Erdheim-Chester Disease and Eyes

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Outline

- Anatomy and function of the eye and orbit
- Background and overview of ECD
  - What can ECD do to the eye?
    - Double vision
    - Pain
    - Exophthalmos
  - Overview of an eye exam
  - General eye conditions that may also occur
    - Droopy eyelids
    - Dry eye syndrome
    - Cataracts
    - Refractive error
- Questions
  - Please ask anytime!
Background anatomy

https://c2.staticflickr.com/2/1363/542580866_940d2f9a02.jpg

Eye anatomy

- Iris
- Cornea
- Pupil
- lens
- Sclera
- Ciliary body
- Vitreous
- Retina
- Macula
- Optic nerve
- Choroid


https://c2.staticflickr.com/2/1363/542580866_940d2f9a02.jpg
Optic nerves

Orbital anatomy

http://msk-anatomy.blogspot.com/2014/12/cranial-nerves-anatomy.html

Eyelid structure

Clogged Meibomian Glands

http://www.mastereyeassociates.com/blepharitis


http://www.medindia.net/patients/patientinfo/granulated-eyelids.htm
CT and MRI

De Palma et al, 1998
ECD and eyes overview

- Erdheim-Chester Disease (ECD)
- ECD and Eyes
  - Eyelid changes
  - Orbital changes
    - Symptoms
- Eye exam
  - Overview
- Other common eye problems
**Erdheim-Chester Disease (ECD)**
AKA Polyostotic Sclerosing Histiocytosis

- **Rare infiltrative non-Langerhans-cell histiocytosis**
  - Approximately 500 cases reported
    - Mean age of 53 years
- **Wide range of systemic and ophthalmic manifestations**
  - Bone, heart, lungs, **orbits, central nervous system (CNS)**, pituitary gland, and retroperitoneum
  - Bone involvement in most
    - Osteosclerosis of the long bones most commonly, followed by
      - Neurologic symptoms, diabetes insipidus secondary to pituitary gland involvement, etc.
- **Xanthomatous infiltration of tissues by CD68-positive, CD1a-/S100-negative foamy histiocytes surrounded by fibrosis**
  - Touton giant cells

Erdheim-Chester disease (ECD)

- Orbital involvement in 27%
  - Commonly bilateral
  - Exophthalmos, orbital pain, motility deficits, or vision change
    - Orbital masses compressing the optic nerve or the optic chiasm
    - May affect lacrimal gland, muscles, orbital fat
  - May be resistant to medical treatment, requiring surgical debulking
- Involvement of the eyelids or the periorbital spaces in 18%
  - Periorbital yellow xanthogranulomas of skin may occur
- Involvement of structures within the eye
  - Choroid plexus

Xanthelasma - skin manifestation

- Most common cutaneous lesion occurring in one-third of patients
- Yellow eyelid plaques
  - Can also occur in face, neck, axilla, trunk, and groin
- Cholesterol-laden eyelid plaques
- Spectrum of disease
  - Unable to distinguish between ECD and other diseases by skin lesions alone

Xanthogranuloma

- Infiltration by lipid-laden, foamy histiocytes surrounded by fibrosis

Orbital xanthogranuloma

- 4 types of orbital xanthogranuloma
  - Necrobiotic xanthogranuloma (NBX)
  - Adult onset xanthogranuloma (AOX)
  - Asthma-associated adult periocular xanthogranuloma (AAPOX)
  - Erdheim–Chester disease (ECD)

Orbital xanthogranuloma

- Orbital mass may cause
  - Proptosis
  - Pain
  - Decreased motility of eye
    - Double vision
      - From misalignment of eyes
  - Decreased vision
    - Central vision
    - Visual field
    - Color vision

Orbital lesions

- **Mass of the lesion can cause**
  - Extraocular motility restriction
    - Double vision from eyes not aligning
  - Compression on optic nerve or blood supply of optic nerve
    - Vision change
Variable presentation

- Eyelid nodule
- Mild eyelid droop

Bita Esmaeli, MD
Differential diagnosis

- ECD related retro-orbital involvement may resemble
  - Wegener’s granulomatosis
  - Graves disease
  - Langerhans cell histiocytosis
  - Lymphoma
  - Sarcoidosis
  - Sjogren’s disease
  - Idiopathic orbital inflammation

Treatment

- **Systemic treatment**
  - Recent discovery of BRAF mutations in up to 54% of patients
    - Led to treatment with BRAF inhibitors
  - Interferon-a-2a and pegylated interferon-a
  - Anticytokine directed therapy
    - Anakinra, infliximab, tocilizumab
  - Serine/threonine kinase inhibitors: vemurafenib (inhibitor of BRAF harboring the V600E mutation) and imatinib

- **Orbit specific treatment**
  - Steroids may reduce edema acutely, e.g. severe exophthalmos
    - Not considered effective monotherapy
  - Radiotherapy has been reported
    - No response or short-term palliation with disease progression within months
  - Surgical debulking is limited in ECD to severe orbital lesions or surgically resectable intracranial lesions
Eye exam

- Take the mystery out of the eye exam
Clinic tests

- Vision
  - Visual acuity
  - Double vision
  - Color vision
  - Visual fields
- Pupils
- Extraocular motility
- Resistance to retropulsion
- Intraocular pressure
- External exam
- Slit-lamp exam
- Pupil dilation
- Posterior fundus exam
Visual acuity
Monocular vs binocular diplopia


http://img.tfd.com/ElMill/thumb/F0D-04-S2958.jpg

https://arcolin4.files.wordpress.com/2013/03/figure-1.jpg
Color vision testing

- Ishihara color plates
- HRR color plates
  - To evaluate if compromise of optic nerve
    - From compression on the nerve or vascular supply

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSKFWRyOk918BLypsUXCMjgRycX6qP7dTWvj85H-j2cd4AtlvXM
Visual fields

- To evaluate if compromise of optic nerve
  - From compression on the nerve or vascular supply
- For ptosis evaluation

http://www.schwartzeyecare.com/user-files/Humphrey_Automated_Visual_Field.jpg

http://www.nature.com/eye/journal/v18/n8/images/6701339f2.jpg
Pupils

Extraocular motility
Resistance to retropulsion
Proptosis

- Protrusion of the eye
- More obvious in some views than others
- May be seen on CT and MRI

Hertel’s exophthalmometry

- Measure anterior extent of the cornea
  - In relation to lateral orbital rim

http://www.alpfmedical.info/visual-acuity/examination-methods-hke.html

http://www.oculist.net/others/ebook/generalophthal/vaughan/public/co_figures/ch002/ch2fg31.jpg
Intraocular pressure

Eyelids
Pupil dilation

http://www.vailranchpharmacy.com/sites/default/files/Post_DialatedEyeExam.png
Anterior and posterior exam

- Slit-lamp exam
- Dilated posterior fundus exam
Choroidal involvement

- Posterior part of the eye
  - Fundus exam
  - Fundus photos
  - Ultrasound
  - Optical coherence tomography (OCT)
  - Fluorescein angiography and indocyanine green

Macular edema
Other common ophthalmic conditions

- Not specific to ECD
  - Dry eye syndrome
  - Corneal abrasion
  - Blepharitis
  - Dermatochalasis
  - Ptosis
  - Orbital cellulitis
  - Refractive error
    - Myopia
    - Hyperopia
  - Presbyopia
  - Cataract
Dry eye syndrome

- Irritation
- Foreign body sensation
- Blurry vision
- Redness
- Sticky eyelid sensation in morning
- Treat with
  - Preservative free artificial tears, gels, and ointments

Blepharitis

- Causes or exacerbates most cases of dry eye

http://www.mastereyeassociates.com/blepharitis
Dermatochalasis and ptosis

- Excess skin
  - vs
- True droop of eyelid

Orbital cellulitis

- Pre-septal vs post-septal

http://www.oculist.net/downaton502/prof/ebook/duanes/graphics/figures/v2/0340/005af.jpg
Refractive error

[Diagram showing refractive errors and their corrections: Myopia, Myopia corrected, Hyperopia, Hyperopia corrected, Astigmatism, Normal vision]

http://www.visionexcellence.com.au
http://melbourneeyecentre.com.au
Presbyopia

- Decreased or lost ability of lens to change shape and focus light
  - Age related change

https://visionhelp.files.wordpress.com/2012/07/presbyopia2.jpg?w=300
Cataract

- Clouding of the natural lens of the eye
  - Can be bilateral and asymmetric
  - Age related lens change but can worsen with medications
    - Steroids

- Cataract surgery
  - Removal of the natural cloudy lens
  - Placement of an artificial lens
  - Very commonly performed with excellent success rates

Questions??

Thank you!
References


