History
 - Do NOT trim the orbital tissues away from the globe
 - Incisional Bx:
 - Anterior and superior aspect of episclera
 - Eyelid: thickened areas of palpebral conj near fornix
 - Skin: thickened areas (deep dermis/SQ)

45

Orbital invasive squamous cell carcinoma with adnexal involvement clinically mimicking feline restrictive orbital myofibroblastic sarcoma: 19 cases (1990–2016)

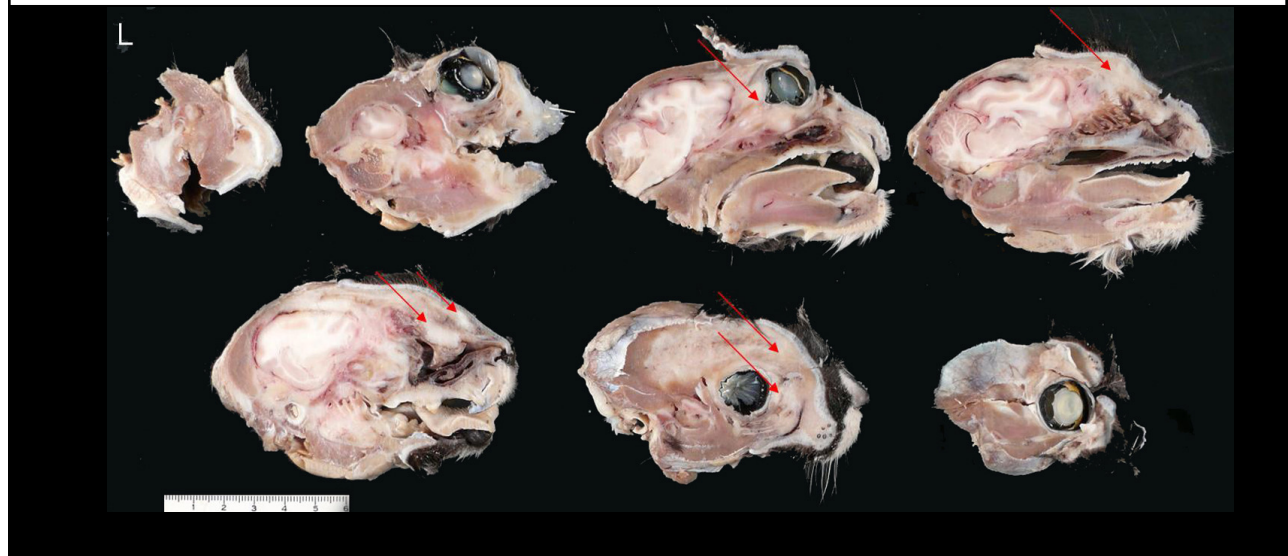
Kathryn A Diehl,* Silvia G Pryor* and Leandro BC Teixeira†



46

Subgross

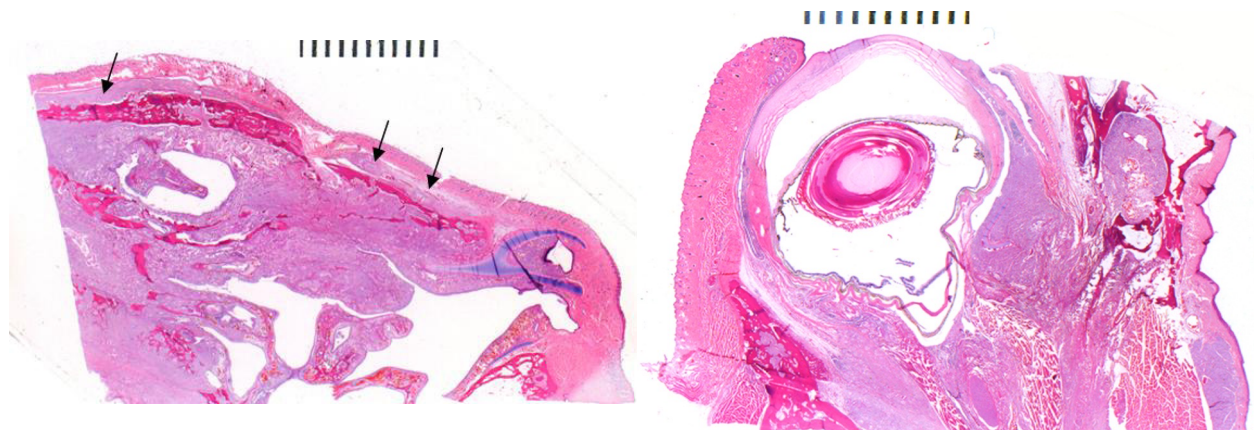
Orbital SCC mimicking FROMS



47

Orbital SCC mimicking FROMS

Diagnosis



48

FROMS - Prognosis

- Poor
- Can spread to contralateral orbit → bilateral
 - 0-8 months b/w eyes
 - 0-14 months b/w presentation and oral involvement
- No mets reported
- Survival 3-15 months

Bell *et al.*, 2011

49



50