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SCHOOL OF MEDICINE | DEPARTMENT OF
Diagnostic Radiology

Globe Imaging: A Global Overview of Globe Pathologies

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Disclosures

- None

Introduction

Objectives:

1. Correlate clinical findings with imaging to establish diagnosis of globe pathologies

2. Illustrate characteristic findings of commonly encountered globe abnormalities on CT and MRI

3. Review differential diagnosis of globe abnormalities based on anatomic location

Introduction

- Globe abnormalities can present as a conundrum on CT or MRI images and are often under-recognized

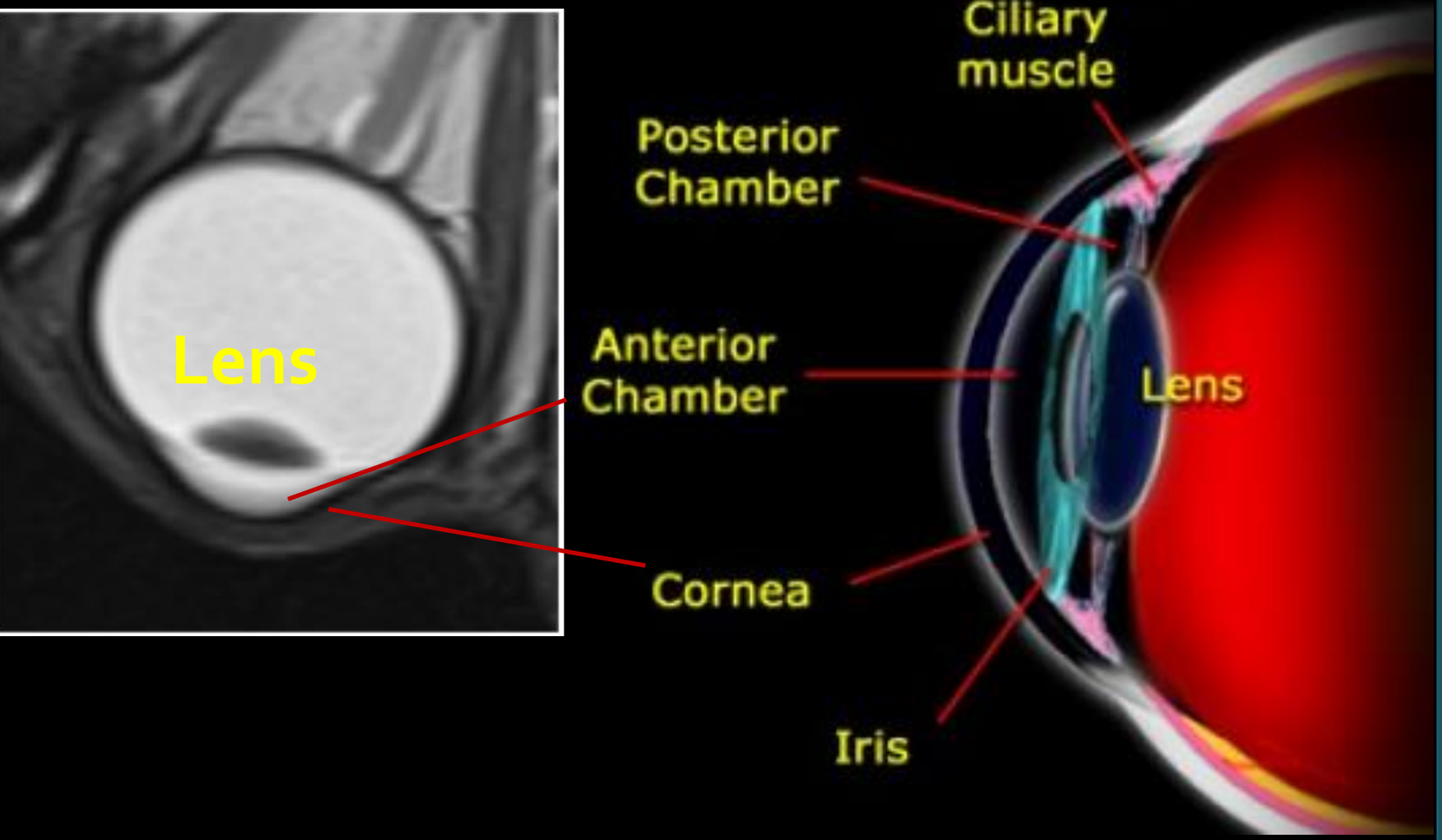
- Abnormalities can be divided based on anatomical location and can involve neoplastic, infection, traumatic, iatrogenic and inflammatory processes

- Common surgical hardware involving the globe will also be presented

Introduction

- Globe abnormalities can present on CT or MRI and may be incidental findings
- Correlation of imaging findings with clinical eye exam helps guide diagnosis
- Precise understanding of orbital anatomy and characteristic imaging features leads to timely diagnosis and appropriate management plan

Anatomy



Anterior chamber

Bounded anteriorly by the cornea and posteriorly by lens and iris. Pathologies include:

- Rupture of the globe
- Hemorrhage: also known as anterior hyphema
- Cataract
- Keratitis: inflammation of the cornea
- Periorbital cellulitis

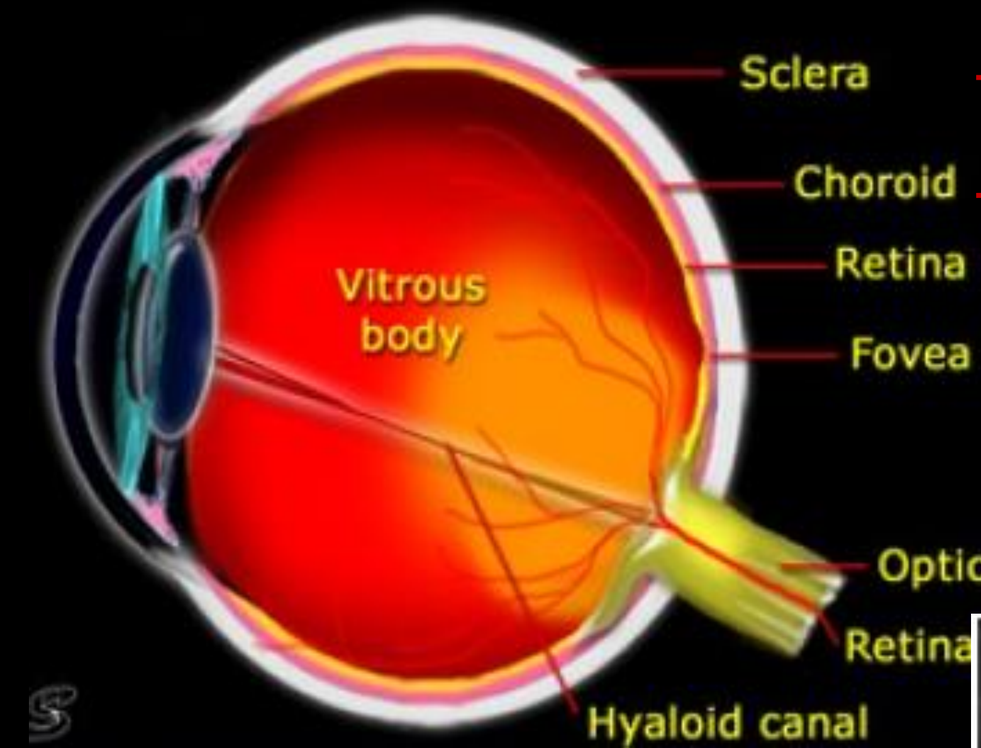
Posterior chamber

A very small area posterior to the iris. Posterior chamber ***cannot be discerned on imaging.***
Pathologies include:

- Glaucoma
- Uveitis
- Ciliary melanoma.

Reference: http://www.radiologyassistant.nl

Anatomy



Vitreous body pathology:

- Rupture
- Hemorrhage
- CMV infection: especially in HIV
- Persistent Hyperplastic Primary Vitreous

Retina pathology:

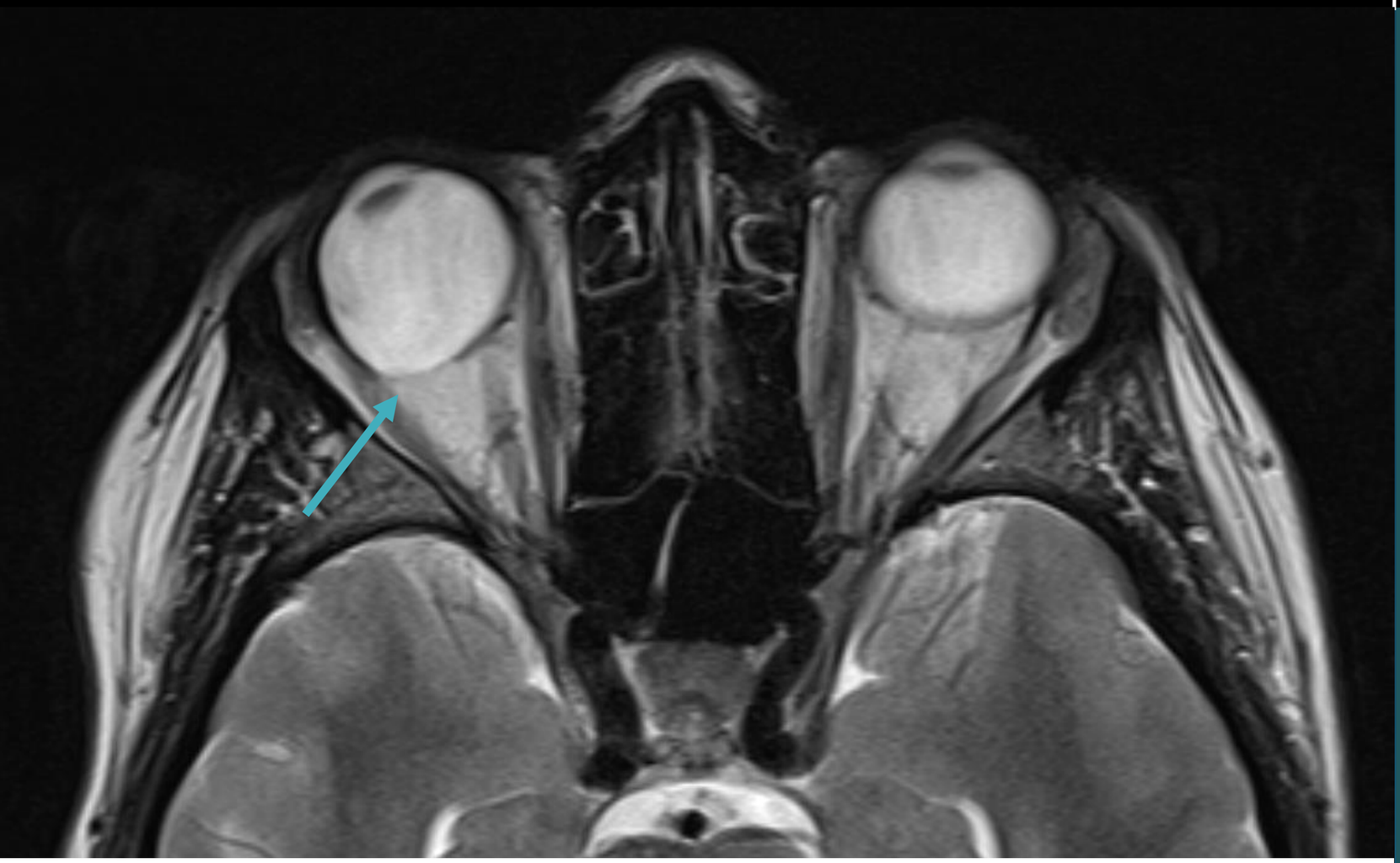
- Retinoblastoma (child)
- Hemangioblastoma: (adult) associated with von Hippel Lindau disease
- Retinal Detachment

Choroid pathology:

- Melanoma
- Metastases: the choroid is the most vascular part of the globe
- Detachment: usually post-traumatic

Reference: http://www.radiologyassistant.nl

Case: Posterior Staphyloma



Axial T2 MR images of the orbits demonstrates a posterior bulge (arrow) which is eccentric to the optic nerve insertion and enlargement of the globe, consistent with posterior staphyloma.

Clinical Information: Patient presents with significant myopia. Affected eye may be enlarged, or protruding[1]

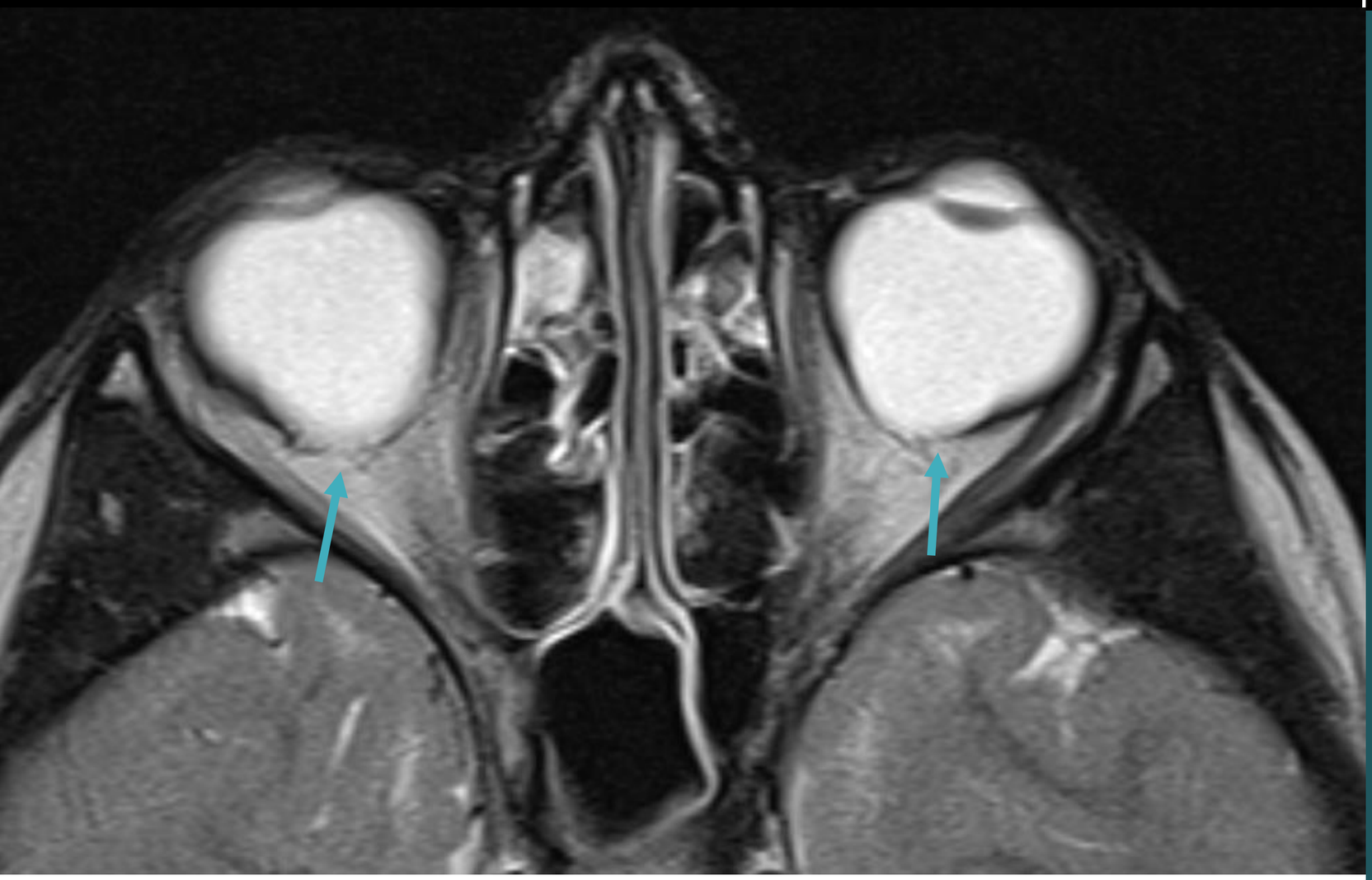
Epidemiology: 19% to 90% in patients with highly myopic eyes[1]

Pathophysiology: Caused by thinning of the scleral layer of the globe. Most commonly congenital or due to severe myopia[2]

Key Imaging Characteristics: Usually results in a posterior bulge and enlargement of the affected eye. Increased AP diameter with focal deformation of the globe lateral to the head of the optic nerve.[3]

Reference:
1. Numa, S., et al. (2018). "Prevalence of posterior staphyloma and factors associated with its shape in the Japanese population." Scientific Reports 8(1): 4594
2. https://www.aao.org/eye-health/ask-ophthalmologist-q/staphyloma
3. Osborne D et al. Computed tomographic analysis of deformity and dimensional changes in the eyeball. Radiology. 1984;153 (3): 669-74.

Case: Coloboma



Axial T2 MR image demonstrates bilateral focal posterior defect (arrows) which is centrally located near the optic nerve insertion which represent bilateral colobomas.

Clinical Information: Patients can present with unilateral or bilateral microphthalmia and inferior ocular deviation[1]

Epidemiology: 1 in 10,000. In 10%, there are other CNS anomalies with coloboma[2]

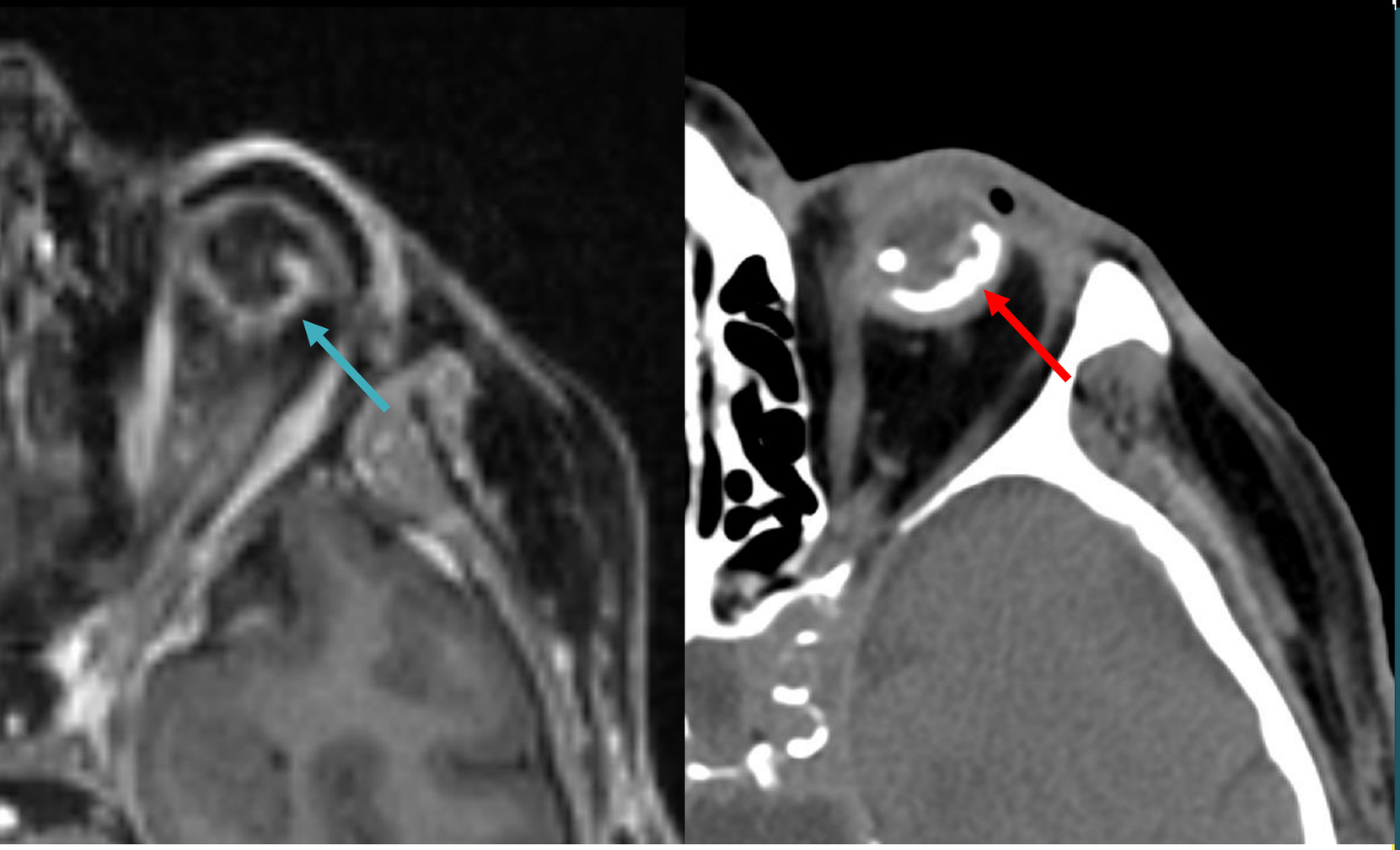
Pathophysiology: Congenital defect in which certain ocular tissues are absent. Failure of closure of the choroidal fissure posteriorly during development[2]

Key Imaging Characteristics: On CT or MRI, the affected globe is small and has a focal posterior defect in the globe with vitreous herniation. A retrobulbar cyst may be present[2]

Reference:

1. Gregory-Evans, C. Y., et al. (2004). Ocular coloboma: a reassessment in the age of molecular neuroscience 41(12): 881-891.
2. Harnsberger HR, Glastonbury CM, Michel MA et-al. Diagnostic Imaging: Head and Neck. Lippincott Williams & Wilkins. (2010) ISBN:1931884781

Case: Phthisis Bulbi



Axial T1 MR and CT images demonstrate small left globe, thickened posterior sclera (blue arrow) and calcifications (red arrow), consistent with phthisis bulbi.

Clinical Information: Patient presents with atrophy and a small eye; blindness if at end stage[1]

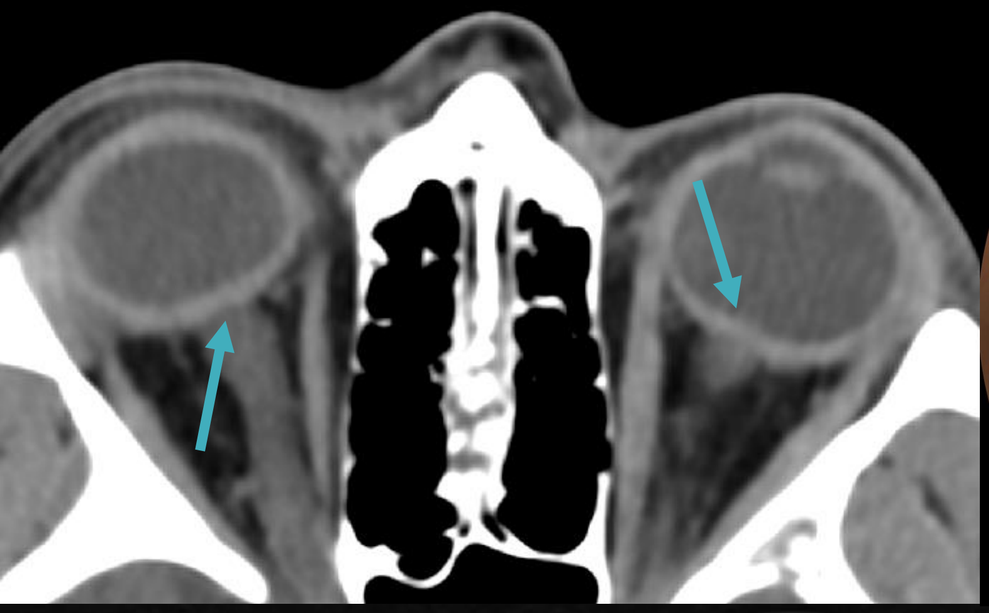
Pathophysiology: End-stage eye disease characterized by shrinkage and visual loss of the affected eye. Associated with trauma, surgery, infection, inflammation, malignancy, retinal detachment, and vascular lesions[2]

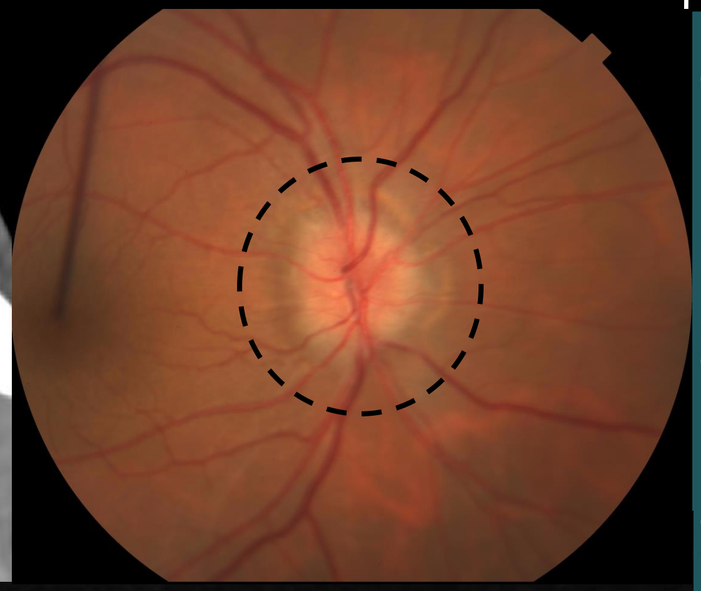
Key Imaging Characteristics: Reduced globe size (usually <20 mm) with a thickened/folded posterior sclera. Ocular calcification or ossification is also present[3]

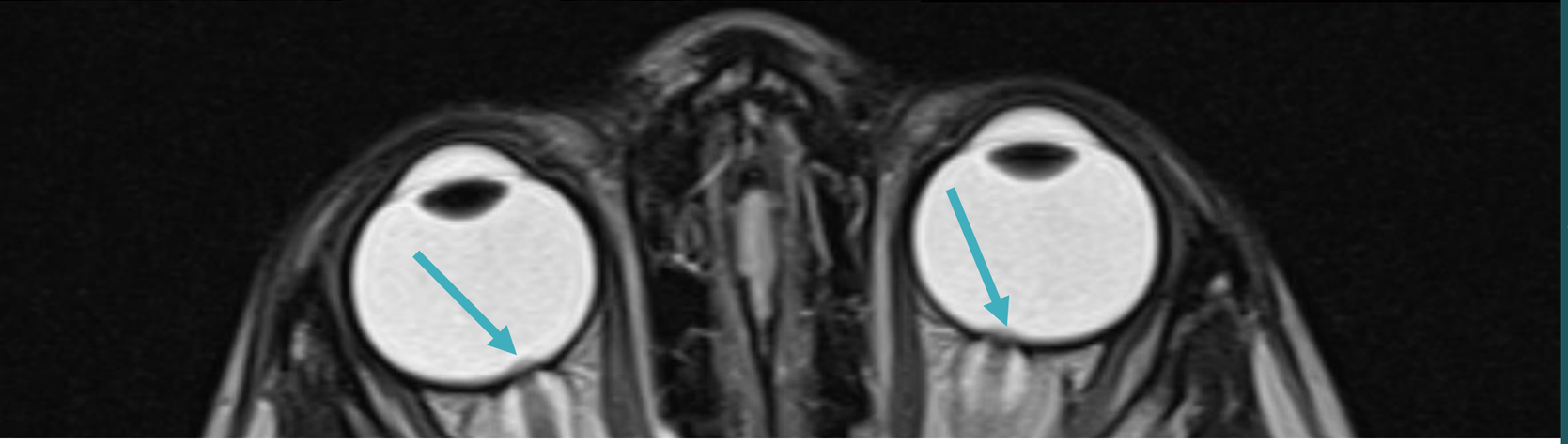
Reference:

1. Pernick, N. Globe: phthisis bulbi. PathologyOutlines.com website. http://www.pathologyoutlines.com/topic/eyeglobephthisisbulbi.html . Accessed January 29th, 2019.
2. Tripathy, K et al. (2018). Phthisis Bulbi—a clinicopathological perspective. Seminars in Ophthalmology, 33(6), 788-803. doi:10.1080/08820538
3. Kashyap S, Meel R, Pushker N et-al. Phthisis bulbi in retinoblastoma. Clin. Experiment. Ophthalmol. 2011;39 (2): 105-10.

Case: Papilledema







Axial T2 MR (top left) and CT (bottom) demonstrating bilateral indentation of the posterior globe with optic nerve indentation (arrows). Example image (top right) on fundoscopy demonstrating optic disk swelling consistent with papilledema, with no vessel obscurations or vessel tortuosity.

Clinical Information: Patients presents with headache, possible nausea/vomiting. Decreased visual field on physical exam[1]. Optic disk swelling on funduscopic exam.

Epidemiology: 1 -2 per 100,000 in general population[2]

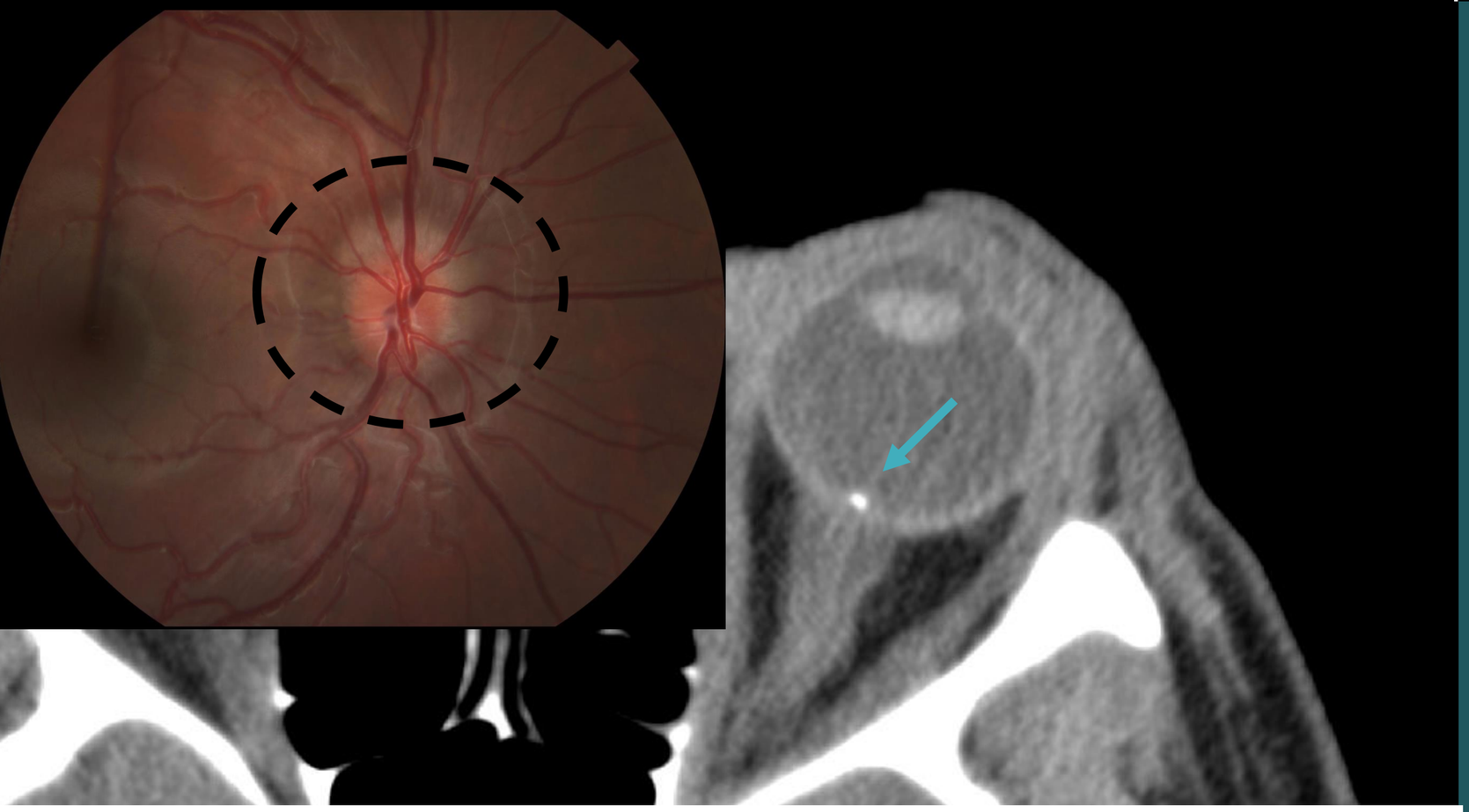
Pathophysiology: swelling of the optic disc from increased intracranial pressure (ICP), possibly due to space-occupying lesions, inflammation, or blockage in CSF drainage

Key Imaging Characteristics: MRI may show flattening or bulging of the optic nerve head. Needs clinical correlation using fundoscopy[3]

Reference:

1. Vaphiades MS. The disk edema dilemma. Surv Ophthalmol. Mar-Apr 4. 2002;47(2):183-8.
2. Rigi et al. (2015). Papilledema: epidemiology, etiology, and clinical management. Eye and Brain; 7, 47-57
3. Passi, N., et al. (2013). MR Imaging of Papilledema and Visual Pathways: Effects of Increased Intracranial Pressure and Pathophysiologic Mechanisms. 34(5): 919-924.

Case: Drusen



Axial CT images demonstrate punctate calcification at the posterior left globe at the optic nerve insertion. Fundoscopic image demonstrates optic nerve drusen which can be mistaken for papilledema, however there is a more distinct nodular appearance in optic nerve drusen and no vessel obscurations.

Clinical Information: Patients are usually asymptomatic; rarely may have transient visual impairments. Fundoscopy shows small optic disk with irregular margins[1]

Epidemiology: 3-24 per 1000; M:F equal[2]

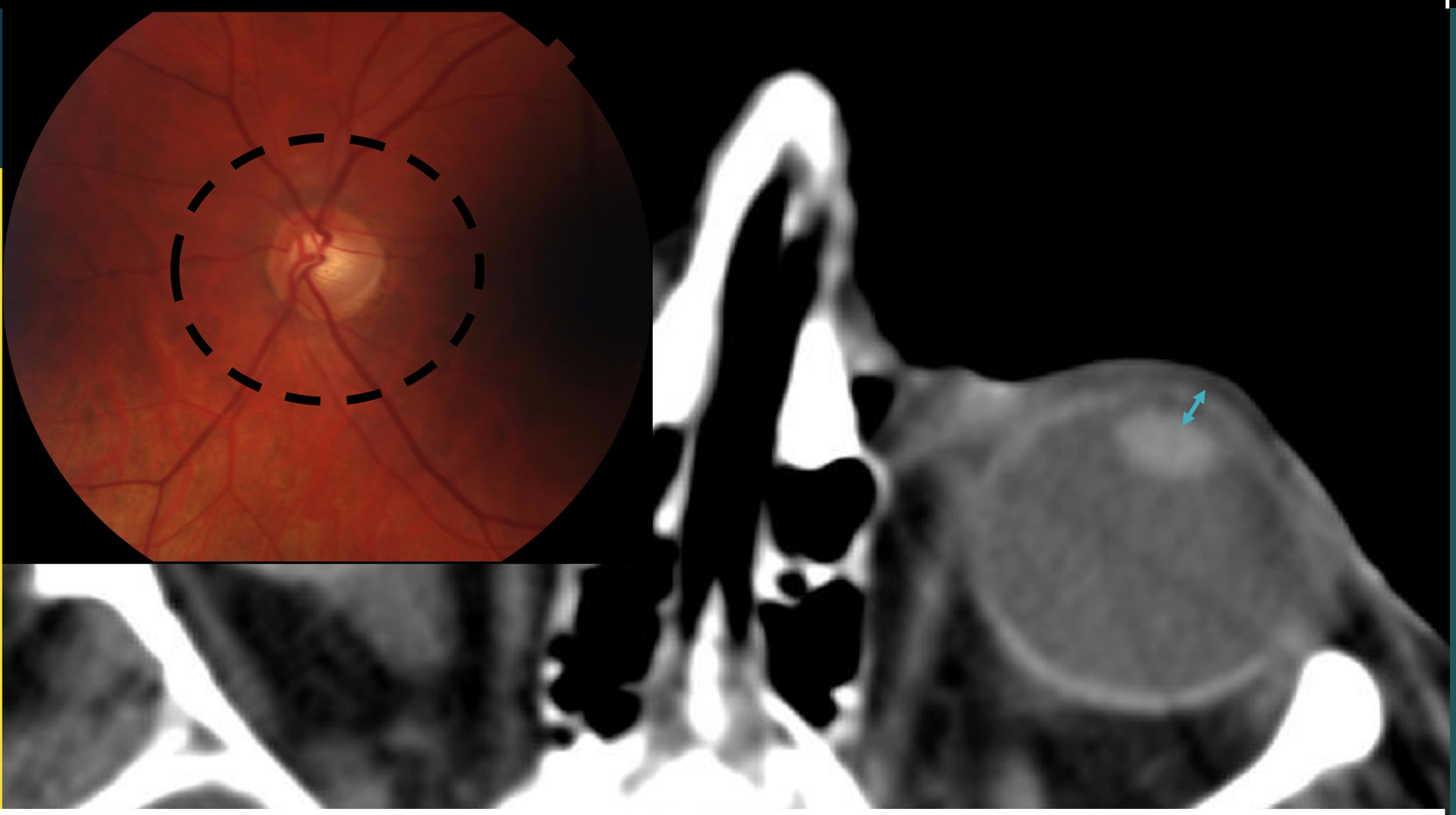
Pathophysiology: Small protein-like deposits form around the optic disc, resulting in blood supply comprise, slowed axoplasmic flow, and the formation of calcific excrescences. Usually bilateral[2]

Key Imaging Characteristics: CT preferred over MRI. White spots of calcification can be seen, usually between 1-4mm in size[3]

Reference:

1. Lee, K. M., et al. (2018). Factors associated with visual field defects of optic disc drusen. PLOS ONE 13(4): 1.30;13(4)
2. Auw-Haedrich C, Staubach F, Witschel H. Optic disk drusen. Surv Ophthalmol. 2002 Nov-Dec;47(6):515-32.
3. Bec P et al. Optic nerve head drusen. High-resolution computed tomographic approach. Arch. Ophthalmol. 1984;102 (5): 680-2

Case: Glaucoma



Axial CT images demonstrate shallow anterior chamber in the left globe in a patient with narrow angle glaucoma. The funduscopic pictures shows 0.6-7 cup to disc ration, which is consistent with glaucomatous optic nerves.

Clinical Information: Patients with narrow angle glaucoma may complain of intermittent headaches/nausea/photophobia and halos, but during the majority of the time if the IOP is normal they may be asymptomatic. May report blurry vision and limited visual fields at end stage. Correlate through IOP, fundoscopy, gonioscopy and slit lamp exams[1]

Epidemiology: The global prevalence for population aged 40–80 years is 3.54%[2]

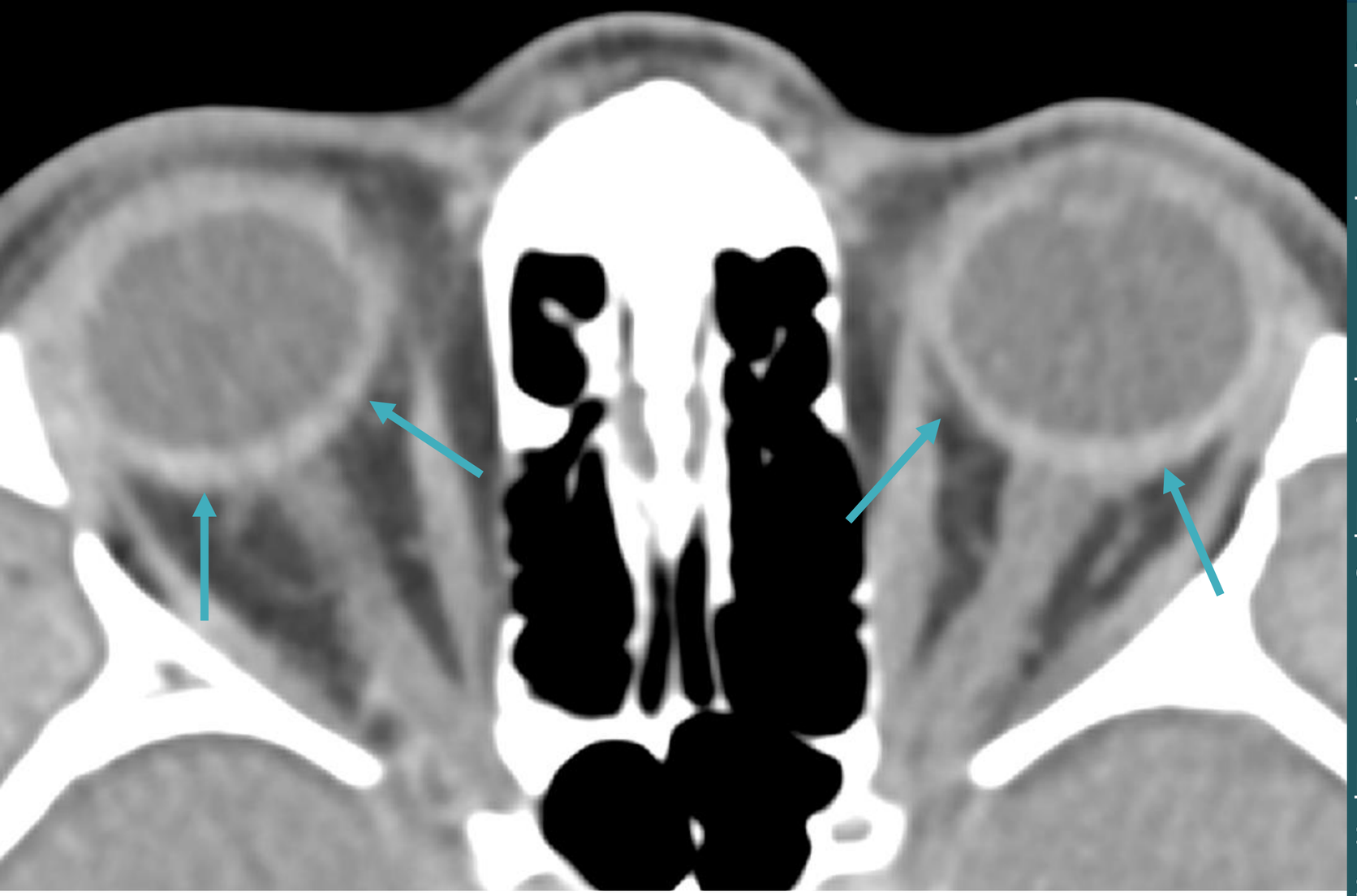
Pathophysiology: Retinal ganglion cell loss leads to cupping of the optic disc with corresponding visual field defects. Likely due to abnormal drainage angle, can to increased IOP[1]

Key Imaging Characteristics: A shallow anterior chamber can suggest glaucoma. Recent research has also shown promise of imaging with MRI where glaucoma can be identified by a decrease in optic nerve diameter, localized white matter loss and decrease in visual cortex density[3]

Reference:

1. Prum, B. E. et al. (2016). Primary Open-Angle Glaucoma Suspect Preferred Practice Guidelines. Ophthalmology 123(1): 112-151.
2. Tham, Y.-C et al. (2014). Global Prevalence of Glaucoma and Projections of Glaucoma Burden through 2040: A Systematic Review and Meta-Analysis. Ophthalmology, 121(11), 2081-2090.
3. Fiedorowicz M, Dyda W, Rejdak R, Grieb P. Magnetic resonance in studies of glaucoma. Med Sci Monit. 2011;17(10):RA227-32.

Case: Scleritis



Axial CT images demonstrate thickening and enhancement of the sclera which is concerning for scleritis.

Clinical Information: Patient complains of a painful eye over a few days. Erythema and vision loss also possible in the affected eye. Association with rheumatoid arthritis/trauma[1]

Epidemiology: 3-5 per 100,000 between age 30-50. M:F = 1:2[1]

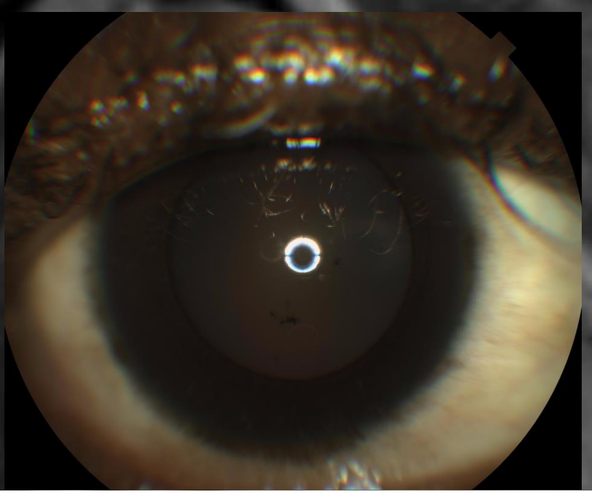
Pathophysiology: Autoimmune condition induces granulomatous inflammation and vasculitis, resulting in necrosis of the sclera[2]

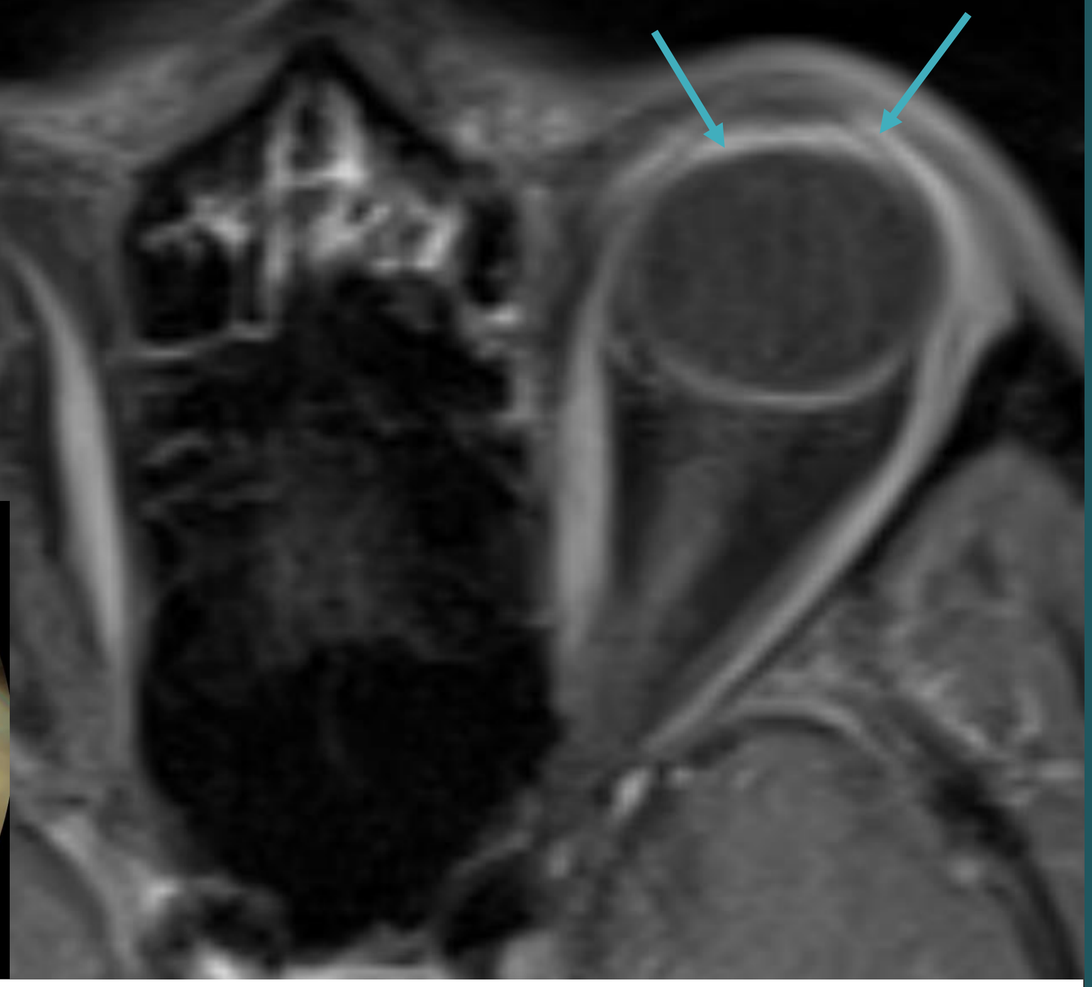
Key Imaging Characteristics: Classical signs include scleral enhancement, scleral thickening, and focal periscleral cellulitis[3]

Reference:

1. Karamursel et al. Evaluation of Patients with Scleritis for Systemic Disease. Ophthalmology 2004; 111: 501-506
2. Okhravi et al. Scleritis. Survey of Ophthalmology 2005. 50(4): 351-363.
3. Diogo, M. C., et al. (2016). "CT and MR Imaging in the Diagnosis of Scleritis." 37(12): 2334-2339.

Case: Anterior Uveitis





Axial contrast enhanced MR images demonstrate abnormal thickening and enhancement of the left uveal tract. In the anterior segment photo, synechiae on the lens can be seen from inflammation.

Clinical Information: Patient complains of ocular pain, erythema, and photophobia that has been on going for a few days. Sudden onset, unilaterally or bilaterally[1]

Epidemiology: 12 per 100,000. More common in Finnish population: 23 per 100,000[2]

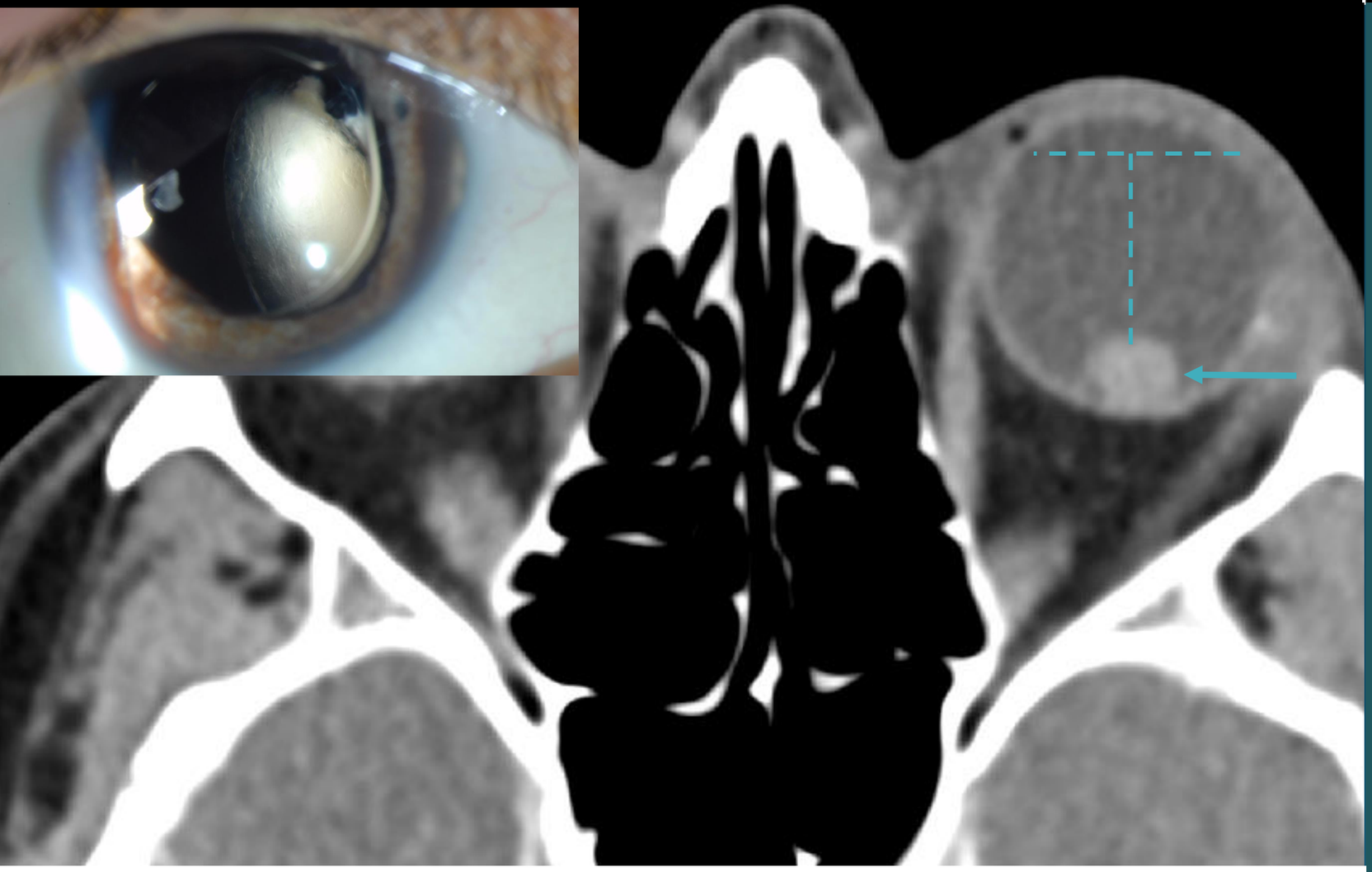
Pathophysiology: Unclear. Possibly related to cross reactivity with ocular antigens in genetically pre-disposed individuals. Can be associated with HLA-B27 (Ankylosing spondylitis), inflammatory bowel disease or infection (herpes)[1]

Key Imaging Characteristics: Increased uveal tract enhancement. Cross-sectional imaging may reveal secondary causes such as enlarged lymph nodes or lacrimal glands.[3]

Reference:

1. Kabeerdoss J, et al. Gut inflammation and microbiome in spondyloarthritis. Rheumatol Int. 2016 Apr;36(4):457-68
2. Islam N, Pavesio C. Uveitis (acute anterior). BMJ Clin Evid. 2010;2010:0705. Published 2010 Apr 8.
3. Li CQ, et al. Magnetic resonance imaging of uveitis. Neuroradiology. 2015 57:825-832.

Case: Lens Dislocation (Ectopia Lentis)



Axial CT images demonstrate posterior displacement of the lens in the left globe consistent with lens dislocation. The corresponding slit lamp photo shows lens dislocation infratemporally.

Clinical Information: Patient usually presents with a swollen red eye post-trauma. Decrease visual acuity and accommodation is common.[1]

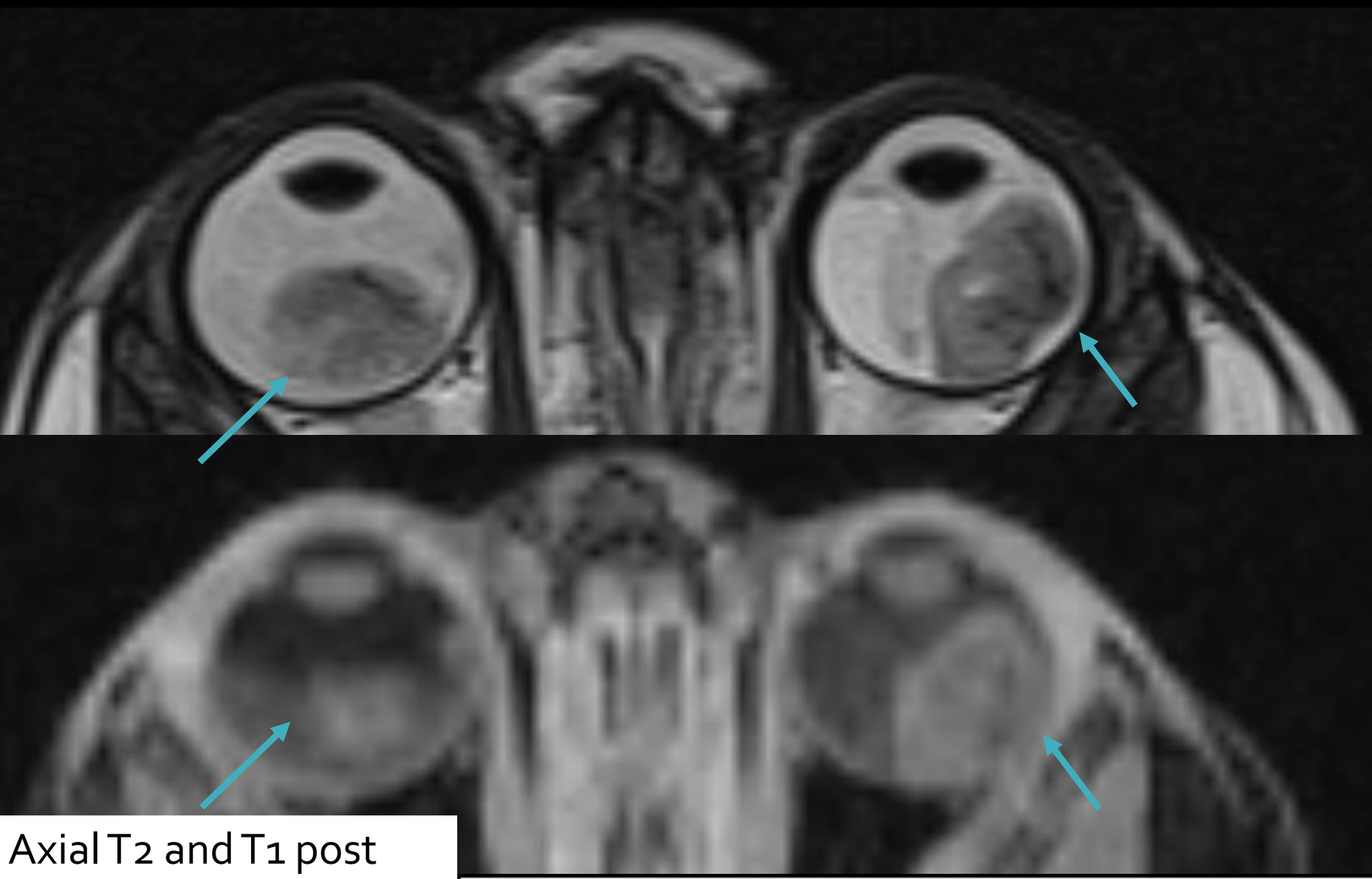
Pathophysiology: In the absence of trauma, genetic mutations including Marfan Syndrome and other genetic conditions can lead to non-traumatic ectopia lentis.[2]

Key Imaging Characteristics: CT is preferred over MRI. Dislocation of the lens posteriorly in the affected globe is a classic sign, accompanied by other signs of possible trauma.[3]

Reference:

1. Clarke, Clement C. "Ectopia lentis: a pathologic and clinical study." Archives of Ophthalmology 21.1 (1939): 124- 153
2. Chandra, Aman, et al. "A genotype-phenotype comparison of ADAMTSL4 and FBN1 in isolated ectopia lentis." Investigative ophthalmology & visual science53.8 (2012): 4889-4896
3. Kubal, W. S. (2008). "Imaging of Orbital Trauma." 28(6): 1729-1739

Case: Retinoblastoma



Axial T2 and T1 post contrast MR images demonstrate bilateral enhancing masses in the globes bilaterally which were retinoblastomas.

Group	Description	Features
A	Small	≤3 mm in any diameter; located >3 mm from the foveola and >1.5 mm from the optic disc; confined to the retina with no vitreous seeding
B	Large	Macular or juxtapapillary location with no dissemination (subretinal fluid extends <3 mm from tumor); confined to the retina with no vitreous seeding
C	Local dissemination	Discrete; vitreous or subretinal seeding extending <3 mm from tumor
D	Diffuse	Tumor is massive or diffuse with diffuse or greasy vitreous seeding or fine subretinal seeds; avascular plaques or exophytic disease
E	Unsalvageable or extensive	One or more of the following poor prognostic factors: neovascular glaucoma, intraocular or corneal hemorrhage, tumor contact with the lens, tumor in the anterior segment, diffuse infiltrating retinoblastoma
F	Extrascleral	Extrascleral spread to the optic nerve, orbit, or brain; distant metastases

Clinical Information: Leukocoria (whitening of the red reflex) during a routine screening exam of a child. Can also present with strabismus[1]

Epidemiology: 11.8 per 1,000,000 children under the age of 5 in the USA. M:F = 1:1. 10-30% is familial[1]

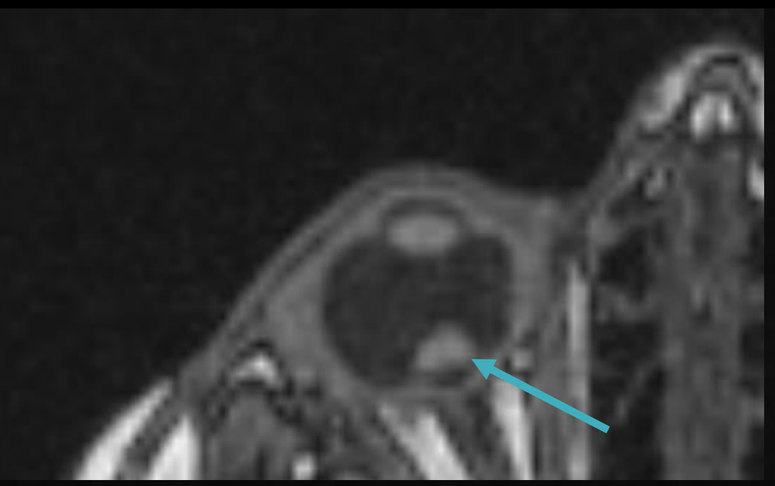
Pathophysiology: Mutation of RB1, a tumor-suppressing gene, on chromosome 13. Autosomal dominant inheritance pattern[2]

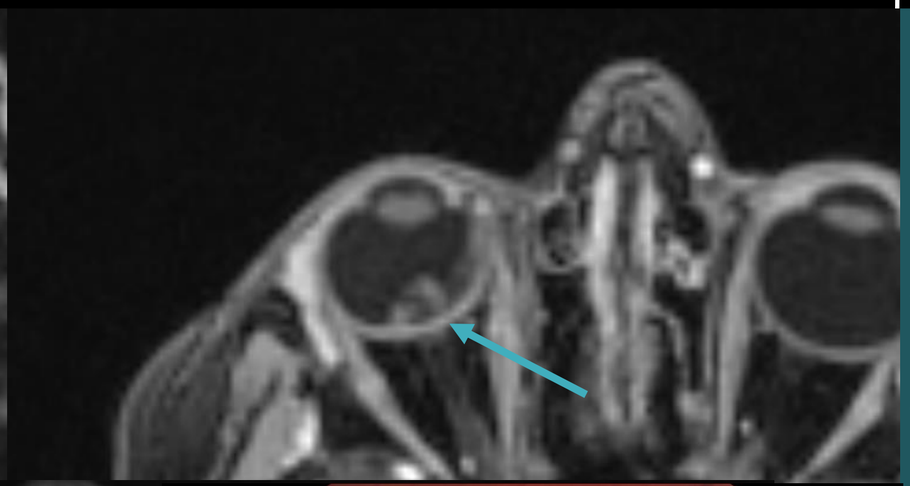
Key Imaging Characteristics: MRI is preferred over CT. Tumor cells demonstrate increased signal intensity than ocular fluid on T1 and low signal intensity on T2 with contrast enhancement and reduced diffusion. CT can show a calcified mass and a dense vitreous due to hemorrhage[3]

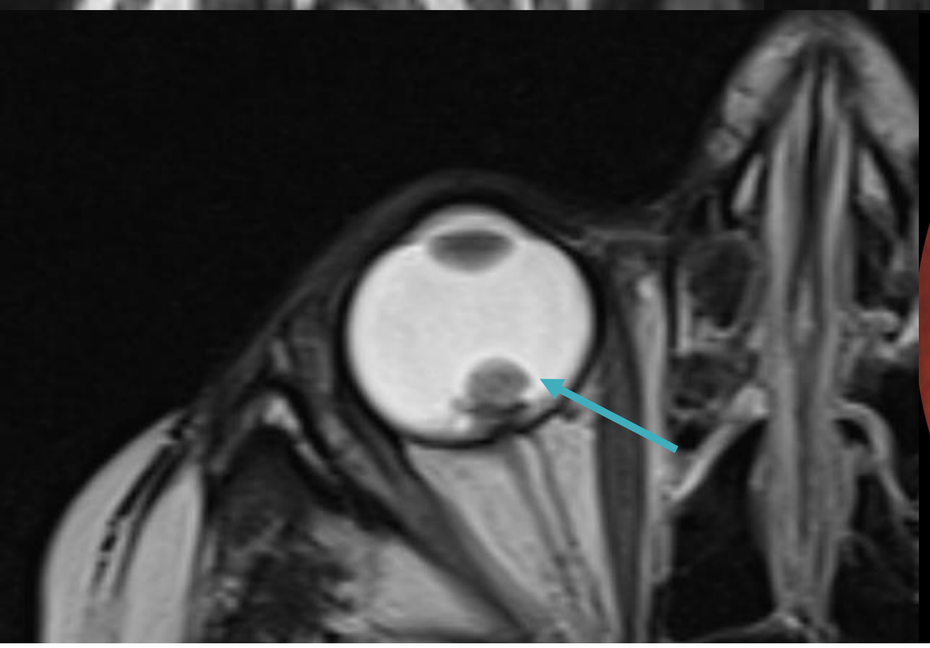
Reference:

1. Broaddus, E., Topham, A., and Singh, A.D. 2009. Incidence of retinoblastoma in the USA: 1975-2004. Br J Ophthalmol. 93: 21-3
2. Abramson DH et al. Update on retinoblastoma. Retina. 2004 Dec;24:828-48
3. de Graaf P et al. Retinoblastoma: MR imaging parameters in detection of tumor extent. Radiology. 2005;235 (1): 197-207.

Case: Retinal Hamartoma







Axial MR images demonstrate a lobulated enhancing mass in the posterior right globe. This was thought to be a retinal hamartoma. In the fundus photo, a retinal hamartoma is seen nasal to the optic disc.

Clinical Information: Patients may be asymptomatic, or present with decreased visual acuity or strabismus[1]

Epidemiology: 1 per 20,000[2]

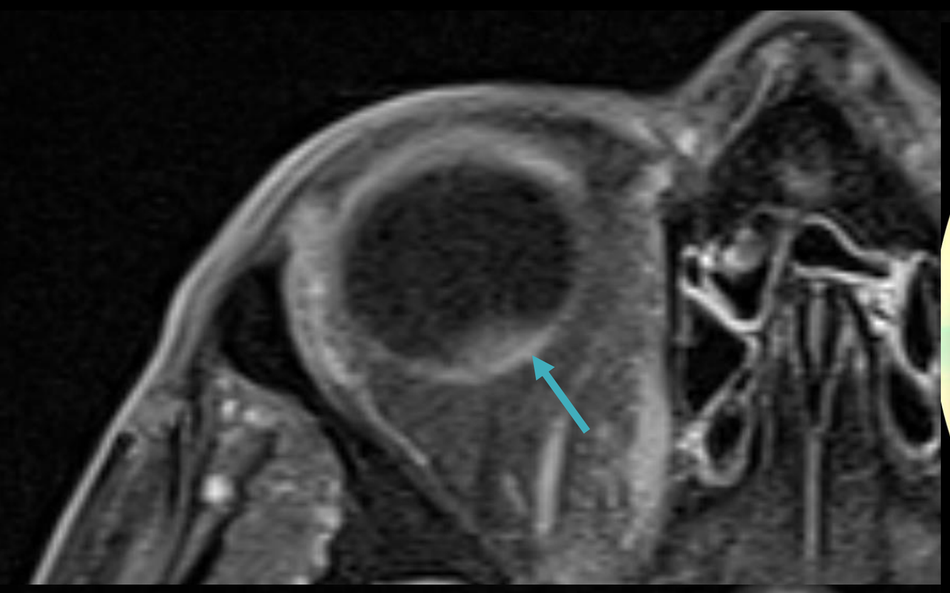
Pathophysiology: Retinal hamartomas are glial tumors of the retinal nerve fiber layer that arise from retinal astrocytes. Associated with tuberous sclerosis and rarely with neurofibromatosis[1]

Key Imaging Characteristics: Calcific densities in the affected globe(s) involving the retinal margins is a classic sign of retinal hamartoma.[3] Imaging is performed to exclude retinoblastoma and monitor findings of TS.[4]

Reference:

1. Martin, K., et al. (2010). "Retinal astrocytic hamartoma." Optometry 81(5): 221-233
2. Prasad et al (2001). Retinal astrocytic hamartoma. 77(911): 556-556.
3. Hurst JS, Wilcoski S. Recognizing an index case of tuberous sclerosis. Am Fam Physician. 2000;61 (3): 703-8, 710. Pubmed citation Am Fam Physician. 2000 Feb 1;61(3):703-708
4. Rauschecker AM, et al. (2012). High-resolution MR imaging of the orbit in patients with retinoblastoma. RadioGraphics. 2012;32.

Case: Ocular Melanoma



Axial MR images demonstrate an enhancing mass in the posterior right globe which was an ocular melanoma. The fundus photo shows the large elevated structure, with lack of drusen, presence of fine orange pigmentation, and fluid underneath typical of ocular melanoma.

Clinical Information: Patient presents with unilateral decreased visual acuity and field of vision. Frequently in Caucasian population[1]

Epidemiology: 6 per 1,000,000 in the US. M>F[2]

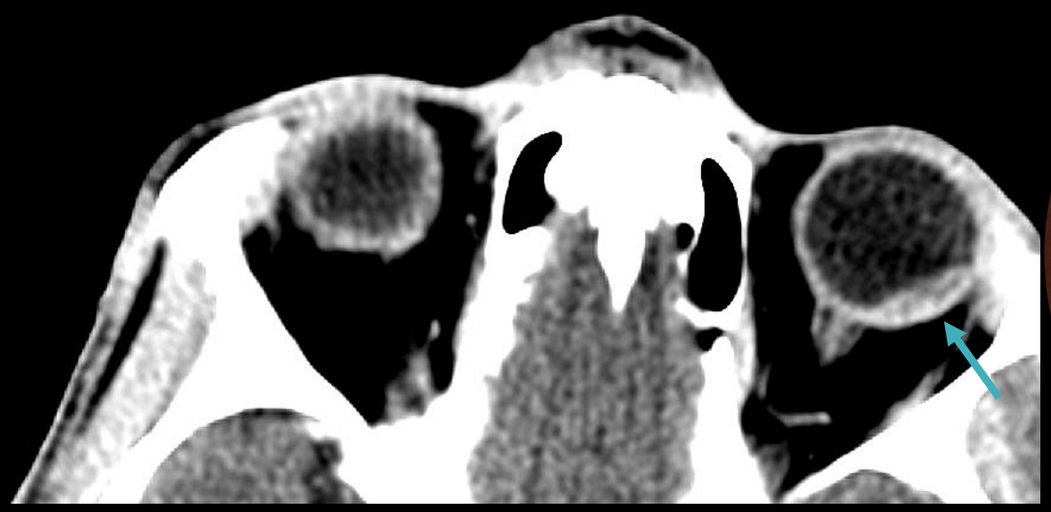
Pathophysiology: Malignancy arises from melanocytes in the choroid, ciliary body, or iris. Monosomy 3, as well as P13K/AKT and MAPK pathways have been linked as possible genetic causes[1,2]

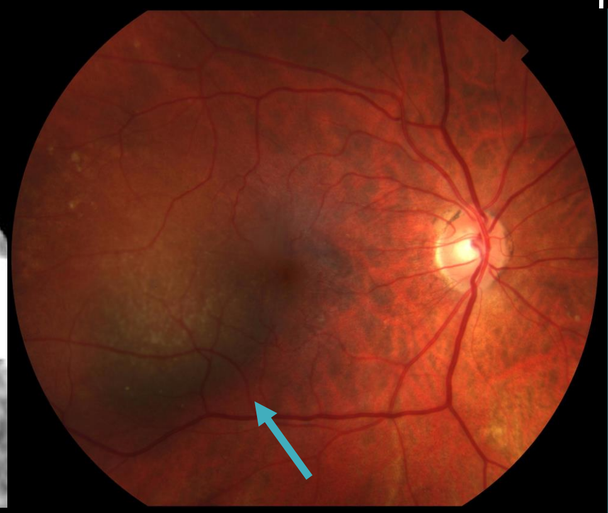
Key Imaging Characteristics: MRI is preferred over CT. Moderately high signal mass lesion on T1 and associated exudative retinal detachment.[3]

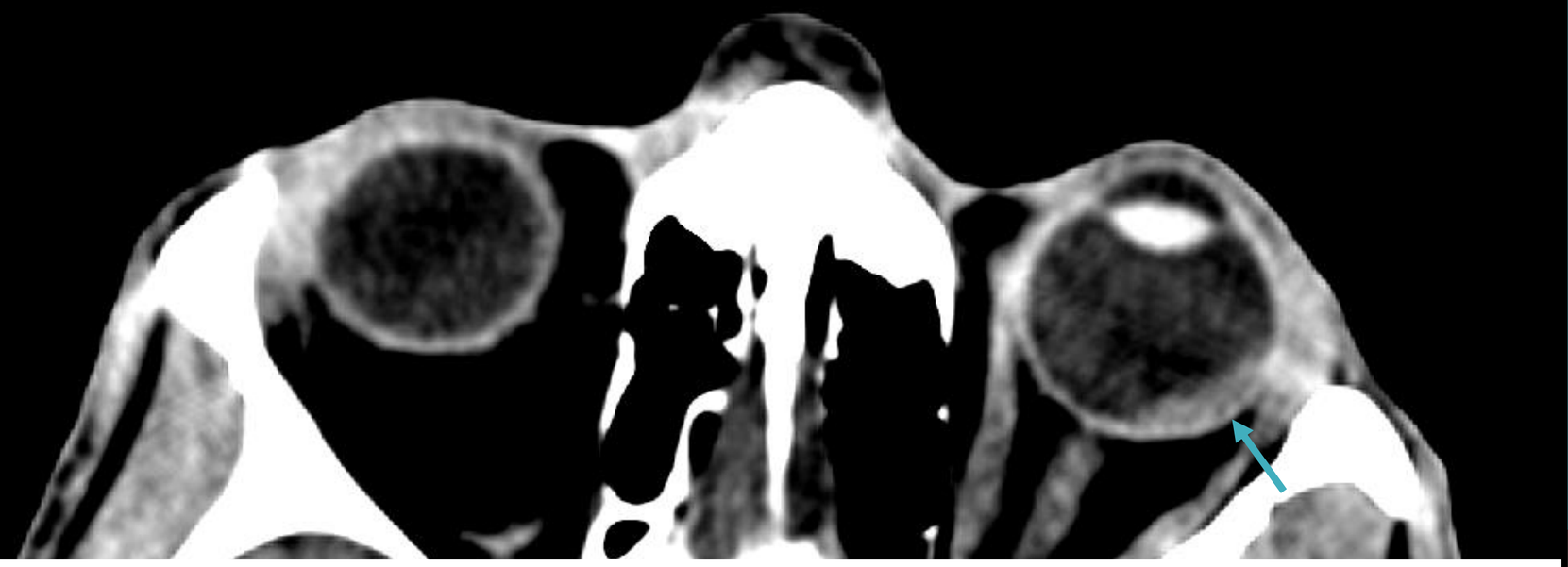
Reference:

1. Shields CL, et al. Iris melanoma: features and prognosis in 317 children and adults. J AAPOS. 2012 Feb;16(1):10-6
2. Jovanovic P, et al. Ocular melanoma: an overview of the current status. Int J Clin Exp Pathol. 2013;6(7):1230-44
3. Kaufman LM et al. Retinoblastoma and simulating lesions. Role of CT, MR imaging and use of Gd-DTPA contrast enhancement. Radiol. Clin. North Am. 1998;36 (6): 1101-17

Case: Metastasis (Lung)







Axial CT images demonstrate an enhancing mass in the posterior left globe which was suspected to be a metastatic lung lesion. In the fundus photo leopard print spots are seen temporally (indicative of metastatic lesions).

Clinical Information: Patient with a diagnosis of non-small cell or small cell lung cancer. Unilateral metastasis in 80% cases. Blurred or distorted vision in the affected eye[1]

Epidemiology: 1–2.5% of all patients who die from lung cancer have metastatic carcinoma in at least one eye[1]

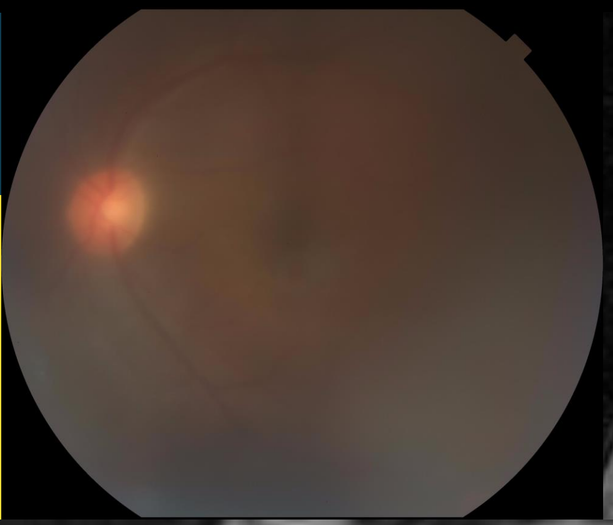
Pathophysiology: Lung metastasis is most likely to involve superior lateral extraconal quadrant[2]

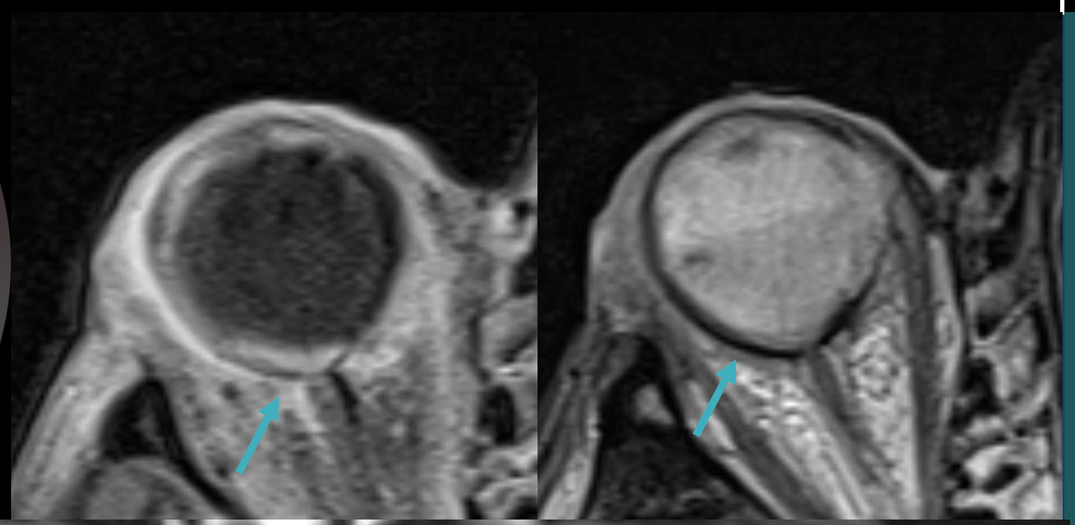
Key Imaging Characteristics: On CT, morphology is variable and can be either well-defined or diffuse. MRI shows greater resolution but similar findings to CT[3]

Reference:

1. Lampaki S, Kioumis I, Pitsiou G, et al. Lung cancer and eye metastases. Med Hypothesis Discov Innov Ophthalmol. 2014;3(2):40-4
2. Char DH, Miller T, Kroll S. Orbital metastases: diagnosis and course. Br J Ophthalmol. 1997;81 (5): 386-90
3. Green S, Som PM, Lavagnini PG. Bilateral orbital metastases from prostate carcinoma: case presentation and CT findings. AJNR Am J Neuroradiol. 1995;16 (2): 417-9

Case: Endopthalmitis





MR images demonstrate irregular contour and enhancement of the right globe with surrounding soft tissue enhancement consistent with endopthalmitis. The fundus photo shows 3+ vitritis (haze), indicating inflammation and infection in the globe.

Clinical Information: Patients presents with ocular discharge with erythema, pain, and visual blurring. Usually within 1 week post-surgery[1]

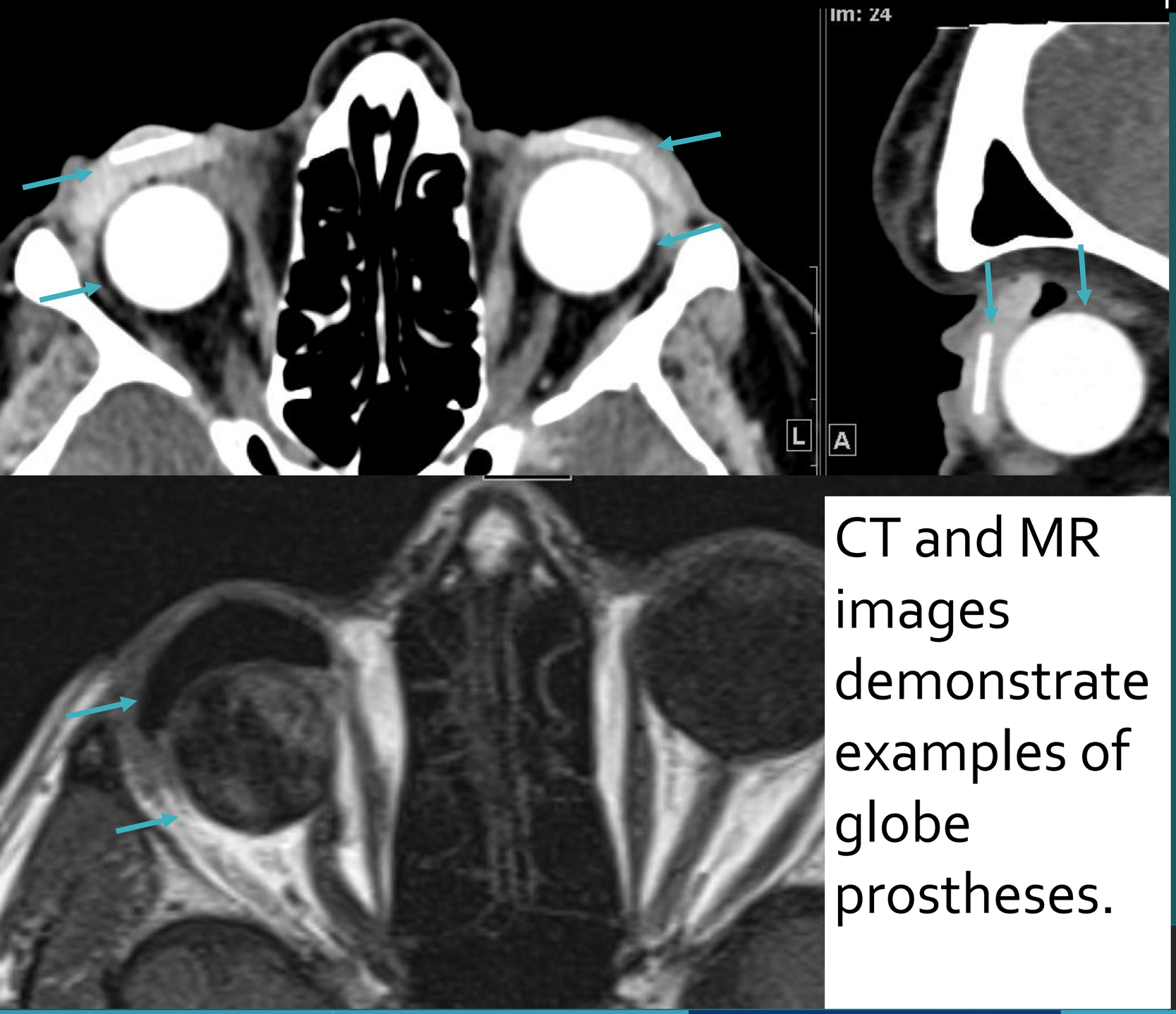
Epidemiology: 5 per 10,000 hospitalized patients. Right eye more likely to be affected than the left[2]

Pathophysiology: Inflammation of the intraocular cavities, usually due to bacterial infection. Can also occur due to trauma or retained lens[1]

Key Imaging Characteristics: CT can show proptosis or choroidal enhancement post-contrast. MRI can show high FLAIR signal and edema in the vitreous humor, in addition to restricted diffusion on DWI akin to an abscess[3]

Reference:
1. Lemley et al. Endophthalmitis, a review of current evaluation and management.. Retina 27:662-680, 2007
2. Callegan MC et al. Bacterial endophthalmitis: epidemiology, therapeutics, and bacterium-host interactions. Clin Microbiol Rev. 2002;15(1):111-24.
3. Radhakrishnan R et al. Imaging findings of endophthalmitis. The neuroradiology journal. 29 (2): 122-9.

Case: Globe Prosthesis



CT and MR images demonstrate examples of globe prostheses.

Clinical Information: A prosthetic eye is inserted post-enucleation to manage certain ocular diseases, including phthisis bulbi, ocular malignancy, and severe trauma[1]

Key Imaging Characteristics: CT demonstrates a high-attenuation ring with a large central area of air attenuation. MRI shows a homogeneous dark signal intensity on T1- and T2-weighted images. T2-weighted signal intensity gradually decreases because of ingrowth of fibrovascular tissue[1]

Reference:
1. Reiter, M. J., et al. (2015). "Postoperative Imaging of the Orbital Contents." 35(1): 221-234

Case: Retinal Detachment

https://radiopaedia.org/articles/retinal-detachment?lang=us

Clinical Information: Patient presents with ongoing fixed or slowly progressive visual field loss. Can be post-cataract surgery or trauma. Check for Hx of DM or HTN[1]

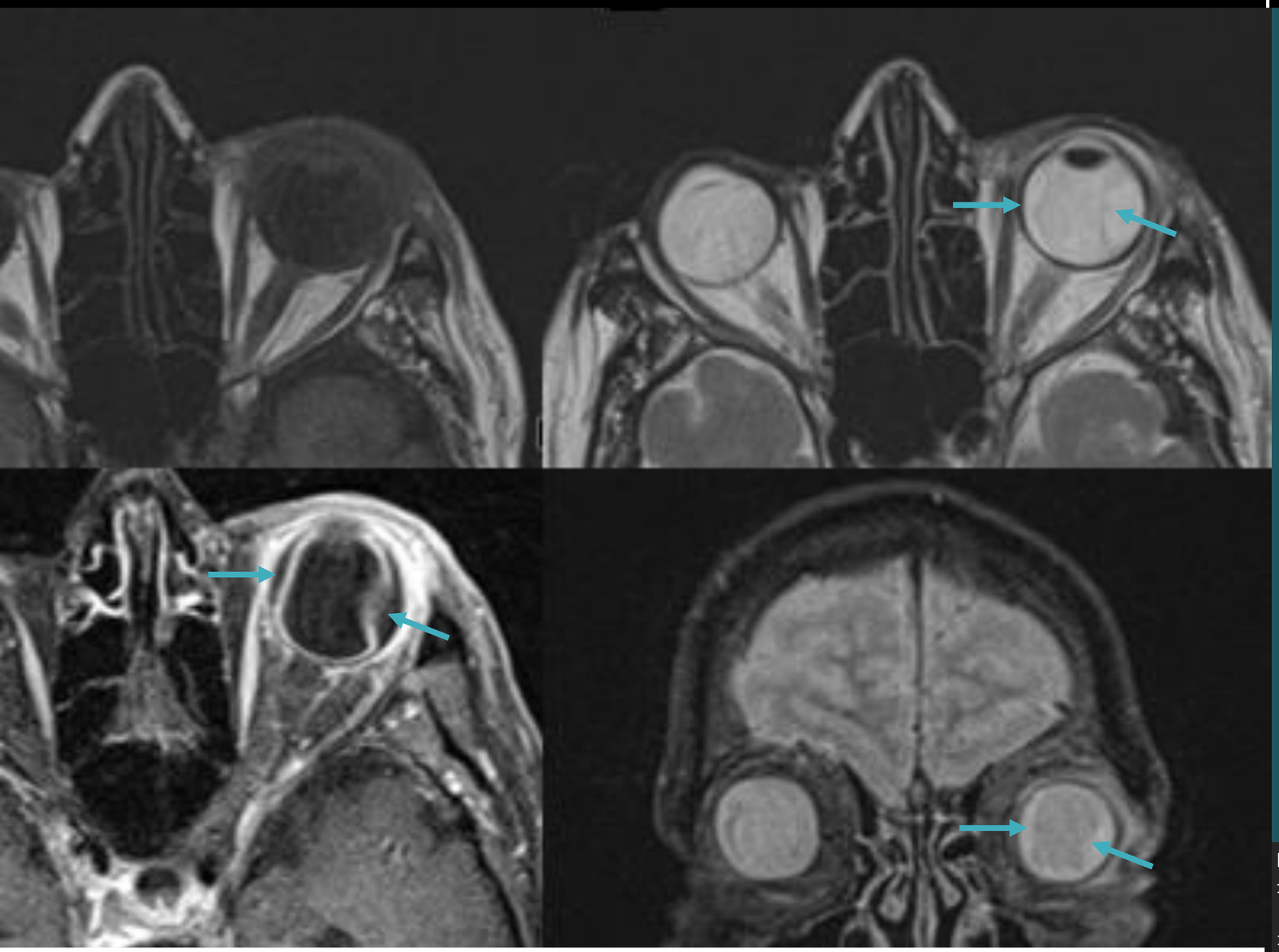
Epidemiology: 5 per 100,000 in general population. 20 per 100,000 in middle-age/elderly demographics[2]

Pathophysiology: Separation of the inner and outer layers of retina, usually due to the tearing of the inner layer[1]

Key Imaging Characteristics: Classic sign is an area of detachment limited anteriorly by the ora serrata and convergence on the optic disk posteriorly[3]

Reference:
1. Reiter, M. J., et al. (2015). "Postoperative Imaging of the Orbital Contents." 35(1): 221-234
2. Mitry D et al The epidemiology of rhegmatogenous retinal detachment: geographical variation and clinical associations British Journal of Ophthalmology 2010;94:678-684.
3. Lane JI et al. Retinal detachment: imaging of surgical treatments and complications. Radiographics. 2003;23 (4): 983-94

Case: Choroidal Detachment



MR images demonstrate displaced choroid layer consistent with choroidal detachment (arrows).

Clinical Information: Patient with recent ocular surgery presents with painless vision loss or achy eye[1]

Epidemiology: 2-4.5% in Western countries[1]

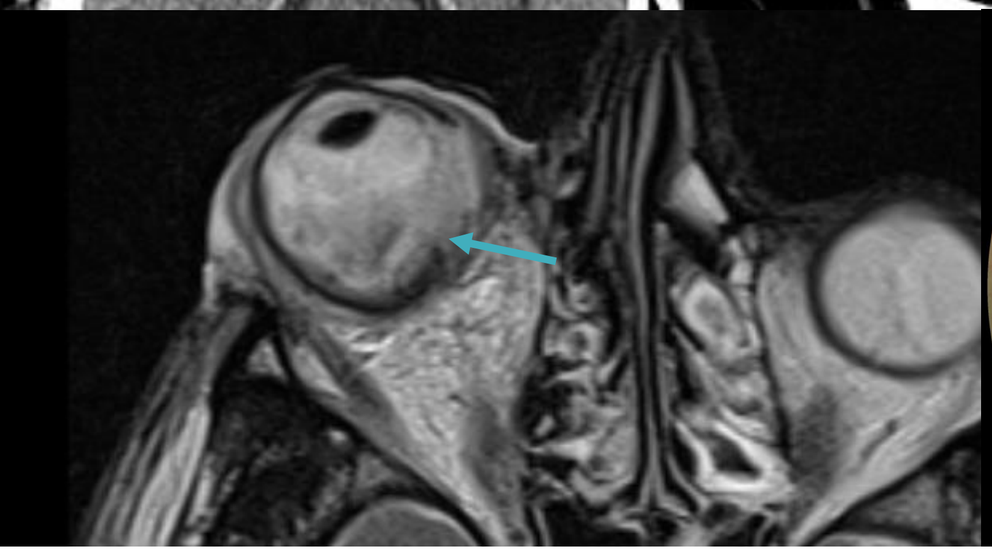
Pathophysiology: Choroid detaches from the scleral layer. Typically due to the accumulation of fluid in the suprachoroidal space or inflammatory process. Increased IOP is a risk factor[2]

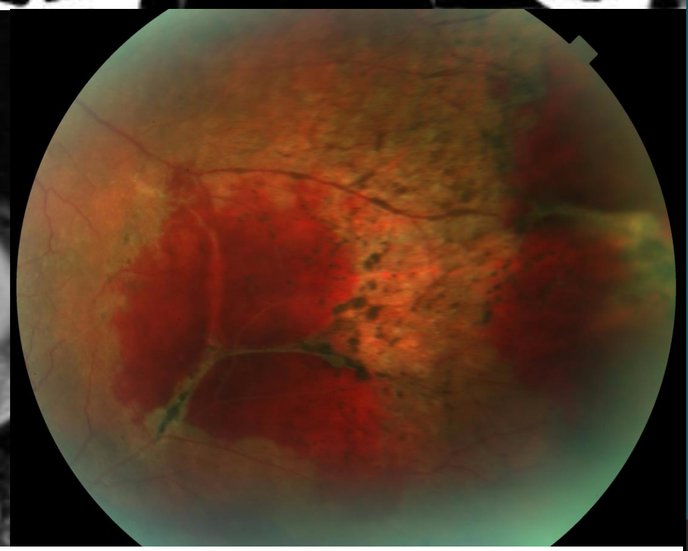
Key Imaging Characteristics: CT/MRI shows a detachment not limited by ora serrata anteriorly, and divergence near the optic disk. Imaging typically not required[3]

Reference:

1. Seelenfreund M, et al. Choroidal detachment associated with primary retinal detachment. Arch Ophthalmol. 1974;91(4):254–258
2. Bellows, R. et al. (1981). "Choroidal Detachment: Clinical Manifestation, Therapy and Mechanism of Formation." Ophthalmology 88(11): 1107-1115
3. Lebedis CA, Sakai O. Nontraumatic orbital conditions: diagnosis with CT and MR imaging in the emergent setting. Radiographics. 2008;28 (6): 1741-53

Case: Globe Rupture





MR images demonstrate abnormal medial contour of the globe with hyperdense hemorrhage within which is consistent with globe rupture. Posterior globe rupture is seen in the fundus photo, showing a break in through the choroid with hemorrhage surrounding the break.

Clinical Information: Patients presents with trauma to the eye and visual deficits.

Epidemiology: 3.4 per 100,000 adults. Mostly due to workplace injury. M:F = 5:1[1]

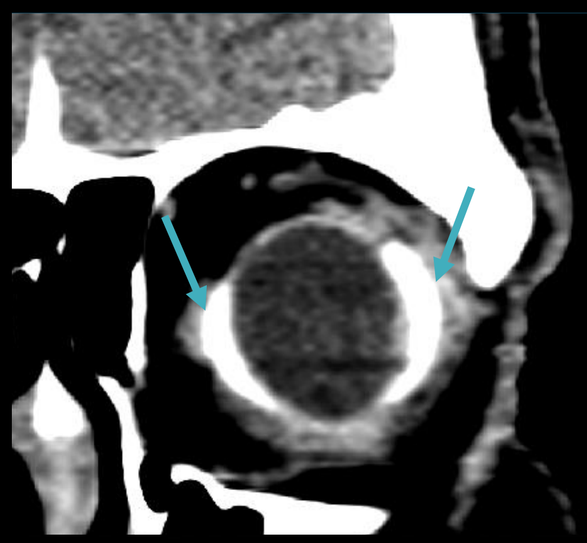
Pathophysiology: Ocular trauma leads to increased IOP and tearing of the sclera. Sharp objects can penetrate the globe[1]

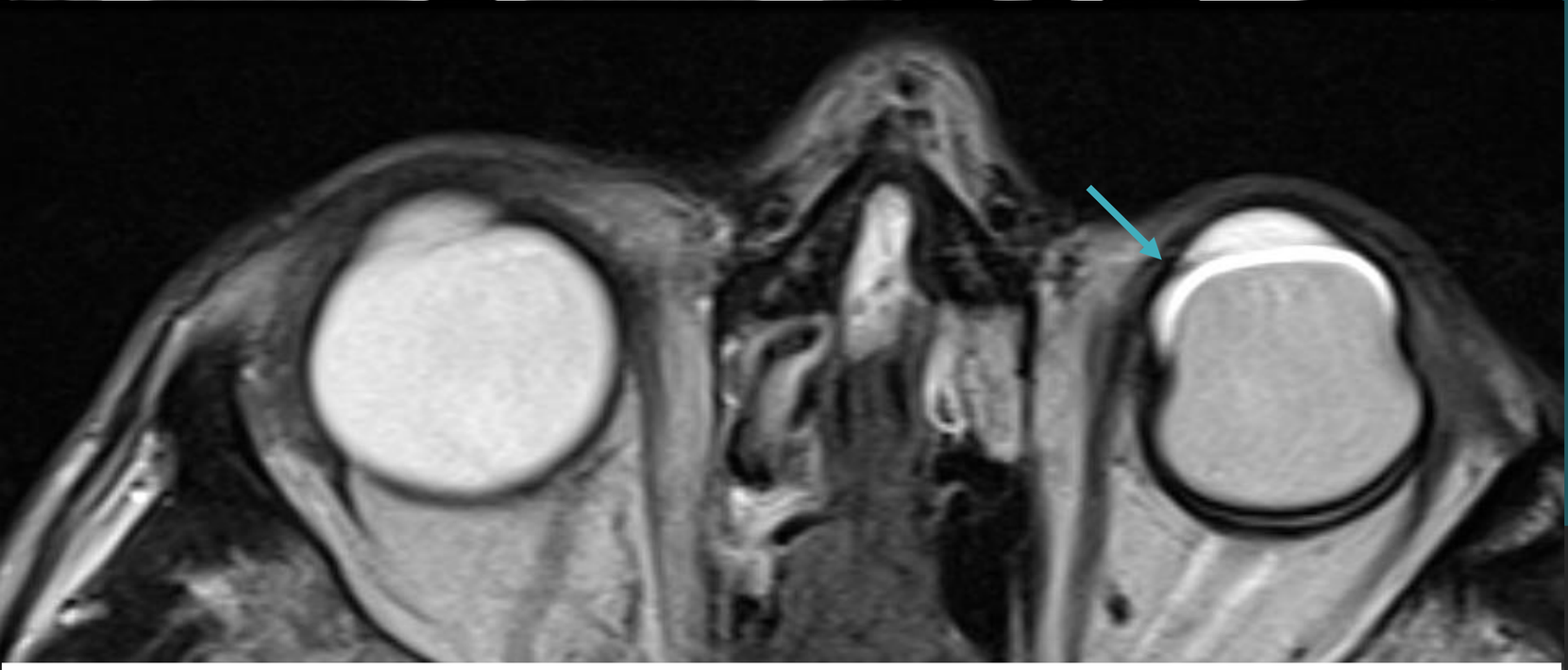
Key Imaging Characteristics: Imaging is classic for collapsed globe and/or presence of foreign body. Anterior chamber may also be enlarged[2,3]

Reference:

1. Sahin Atik, S., et al. (2018). "Open Globe Injury: Demographic and Clinical Features." 29(3): 628-631
2. Kubal WS. Imaging of orbital trauma. Radiographics. 2008;28 (6): 1729-39.
3. Hallinan JT, Pillay P, Koh LH, Goh KY, Yu WY. Eye Globe Abnormalities on MR and CT in Adults: An Anatomical Approach. (2016) Korean journal of radiology. 17 (5): 664-73.

Case: Scleral band





MR and CT images demonstrate examples of scleral banding (arrows demonstrate the scleral band).

Clinical Information: Patient with retinal detachment undergoes ophthalmologic procedure and a piece of silicone strip/sponge is inserted to optimize the healing process[1]

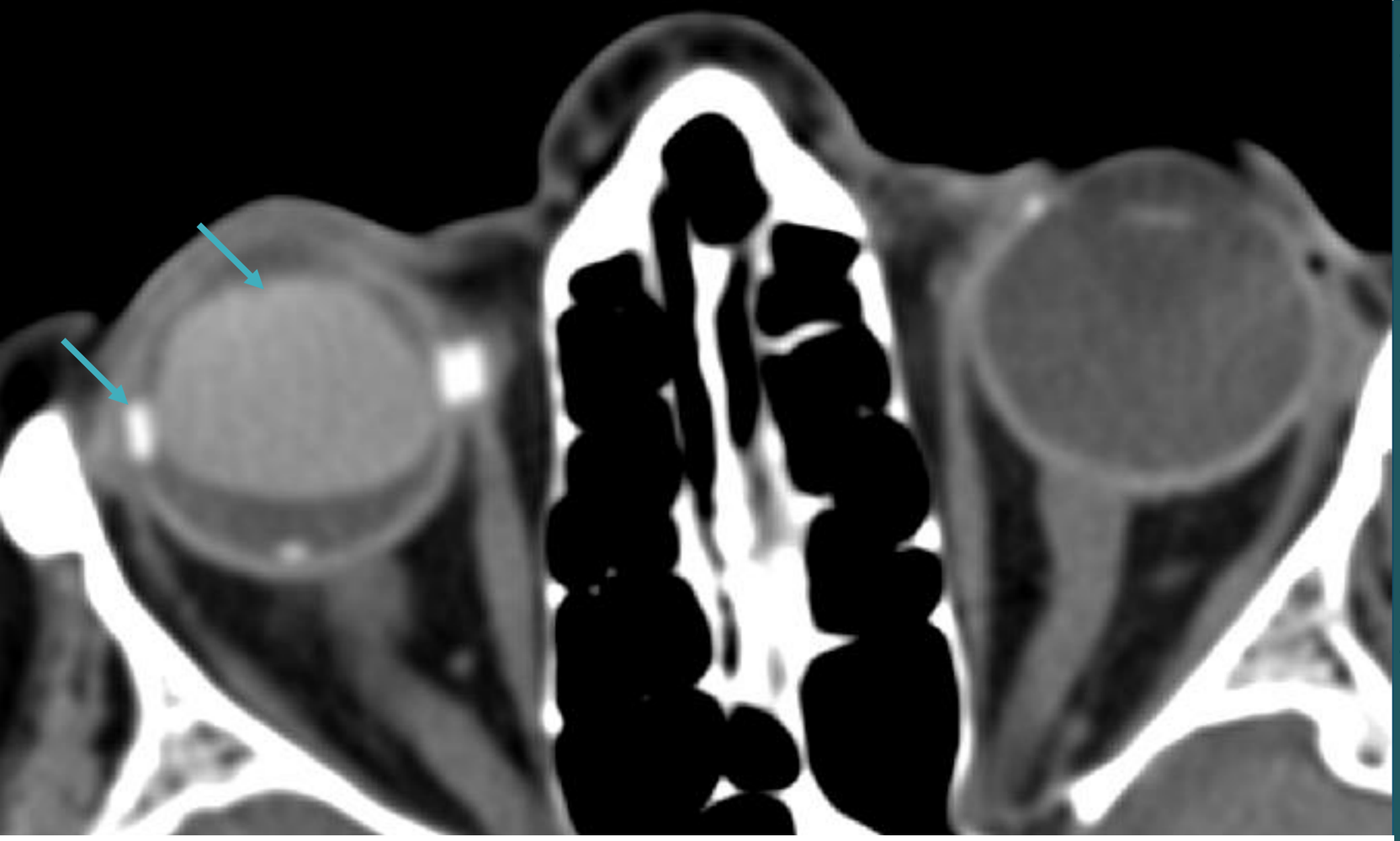
Pathophysiology: Inserted piece of scleral band indents the globe causing scleral buckling that helps appose the retinal pigment epithelium to the sensory layer of the retina.[2]

Key Imaging Characteristics: CT shows a layer of hyperdensity in the globe where the silicone scleral band is inserted[3] Gas density can also be seen if sponge material used.

Reference:

1. American Academy of Ophthalmology: The repair of rhegmatogenous retinal detachment. Information Statement. Ophthalmology 1990;97:1562–1572.
2. Lane JI et al. Retinal detachment: imaging of surgical treatments and complications. Radiographics 23 (4): 983-94
3. Schwartz SG, Kuhl DP, McPherson AR, Holz ER, Mieler WF. Twenty-year follow-up for scleral buckling. (2002) Archives of ophthalmology (Chicago, Ill. : 1960). 120 (3): 325-9.

Case: Silicone Retinopexy



Axial CT Images demonstrate silicone retinopexy. The silicone is seen as hyperdense material. Peripheral hyperdensity around the globe is consistent with a scleral band.

Clinical Information: Patient with retinal tear or detachment undergoes ophthalmologic procedure of heating (diathermy), freezing (cryotherapy), or a laser (photocoagulation)[1]

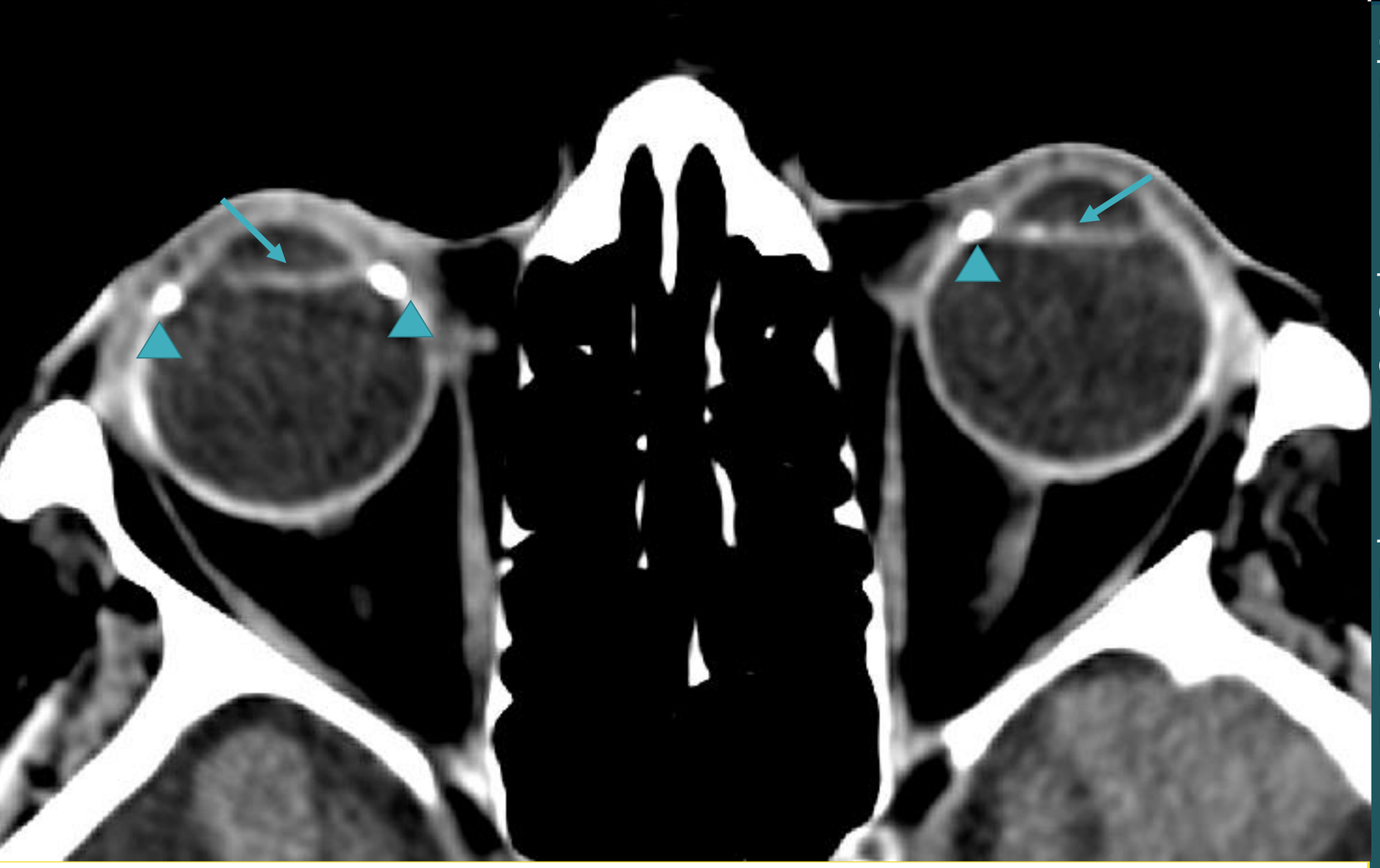
Pathophysiology: Intraocular tamponade agents can be used to reappose the retina in a retinal detachement.[1]

Key Imaging Characteristics: Gas bubble injection results in air attenuation on CT while silicone injection will result in hyperdensity on CT.[3]

Reference:

1. Lane JI et al. Retinal detachment: imaging of surgical treatments and complications. Radiographics 23 (4): 983-94
2. Fabian, I. D., et al. Pneumatic Retinopexy for the Repair of Primary Rhegmatogenous Retinal Detachment. JAMA Ophthalmology 2013 131(2): 166-171
3. Ito, Y., et al. (2016). Imaging characteristics of the postoperative globe: a pictorial essay. 34(12): 779-785.

Case: Prosthetic Lens



Axial CT Images demonstrate bilateral prosthetic lens (arrows). Note the thicker native lens has been replaced with a thin hyperdensity. Also note benign scleral calcifications (arrowhead).

Clinical Information: Patient with a history of cataract extraction and implantation of an intraocular lens.[1]

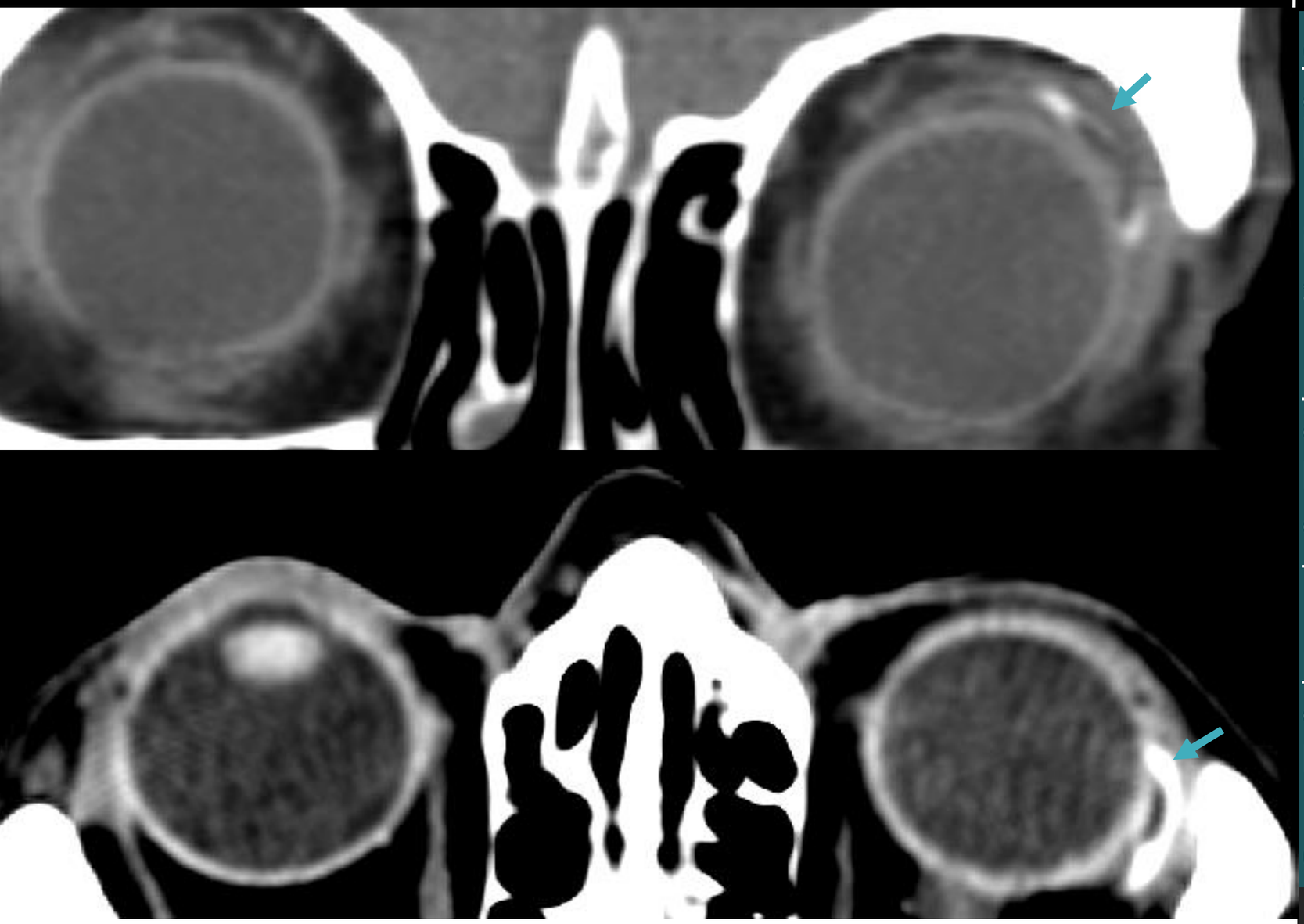
Pathophysiology: An intraocular lens consists of an optic lens and footplate component. Intraocular lens dislocation is a rare complication.[2]

Key Imaging Characteristics: On CT, prosthetic lens is seen as a thin layer of hyperdensity. On MRI, the prosthetic lens is seen as a thin layer of hypodensity on T1 and T2[1,2,]

Reference:

1. Kuo MD et al. In vivo CT and MR appearance of prosthetic intraocular lens. (1998) AJNR. American journal of neuroradiology. 19 (4): 749-53
2. Ito Y, et al. Imaging characteristics of the postoperative globe: a pictorial essay. (2016) Japanese journal of radiology. 34 (12): 779-785

Case: Ahmed Valve



Axial and coronal CT images demonstrate an Ahmed valve in the left superior lateral orbit. Note adjacent fluid density bleb which is a normal finding.

Clinical Information: Patient has a glaucoma drainage device (GDD) inserted by an ophthalmologist. History of previously failed trabeculectomy or insufficient conjunctiva due to prior surgical procedures and injuries[1]

Pathophysiology: Ahmed valve is a common GDD used to divert aqueous humor from the anterior chamber to an external reservoir. This effectively lowers the IOP[2]

Key Imaging Characteristics: Ahmed valve can be identified on CT as thin curvilinear high attenuation structures surrounded by prominent thin-walled fluid collections (can mimic a cystic orbital lesion)[3]

Reference:

1. Hill RA et al. Trabeculectomy and Molteno implantation for glaucomas associated with uveitis. Ophthalmology 1993;903-908
2. Ceballos EM, Parrish RK, Schiffman JC. Outcome of Baerveldt glaucoma drainage implants for the treatment of uveitic glaucoma. Ophthalmology 2002;109:2256-2260
3. Reiter, M. J., et al. (2015). "Postoperative Imaging of the Orbital Contents." 35(1): 221-234

Conclusion

- Understanding characteristic features of globe abnormalities and relation to corresponding ophthalmological clinical exam is important

- This will aid radiologists in establishing diagnosis with improved accuracy and efficiency, while providing concise consultations to appropriate physicians

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17. Karamursel et al. Evaluation of Patients with Scleritis for Systemic Disease. Ophthalmology 2004; 111: 501-506
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Thank you for your attention!