Orbital Cellulitis

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The Orbit

- Bony cavity containing the eye and its adnexa.*

*Stedman’s Medical Dictionary
Anatomy

• Bones
Anatomy

• Bones:
• Frontal
Anatomy

- Bones:
- Maxilla
Anatomy

- Bones:
- Zygomatic
Anatomy

- Bones:
- Ethmoid
Anatomy

- Bones:
- Sphenoid
Anatomy

- Bones:
- Lacrymal
Anatomy

- Bones:
- Palantine
Anatomy

- Foramen
  - Superior Orbital Fissure
  - Optic Foramen
  - Inferior Orbital Fissure
Anatomy

sup. orb. fiss.
zygomatic
inf. orb. fiss.
palatine
maxilla
frontal
sphenoid
ethmoid
lacrymal
optic foramen
Anatomy

• Periorbita

Each bone comprising the orbit has its own periosteum. Together, these form a contiguous lining of the orbit called the periorbita. The periorbita is loosely adherent the bones of the orbit, except at the sutures, and can be easily dissected away by blood or pus.
Anatomy

- Extraconal Muscles
Anatomy

- Intraconal Muscles
Anatomy

• Nerves
Anatomy

- Branches of CN V
Anatomy

• Arteries
Anatomy

- Eyeball and appendages
Anatomy

- Chock-a-block with fat.
Anatomy

- **Septum**
  The orbital septum is a reflection of the periorbita that inserts into the tarsal plates.
Anatomy

• Venous Supply
The orbit and sinuses are supplied by a network of valve less veins that drain into the cavernous sinus.

Anatomy

- **Sinuses**

  The orbit is separated from the ethmoid sinus by a thin piece of bone called the lamina papyracea. This bone is only 0.5mm thick at its thinnest point.

Infections of The Orbit

Chandler’s Classification of bacterial infections:

Type 1: Preseptal cellulitis
Type 2: Inflammatory edema
Type 3: Subperiosteal abscess
Type 4: Orbital abscess
Type 5: Cavernous sinus thrombosis

Types 2-5 can progress very rapidly and can lead to blindness, cerebritis, meningitis and death. Before the antibiotic era orbital cellulitis carried a 20% mortality rate

Infections of The Orbit

- **Preseptal cellulitis:** Infection is limited to the skin and subcutaneous tissues anterior to the orbital septum. Characterized by erythema and swelling, *without* proptosis, chemosis, or dysfunction in ocular movement.

Infections of The Orbit

- **Inflammatory edema:** The first manifestation of orbital involvement is edema of fatty retinaculum and adjacent tissues. Characterized by proptosis, pain and diminished extraocular movement.

Infections of The Orbit

- Subperiosteal abscess: Collection of pus between the periorbita and bony wall of the orbit. Characterized by proptosis, usually inferotemporal, and painful, restricted extraocular movement.

Infections of The Orbit

• **Orbital Abscess:**
  True intraconal abscesses are rare since the advent of antibiotics. Characterized by marked proptosis, chemosis, and visual acuity disturbances.

Infections of The Orbit

- **Cavernous Sinus Thrombosis:**
  Originates from a septic thrombophlebitis in the ophthalmic veins. Characterized by ophthalmoplegia, VA changes, hyperesthesia, and ptosis.

Imaging Modalities

- Imaging is only necessary when there is suspicion of postseptal involvement, deteriorating condition, or treatment failure.
- CT: Method of choice. Best visualization of bony structures. Good tissue differentiation because of high fat content. Can be used with stereotactic headset for surgical planning.
- MRI: Good for further characterizing soft tissue masses, and evaluating CN II. Not reliable for stereotactic imaging.
- US: Can be used to follow size of SPA. Requires a highly trained tech. Very difficult to interpret. Inadequate visualization of the orbital apex.

Patient NK

• HPI: Patient awoke on the day of admission with a swollen, painful right eyelid. Patient reported that his right eye was “itchy” for the past two days. He also reported that he had had right sided sinus pressure that began after he had his wisdom teeth extracted one month ago. He had no other significant past medical history.

• PE: Patient had a tender, swollen, erythematous right upper eyelid without discharge, chemosis, or injection. There was a mild amount of proptosis in the right eye. Duction in the right eye was limited superomedially. His visual acuity was 20/20 OU.
Patient NK

*Courtesy of Brian Bronzo
• **Patient**
  
  NK

• **DDX:**
  
  • Allergic reaction
  • Dysthyroid exophthalmos
  • Orbital tumor
  • Orbital pseudotumor
  • Chandler II-V
  • Ruptured Dermoid

*Courtesy of Brian Bronzo*
• Patient NK
• Orbital CT
• Patient
  NK
• Orbital CT with contrast

Findings:
Ovoid, 1.5 cm, soft tissue density mass, with a ragged slightly attenuating border.
Pansinusitis
Rightwardly deviated nasal septum

*BIDMC
• Patient
NK
• Orbital CT with contrast

Findings:
Isoattenuating, homogeneous mass with hyper-attenuating border.
Frontal sinusitis.
• Patient NK
• MRI • T1 Pre Contrast

Findings:
Right sided intraorbital mass of intermediate signal intensity with a central area of hypointensity.
• **Patient**
  
  NK

• **MRI**

• **FLAIR**

**Findings:**

Suppression of fluid signal renders identification of the presumably fluid filled mass difficult.
Findings:
The right sided orbital contents are hyperintense relative to the left sided contents, likely representing edema secondary to inflammation.
• Patient
NK
• MRI
• T1 Post Contrast

Findings:
Right sided orbital contents are highly enhancing.
- Patient NK
- MRI
- Susceptibility

Findings:
Area of susceptibility represented by mottled hypointensity in the right orbit. This most likely represents blood that is in stasis.
- **Patient**
  - NK
- **MRI**
- **T1 Pre Contrast**

**Findings:**
Hyperintense homogenous mass in superomedial orbit.

*BIDMC*
• Patient
  NK
• MRI
• T1 Post Contrast

Findings:
Nonenhancing mass with an enhancing border. Right sinuses strongly enhancing.
• Patient NK
• MRI
• IR

Findings:
Center of the mass has a hyperintense signal, this likely represents fluid.
• Patient
• NK
• MRI
• IR

*BIDMC
• **Patient NK**

• **CT with contrast**

**Findings:**
Mass size stable compared to previous CT, with less intraorbital fat stranding.
• Patient NK
• CT with contrast
• VTI Headset

Finding:
VTI headset was used for possible endoscopic surgical evacuation of the lesion.

*BIDMC
• **Patient**

NK

• **CT with contrast**

**Finding:**
Mass is slightly smaller compared to previous CT.
- Patient NK
- CT with contrast
- Two week follow-up

Findings:
Mass nearly resolved. Sinuses on right side now filled with air.
- CT w/ con
- Initial

- CT w/ con
- Two days post initial

- CT w/ con
- Four days post initial

- CT w/ con
- Two weeks post initial

*BIDMC*
Patient NK

- DDx post imaging: Postseptal, extraconal phlegmon/abscess.
Patient PS

• HPI: Patient presented with a fever and a sore eye of two days duration.

• PE: Tender, swollen, erythematous left upper eyelid. VA 20/20 OU. EOMI. No proptosis.
Patient PS

• **DDX:**
  - Allergic reaction
  - Preseptal cellulitis
  - Chalazion
  - trauma

* www.revoptom.com/handbook/sect1c.htm
- **Patient PS**

- **CT with contrast**

  **Findings:**
  Soft tissue density swelling anterior to left eye. No intraorbital masses, fat stranding or sinus involvement.

Patient PS

- DDx post imaging: Preseptal cellulitis.
Patient SR

• **HPI:** Patient presented with fever and eye pain of 4 days duration.

• **PE:** Swollen, tender, erythematous, left eyelid. Moderate proptosis with impaired duction medially in the left eye.

• **DDX:**
  - Allergic reaction
  - Dysthytoid exophthalmos
  - Orbital tumor
  - Orbital pseudotumor
  - Chandler II-V
  - Ruptured Dermoid
Patient SR

• CT pre-contrast

Findings:
Poorly demarcated, soft tissue density mass in medial portion of left orbit.

*Courtesy of Steve Reddy, MD
Patient SR

- CT post contrast

Findings:
Lens shaped hypo-attenuating mass apposing the medial wall of the orbit with a sharp, hyperattenuating border.

*Courtesy of Steve Reddy, MD
Patient SR

- DDx post imaging: Subperiosteal abscess.
References

- Stedman’s Concise Medical Dictionary. Lippincott Williams & Wilkins 2001. Philadelphia PA
- www.revoptom.com/handbook/sect1c.htm
- www.vesalius.com
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