Ocular Examination: FRONT TO BACK
Orbital Pathology/Lacrimal Pathology

Fine-tune your OBSERVATION skills
KNOW WHAT IS NORMAL

E-medicine
Lecture 1
Anatomy of the Orbit

- Space bound by orbital bones
- Conical with a volume of approximately 27 ml
- Closed compartment

<table>
<thead>
<tr>
<th>Ethmoid bone</th>
<th>Palatine bone</th>
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</thead>
<tbody>
<tr>
<td>Frontal bone</td>
<td>Sphenoid bone</td>
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<tr>
<td>Lacrimal bone</td>
<td>Zygomatic bone</td>
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Anatomy of the Orbit

- Contains
  - External ocular muscles
  - Ophthalmic artery and its branches
  - Orbital veins and nerves
  - CN II, III, IV, V, VI,
  - Lacrimal gland
What can go wrong?

- Lacrimal Gland
  - Drainage system
  - Mass
  - Non-functioning

Orbit
- Proptosis
- Fractures
- Foreign Body
- Infection
- Inflammation

Diffuse idiopathic orbital inflammation

Dry Eye Syndrome

Thyroid Eye Disease (Grave’s Oculopathy)

Preseptal – Versus – (Septal) Orbital Cellulitis
What are some signs/symptoms of orbital disease/pathology?

By your observation, what could the patient come in complaining about and what are some things that you will find upon examination of this patient.

Did not just see a sad movie

Patient looking up
Orbital Disease

- Signs and symptoms vary with underlying disease/pathology

<table>
<thead>
<tr>
<th>Table 20.1 Causes of orbital disease</th>
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<tbody>
<tr>
<td><strong>Children</strong></td>
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<tr>
<td>Orbital cellulitis</td>
</tr>
<tr>
<td>Dermoid and epidermoid cysts</td>
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<tr>
<td>Capillary haemangioma and lymphangioma</td>
</tr>
<tr>
<td>Neurofibroma*</td>
</tr>
<tr>
<td>Rhabdomyosarcoma*</td>
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<tr>
<td>Optic nerve glioma*</td>
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<tr>
<td>Leukaemia*</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>Adults</strong></th>
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<tbody>
<tr>
<td>Trauma</td>
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<tr>
<td>Thyroid eye disease</td>
</tr>
<tr>
<td>Idiopathic orbital inflammatory disease (formerly known as ‘pseudotumour’)</td>
</tr>
<tr>
<td>Lacrimal gland inflammation and tumours</td>
</tr>
<tr>
<td>Cavernous haemangioma</td>
</tr>
<tr>
<td>Varices and lymphangioma</td>
</tr>
<tr>
<td>Lymphoma and lymphoproliferative disease</td>
</tr>
<tr>
<td>Meningioma (optic nerve or sphenoid wing)</td>
</tr>
<tr>
<td>Metastases</td>
</tr>
</tbody>
</table>

*Rare.

For whatever reason, all of these either take up space or/and cause inflammation,
• Burning, irritation
• Fever
• General malaise
• Pain
• No pain
• Headaches
• Pulsating, pressure feeling (not exactly pain)
• Diplopia
• No diplopia
• EOM restriction
  – Ophthalmoplegia
• Corneal NaFl staining
• Sclera visible between superior limbus and lid
• Hypoesthesia
  – Decreased sensation
• Pseudoptosis
  – Droopy eye lid NOT due to muscle weakness
• Rapid pulse
• Irritability
• Excessive sweating
• Fluctuating vision
• Blurred vision
• Nausea
• APD
• Proptosis
• Exophthalmometer measurements
  – Outside normal limits
• Lagophthalmos
  – Inability to close eyelids
• Epiphora
  – Excessive tearing
• Crepitus
  – Describes the grating, crackling or popping sounds and sensations experienced
Fractures

- **Blowout fracture**
  - Break in floor of orbit (maxillary bone)

- **Ethmoid fractures**
• Your observations

• History?

• Symptoms

Which is affected eye?????

Remember: always examine patient with all lights on and grossly, initially
• Your observations
  – Bruising
    • Ecchymosis
      – 1 to 3 cm
    • Purpura
      – 3 mm to 1 cm
    • Petechiae
      – < 3 mm
  – EOM restriction
    • Ophthalmoplegia
  – Conjunctival injection
  – (Pseudo)Ptosis
    • Lid droop NOT caused by weakening muscle
• History ?
  – hit with...........
    • Trauma history

• Symptoms
  – Pain
  – Diplopia
  – Tearing
  – Mild blur to vision
    • If JUST the blowout fracture
  – Crepitus
    • Describes the grating, crackling or popping sounds and sensations experienced

Patient trying to look up
Why (pseudo) ptosis?

- The "buckling" theory maintains that an anterior force is transmitted back into the orbit.
- It states that the orbital rim buckles and transmits forces to the orbital walls, resulting in an orbital floor fracture.
- The "retropulsion" theory, advanced by Smith and Rogan, refers to a fracture of the orbital floor caused by sudden increase in intra-orbital pressure; a fracture may result from the hydraulic forces generated in the closed orbital cavity.
- Blows from a fist, for instance, or objects larger than the horizontal diameter of the orbit, are the most frequent cause of this type of fracture.

Why EOM restriction?
Critical signs of recent blow-out fracture include:

- edema and ecchymosis of the lid tissues
- restriction of ocular motility, especially with vertical movements
- orbital crepitus (subcutaneous emphysema)
- hypoesthesia of the ipsilateral cheek, due to entrapment of the infraorbital nerve.

Enophthalmos - Recession of the eyeball within the orbit
Orbital Foreign Body

Non-resolving, painful swelling
Proptosis
Proptosis

- Bulging eye(s)
- NOT a diagnosis, a SIGN of underlying orbital disease
Exophthalmometer

NO “normal” absolute values

> 2 mm difference between eyes

Over 21 mm in whites and 23 mm in blacks
Axial proptosis VS Non-axial proptosis

Intraconal

Extraconal

Fibrous dysplasia of the maxillary sinus
Axial VS Non-Axial Proptosis

- Displaced along the visual axis
- Intraconal pathology
- Dysthyroid eye disease

- Displacement off the visual axis
- Extraconal pathology
- Tumors
“Proptosis” Signs and Symptoms

• Change in appearance
  – Unilateral
  – Bilateral
  – Sclera showing between superior lid and limbus

• Diplopia
  – Non-axial proptosis

• Lagophthalmos
  – Secondary dry eye issues
    • Whole new set of symptoms

• Ophthalmoplegia
  – Whole new set of symptoms

• Decreased BCVA
  – Optic nerve head compression
What are your observations? What are her possible symptoms?

Her only “symptom” when she arrived was extremely blurry distance vision. She was escorted into the clinic by her daughter.
Pseudoproptosis

- Either the simulation of abnormal prominence or
- True asymmetry that is NOT the result of increased orbital contents
Orbital Infection

• Orbital Cellulitis
  – Infection posterior to the orbital septum (anywhere in the orbit)
  – Dangerous condition because of the close proximity to the orbital apex, cavernous sinus, meninges and brain

• Bacterial
  – *Streptococcus* species, *S aureus*, and *Haemophilus influenzae* type B. *Pseudomonas, Klebsiella, Eikenella*, and *Enterococcus*

• Fungal
  – *Mucor* and *Aspergillus*

• Parasitic

• SINUSITIS
  – Most common cause
• Your Observations

• History?

• Symptoms/Signs

• Your Observations

[Image of a close-up of an eye with a red area]
• Your Observations
  – Completely shut eye
  – Injected, swollen eyelids
  – Warm to hot eyelids to touch
    • “Angry”
  – Injected conjunctiva
  – EOM restrictions
  – Watery, (-) discharge

• History?
  – Any recent sinus infections
  – Fever
  – Malaise

• Symptoms/Signs
  – Slight Blurred vision
    • Severely decreased vision
      – Optic nerve involvement
  – Fever
  – Diplopia
Orbital Cellulitis

• Severe cases may present with compression of the optic nerve
  – Vision defects
  – Vision loss
  – APD

• Typically unilateral
  – Most common cause unilateral proptosis in children

• Any age or gender
Orbital Cellulitis

External eyelid hyperemia and swelling NOT in differential diagnosis between preseptal and orbital cellulitis!!!!!
Preseptal Cellulitis
Summary

• Orbital cellulitis is differentiated from preseptal cellulitis with the following signs:
  – Pain with eye movements
  – Ophthalmoplegia
  – Proptosis
  – Globe displacement
  – Decreased vision or vision defect
Orbital Inflammation

• Myositis
  – Acute idiopathic inflammation of an extraocular muscle

• Diffuse idiopathic orbital inflammation
  – Orbital pseudotumor

• Thyroid Eye Disease (Grave’s disease)
Myositis in 12 year old male

- Symptoms
  - Persistent ocular pain
  - Recurrent diplopia

- 3 yrs prior
  - Diplopia
  - Periorbital pain
  - Lid edema
  - Limited abduction of the right eye

Idiopathic Orbital Inflammatory Disease

- Acute or subacute
- Pain
  - Important feature
- Proptosis
- Chemosis
  - Not angry
- Ophthalmoplegia
- Vision disturbances
52 year old black male

- Red, painful, bulging right eye
- Double vision and blurring x 2 wks
- Milder case 9 years ago
Examination

- 20/50, 20/20
- Pupils Normal (-)APD
- Moderate to severe limitation in all directions, worst on up gaze
- Color vision normal
- 7 mm proptosis
• Oral prednisone 100 mg qd
  – Therapy can also be diagnostic
• Presentation 2 weeks later
Orbital Inflammation

- R/O condition
  - 100% certain that infection is NOT involved.
- CT scans are helpful for diagnosis
- Treatment involves oral steroid with taper.
Thyroid-Related Orbitopathy: Grave’s Disease

- An immunological disorder (autoimmune) that affects the orbital muscles and fat
  - Thyroid gland and orbital tissues share surface antigens
  - Lymphocytes, mast cells, and finally fibrosis infiltrate the conjunctiva, lacrimal glands, intraconal fat, and classically, the extraocular muscles
Restrictive Myopathy

• Strabismus
  – Hypotropia or esotropia, involvement of inferior and medial rectus muscles
Thyroid Optic Neuropathy

Compressive
• Grade 0: No signs or symptoms.
• Grade 1: Only signs (lid retraction).
• Grade 2: Soft tissue involvement (chemosis, etc).
• Grade 3: Proptosis (minimum <23, moderate, marked >28).
• Grade 4: Extraocular muscle involvement.
• Grade 5: Corneal involvement.
• Grade 6: Sight loss.
• Patients often complain of tearing, irritation, photophobia, bulging eyes, diplopia most pronounced in the morning, and retro-orbital ache.
PRE-SURGERY                          POST-DECOMPRESSON

and STRAB SURGERY
Lacrimal Gland

Lacrimal Gland
Drainage system
Mass
Non-functioning
Benign Mixed Tumor

Long standing, painless, left globe displacement {patient had slow changing appearance for over a year}

Arch. Ophthalmol., 2004
Adenoid Cystic Carcinoma
The differential diagnosis of OID includes infection, inflammation, and tumor. (a) Orbital cellulitis in patient who presented with acute onset orbital inflammation post-foreign body. (b) Idiopathic OID in patient who presented with acute onset of orbital inflammation. (c) Thyroid orbitopathy in patient who presented with a several months history of increasing proptosis. (d) Tumor in region of the lacrimal gland, note S-shaped ptosis.

Orbital inflammatory disease: a diagnostic and therapeutic challenge, L K Gordon, Eye
VITAMIN C and D

- Vascular: varix, hemangioma
- Infectious: orbital cellulitis
- Traumatic
- Acquired: thyroid eye disease
- Metabolic: thyroid eye disease
- Idiopathic: idiopathic orbital inflammatory disease
- Neoplastic
- Congenital
- Drugs
Lacrimal Gland drainage system

- Obstruction
  - Congenital
  - Dacryocystitis
  - Epiphora
- Excess tearing
Lacrimal Gland Dysfunction

Just for fun – NOT a symptom of dry eye