Choroidal Osteoma Masquerading as Intraocular Foreign Body on Computed Tomography Scan

Abstract
Sixty four year old male referred for ocular evaluation secondary to computed tomography findings of intraocular foreign body. B scan ultrasonography reveals acoustically dense choroidal lesion resulting in posterior sound attenuation consistent with choroidal osteoma.

Case History
- Patient demographics
  - 64 year old Caucasian male

- Chief complaint
  - Purpose of visit: Patient is referred by Radiologist for ocular health evaluation in light of recent head computed tomography (CT) findings of 4 mm round radiodense lesion within the posterior medial left globe.
  - Incidentally, patient reports longstanding mild metamorphopsia OD. No recent visual changes or ocular discomfort OS.

- Ocular history
  - Macular degeneration OD, S/P intravitreal Lucentis Tx (May 2009)
  - Early Cataracts OU

- Medical history
  - GERD
  - Osteoarthritis
  - Hypertension
  - Hyperlipidemia
  - Hepatic Encephalopathy
  - Major Depressive Disorder
  - Sleep Apnea

- Medications
  - Omeprazole 2 capsules 20 mg p.o. qd
  - HCTZ 25 mg / Lisinopril 20 mg 1 tablet p.o. qd
  - Metoprolol 1 tablet 50 mg p.o. qd
  - Simvastatin 1 tablet 40 mg p.o. qhs
  - Lactulose syrup 10 mg /15 mL 2 tablespoons p.o. q4h
  - Trazodone 1 tablet 50 mg qhs PRN

- Other salient information
  - No history of ocular trauma, injury, or inflammation OU

Pertinent Findings
- Clinical Evaluation (08/09/10)
Best Corrected Distance VA:  20/40- OD  
                        20/25+ OS  

Pupils: PERRL, No APD OU  
EOM: Smooth and Full OU  
Goldmann Applanation Tonometry: 11 mm Hg OD, 8 mm Hg OS  

Anterior segment:  
Lids/Lashes: Clear OU  
Conjunctiva: Nasal and Temporal Pinguecula OU  
Cornea: Clear OU  
Iris: Flat OU  
Anterior Chamber: Deep and Quiet OU  

Posterior Segment:  
Lens: Trace Nuclear Sclerosis OU  
Vitreous: No inflammatory cells OU  
ONH Evaluation:  0.45 round C/D OD  
                        0.50 round C/D OS  
                        Healthy rims, No pallor OU  
Macula: Central RPE atrophy without net OD  
Paramacular RPE mottling without net OS  
Posterior Pole: 3 DD flat choroidal hyper- and hypopigmentation adjacent to superior temporal arcade OS  
Periphery: Flat with no holes/tears OU  

- **Physical**  
- Normal vital signs  

- **Laboratory studies (08/09/10)**  
  - Serum Calcium 9.1 mg/dL  
    Reference Range 8.4-10.2 mg/dL  
  - Serum Phosphorous 3.5 mg/dL  
    Reference Range 2.3-4.7 mg/dL  
  - Alkaline Phosphatase 99 U/L  
    Reference Range 40-150 U/L  
  - Magnesium 2.0 mg/dL  
    Reference Range 1.6-2.6 mg/dL  

- **Radiology studies**  
  - Orbit CT (12/28/2009 and 11/20/2009 - CT was originally ordered to address acute transient episodes of ataxia, and dizziness in 2009).  
    - Axial unenhanced scan shows 4 mm round lesion within the posterior medial left globe (11/20/2009). Same findings noted on repeat scan (12/28/2009).  

- **B- scan Ultrasonography (08/09/10)**
- Transverse B-scan performed at high gain setting shows a near flat echographically loud choroidal lesion, producing strong posterior sound attenuation or ‘acoustic shadow’. Echo from the lesion persisted with low gain settings as other ocular structures became less visible.

- Magnetic Resonance Imaging (MRI)
  - Not performed as composition of lesion initially unknown

**Differential diagnosis**

- **Primary/Leading**
  - Choroidal osteoma

- **Others**
  - Sclerochoroidal calcification
  - Intraocular foreign body
  - Choroidal nevus
  - Choroidal melanoma
  - Choroidal hemangioma

**Diagnosis and discussion**

- **Elaborate on the condition**
  - Choroidal osteoma is a benign ossifying tumor of the choroid. It is typically found in young Caucasian females. Documented as being unilateral in approximately 75% of the reported cases, when bilateral it can be asymmetric in appearance (Brown *et al.*).

  - The shape of the osseous lesion is usually round or oval, varying from 2-22 mm in basal dimension and 0.5-2.5 mm in elevation. This well circumscribed lesion with scalloped margins tends to be located in juxtapapillary region. It may extend to the macular region but is rarely confined to the macula alone (Shields *et al.*). The location of the lesion in the patient being presented here is not classic juxtapapillary. Choroidal osteoma may appear yellow-white to orange-red in color. However, as noted in the current presentation, the color may vary depending on the degree of thinning or depigmentation of the overlying RPE, and the thickness of the lesion itself (Gass).

  - Patients with choroidal osteoma may be asymptomatic. Symptoms may present as mild to severe blurred vision, metamorphopsia, and visual field defect corresponding to the site of lesion. Previous studies indicate 80% of all affected eyes have visual acuity of 20/30 or better at the initial evaluation, and 10% have visual acuity of 20/200 or worse (Teich *et al.*).

  - Choroidal osteoma can be detected with CT scan in which the lesion presents as having the density of bone. Acoustically dense lesion with a
strong posterior sound attenuation is noted with B-scan. The shadow created posterior to the lesion is often termed as pseudo-optic nerve. The A-scan echogram similarly shows a high reflective broad spike from the lesion followed by decrease in height of spikes secondary to sound attenuation (Byrne and Green). Interestingly, choroidal osteoma does not show negative image of the bone in MRI scans—it appears as a bright signal on T1-weighted images and relative low intensity signal on T2-weighted images (DePotter et al.).

Clinical complications associated with choroidal osteoma include growth of the lesion, serous retinal detachment, and choroidal neovascularization. Long term follow up of 36 patients with choroidal osteoma by Aylward et al. indicated the probability of developing choroidal neovascularization as 47% in 10 years and 56% in 20 years. It is theoretically postulated that new vessels from the choroid grow through the degenerated RPE and Bruch’s membrane overlying the osteoma.

**Expound on unique features**
- Calcification usually occurs in tissues which have high blood supply. The abundant blood supply delivers osteoblasts which have the potential to reorganize the Haversian system and result in ossification. The choroid and retinal pigment epithelium are the most common sites for intraocular bone formation secondary to abundant blood supply. Although intraocular ossification is often encountered with phthisis bulbi or chronic ocular inflammation, choroidal osteoma is unique in that it usually occurs in healthy eyes without previous history of inflammation (Gass and Shields et al.).

**Treatment, management**
- **Treatment and response to treatment**
  - No treatment initiated—Patient will be monitored at regular intervals for possible complications associated with choroidal osteoma.
  - Communication with Radiology regarding the diagnosis, and safety of pursuing MRI.

- **Refer to research where appropriate:**
  - Treatment for choroidal neovascularization in association to the osteoma has been confined to laser photoocoagulation. Previous studies and a case report from Grand et al. delineated limited effectiveness of the treatment secondary to reduced absorption of energy by the depigmented RPE.

  - Sclerochoroidal calcification is a rare bilateral finding in elderly patients. It presents as multiple discrete yellow placoid lesions in the midperiphery, similar in appearance to choroidal osteoma. Taking into account the location and appearance of the lesion in the current presentation, sclerochoroidal calcification is a differential diagnosis to be considered.
Sclerochoroidal calcification can be classified as dystrophic or metastatic. The dystrophic form has been associated with positive history of trauma, chronic inflammation, retinoblastoma, or senile degeneration of the sclera. The metastatic form has been associated with abnormal calcium phosphorous metabolism or primary renal tubular hypokalemic metabolic alkalosis syndrome. Considering significant systemic implications with the metastatic form, it is recommended to screen patients for any electrolyte imbalance in order to implement the appropriate treatment (Cooke et al., Hanover et al., and Pakrou et al.).

**Bibliography, literature review encouraged**


**Conclusion**

Clinical pearls, take away points if indicated

- Despite the ability to masquerade as an intraocular foreign body on CT scan, choroidal osteoma can be detected and differentiated through appropriate diagnostic tests. Treatment is not necessary for the benign osseous lesion.
Patients must be monitored for the risk of developing vision threatening serous retinal detachment and choroidal neovascularization. Treatment for choroidal neovascularization with intravitreal VEGF inhibitors could be hypothesized to be more effective.