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SUNY EYE INSTITUTE
Collaborative Research Consortium
The State University of New York
RPB

Case Presentation

HPI: 40 y/o Hispanic male presents to the ED of Staten Island University Hospital North with left>right periorbital swelling. He works in a kitchen and reports falling on a counter two days prior, hitting his left eye. He did not endorse immediate pain/swelling but states that swelling has progressed over the past two days and the pain is mild. He endorses itchiness and mucopurulent discharge. He endorses recent URI. He denies sinus pain or pressure. He denies subjective fevers or chills.

Case Presentation

POH: none
PMH: DM, ?h/o cirrhosis
PSH: none
FH: no glaucoma/blindness
Social: EtOH abuse
Meds: none
Current gtt: none
All: NKDA

Case Presentation

Vitals: T 99.0, P 101, BP 123/74
NVAsc: 20/40 OD, 20/100 OS
Pupils: no obvious RAPD
EOM: full OD/OS
Tpen: 18/45
MSE: AAOx3
External: bilateral periorbital edema L>>R with tense lids and erythema on the left, small LUL abrasion, no obvious proptosis
PLE: conjunctival injection OS
DFE: wnl

Case Presentation

Labs:

CBC: **11.7 (83% PMN)** > 12.5/34.5 < **26**

BMP: **130**/**3.1**/**94**/24/12/0.68<136, Ca **8.0**

LFT: TP 7.4, Alb 3.0, Tbili **4.5**, ALT 35, AST **103**, AP 65

Coags: PT **22.5**, INR **2.1**, PTT 37.8

CT orbits: left preseptal edema and inflammation, no post-septal inflammation, no sinusitis, no orbital fractures or hemorrhage, ON wnl, no EOM enlargement

Case Presentation

Working Diagnosis: preseptal cellulitis with in the setting of possible chronic liver disease

Plan: Patient was admitted to the Medical service in the evening for IV antibiotics and supportive therapy. Began receiving IV antibiotics later that night with vancomycin and zosyn.

Case Presentation

Hospital Day 1 Morning:

- 102.1 and 102.5 fevers previous evening (before abx 1st doses)
- appears more lethargic, AAOx2
- BP dropped to 94/52 started on IV fluids
- persistent lid edema/erythema appears with expansion of LUL excoriated area
- induration tracking down left maxilla is noted
- STAT repeat CT scan ordered

Hospital Day 1 Afternoon:

- BP dropped 79/40 with declining MS
- Coded, intubated and transferred to the MICU

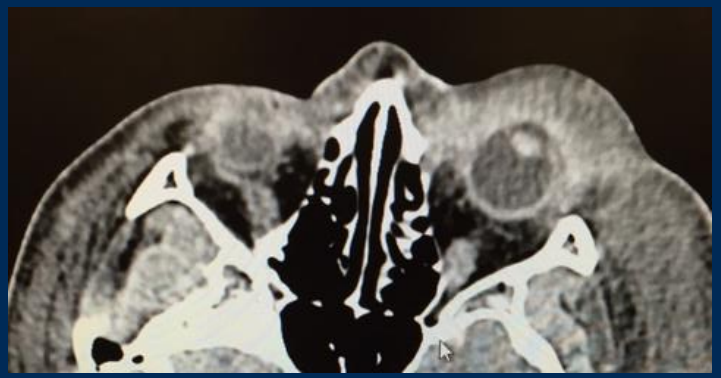
Case Presentation

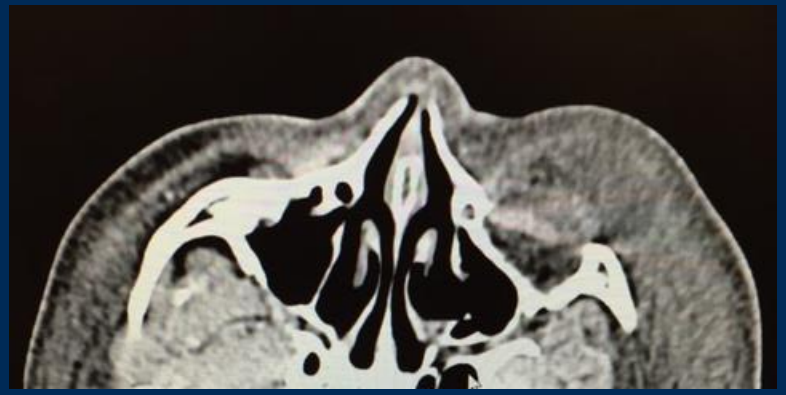
Hospital Day 1 Late Afternoon:

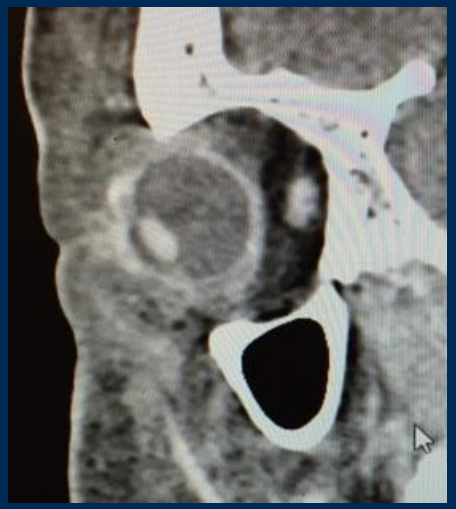
- persistent lid and cheek edema and erythema
- now with complete sloughing of LUL skin and color change noted
- high clinical suspicion for necrotizing soft tissue infection involving the left periorbit
- no post-septal involvement on CT scan

Case Presentation

CT SCANS







Case Presentation

Hospital Day 1 Evening:

- Patient taken to the OR for immediate surgical debridement with General Plastic Surgery and Ophthalmology

Culture: S. pyogenes

Path: inflammation with soft tissue necrosis

Infectious Orbit

- Bacterial Cellulitis
  - Preseptal
  - Orbital
- Necrotizing Fasciitis
- Orbital tuberculosis
- Mucormycosis
- Aspergillosis
- Parasitic
  - Trichinosis
  - Echinococcosis

Bacterial Cellulitis

Bacterial spread from three primary sources:

- direct spread from adjacent sinusitis or dacryocystitis
- direct inoculation following trauma or skin infection
- bacteremic spread from distant focus

Preseptal Cellulitis

Children:

- sinusitis
- H. influenza with bacteremia and meningitis (rare now with routine childhood Hib vaccination)

Adults:

- penetrating cutaneous trauma
- dacryocystitis

Presentation:

- eyelid edema, erythema, and inflammation without globe/orbit involvement
- abscess may present (MRSA)

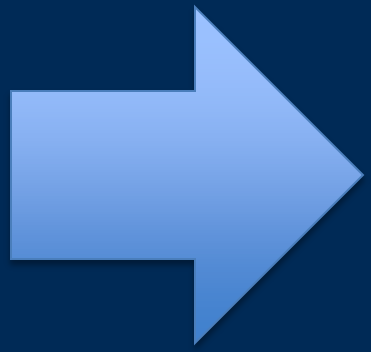
Preseptal Cellulitis

- CT imaging to evaluate sinuses and orbit
- Appropriate antibiotic coverage
    - *S. aureus* (including CA-MRSA & HA-MRSA)
- Admit for IV antibiotics in some cases
- Abscess drainage as necessary

Orbital Cellulitis

- Secondary extension of sinusitis (90%)
- Adults (multiorganism); Children (GPC)
- Fever, Leukocytosis (75%)
- Proptosis, chemosis, ptosis, EOM restriction/pain

Decreased VA
Decreased color vision
Constricted visual fields
Pupillary abnormalities

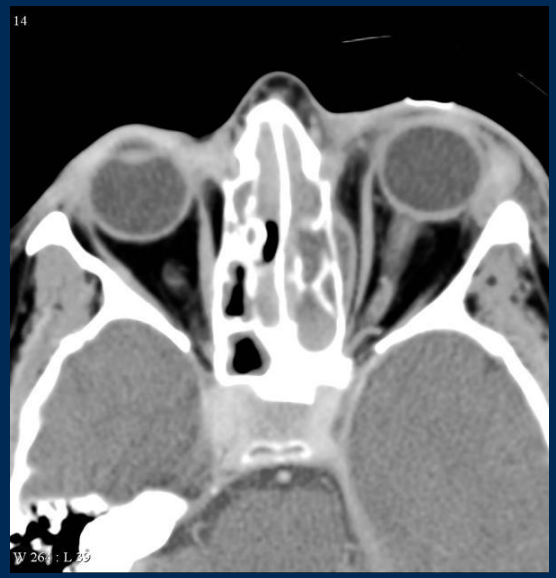


Compressive optic neuropathy!

- CT imaging
- ENT consultation
- Admission for broad IV antibiotic coverage

Orbital Cellulitis

Complications:
-Blindness
-cavernous sinus thrombosis
-cranial neuropathy
-brain abscess
-Death



Subperiosteal abscess

Subperiosteal Abscess

Surgical Management Criteria: Garcia and Harris (2000)

- older than 9
- presence of frontal sinusitis
- nonmedial location
- large SPA
- suspicion of anaerobic infection
- recurrence of SPA after prior drainage
- evidence of chronic sinusitis (e.g. nasal polyps)
- acute optic nerve or retinal compromise
- infection of dental origin (high risk anaerobic)

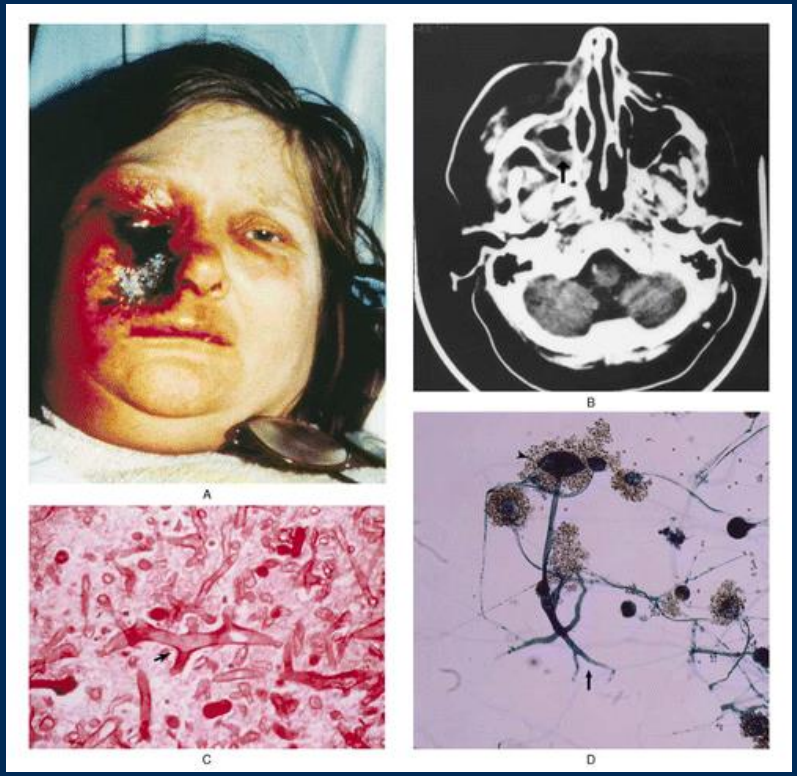
Mucormycosis

- *Mucor* or *rhizopus*
- Severe fungal infection of sinus/nasal cavity that may directly extend to the orbit
- Systemic disease with metabolic acidosis, diabetes, malignancy
- Immunocompromised status, including steroids or antimetabolites

Mucormycosis

• Vascular wall invasion → thrombosing vasculitis → tissue necrosis and spread

- Orbital apex syndrome
- Proptosis
- Ptosis
- Decreased corneal sensation
- Decreased vision



Nonseptate large branching hyphae on H&E

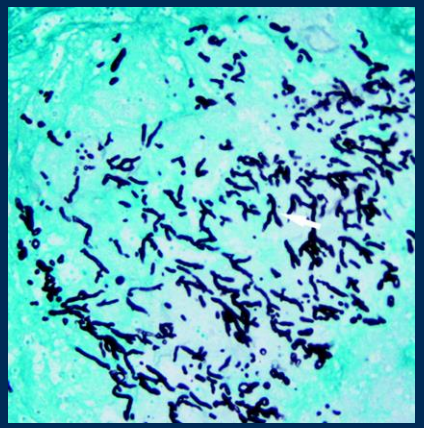
Mucormycosis

- Systemic control of underlying medical/immunologic abnormality
- IV amphotericin B or liposomal amphotericin B
- Aggressive surgical debridement possibly including exenteration

Aspergillosis

Acute invasive:

- fulminant sinus infection with secondary orbital invasion
- severe infection in immunosuppressed patients
- aggressive management with surgical excision and administration of amphotericin B, flucytosine, rifampin, or a combination



Septate branching hyphae of uniform width on Grocott-Gomori methenamine-silver-nitrate

Aspergillosis

Chronic invasive

- may include intraorbital and intracranial extension

Chronic noninvasive sinusitis

- immunocompetent patients without atopic disease necessarily
- sinus disease with tightly packed fungus ball

Allergic aspergillosis sinusitis

- immunocompetent patients with nasal polyps and chronic sinusitis
- eosinophilia, elevated total IgE, positive fungal IgE/IgG
- positive skin test for fungal antigens
- endoscopic debridement

Periorbital necrotizing fasciitis

Overview

- Severe necrotizing soft tissue infection
- Track along superficial fascia and subcutaneous fat (muscle fibers/fascia spared due to blood supply)
- Gangrenous infections associated with high M/M

Epidemiology

- Invasive GAS infections 3.5/100,000 from 2000-2004 in the US (includes sepsis, pneumonia, NF, strep. TSS)
- 8,950-11,500 cases/year → 1,050-1,800 deaths
- Periorbital NF incidence 0.24/100,000 in UK

Periorbital necrotizing fasciitis

Microbiology

- Type 1 = polymicrobial involving at least 1 anaerobe
- Type 2 = GAS, toxic shock syndrome present ~50%
- Amrith et al (2013): review of 94 cases of periorbital NF
  - 51.1% GAS

Risk Factors

- immunocompromised with systemic disease, diabetes, alcohol abuse, malignancy, chemotherapy
- immunocompetent patients (Type 2 infections)
- Tambe et al (2012): 11 patient cohort on periorbital NF
  - 6/11 immunocompetent/healthy
- Wladis et al (2015): 17 patient series on periorbital NF
  - 52.9% immunocompetent/healthy

Periorbital necrotizing fasciitis

Pathogenesis

- For necrotizing fasciitis in general, source is identified 70% (mostly penetrating trauma)
- Wladis et al (2015): 52.9% without source
- Tambe et al (2012): 4/11 without source
- Vasculitis/microthrombi → tissue necrosis/spread

Periorbital necrotizing fasciitis

Presentation

- Early: erythema, edema, warmth, pain out of proportion
- Progressing: skin breakdown, bullae with violacious fluid, cutaneous gangrene
- Later: anesthesia
- Crepitus suggests subcutaneous gas

Periorbital necrotizing fasciitis

Diagnosis

- High suspicion with clinical signs:
  - pain out of proportion
  - induration beyond borders of skin involvement
  - failed initial antibiotic response
  - declining/altered mental status
  - exam changes with skin involvement (bullae, necrosis, ecchymosis)
  - crepitus
- Radiographic signs:
  - Gas (16.9%) and is a late finding
- Labs

Periorbital necrotizing fasciitis

LRINEC Score: Wong et al (2004)

- Laboratory Risk Indicator for Necrotizing Fasciitis Score
- >6 associated with 92% PPV and 96% NPV

Table. Laboratory Risk Indicator for Necrotizing Fasciitis Score

Variable	Value	Points
C-Reactive Protien (mg/L)	< 150	0
	≥ 150	4
WBC (cells/mm^3)	< 15	0
	15-25	1
	> 25	2
Hemoglobin (g/dL)	> 13.5	0
	11-13.5	1
	< 11	2
Serum sodium (mmol/L)	≥ 135	0
	< 135	2
Serum creatinine (mg/dL)	≤ 1.6	0
	> 1.6	2
Plasma glucose (mg/dL)	≤ 180	0
	> 180	2

Risk	Probability	Total Score
Low	< 50%	≤ 5
Moderate	50-75%	6-7
High	> 75%	≥ 8

Periorbital necrotizing fasciitis

Management:

- Admission with broad IV antibiotics, may require ICU
  - ***Note: clindamycin adds antitoxin properties***
- Prompt/aggressive surgical exploration
- Better mortality outcomes if within 24 hours of presentation
- Often requires return to OR within 24-36 hours
- Luksich et al (2002): conservative management if limited to eyelids without signs of toxic shock

Periorbital necrotizing fasciitis

Outcomes:

- Necrotizing fasciitis in general with up to 70% mortality
- Lower mortality in periorbital NF:
  - 1/11 in Tambe et al (2012), 1/17 in Wladis et al (2015)
  - 8/94 (8.95%) in Amrith et al (2013), associated with type 1 infections, toxic shock, facial involvement and blindness

- Wladis et al (2015):
  - VA 20/40 or better (68.75%)
  - Immunosuppression correlated with exenteration

- Amrith et al (2013):
  - Vision loss (13.8%)
  - Surgical debridement done (85.1%)

Back to Our Patient

- Suboptimal initial debridement about 36 hours after initial presentation; Ophthalmology recommends further debridement during the case
- Ophthalmology continues to recommend further debridement recommended as well as hospital transfer for Oculoplastics
- Unable to be transferred, as is medically unstable
- Continued on IV antibiotics in the ICU
- Died about 1 week following initial presentation

Reflective Practice

This case yielded a dramatic presentation of severe periocular infection with high morbidity/mortality and fostered a thorough review of the literature for management.

Thank You
Dr. Mostafavi
Dr. Edghill
Dr. Shinder
Patient

Core Competencies

Patient Care: The case involved thorough patient care and careful, timely and appropriate follow up.

Medical Knowledge: This presentation allowed me to review the presentation, work-up and management of necrotizing fasciitis.

Practice-Based Learning and Improvement: This presentation included a literature search of risk factors and current treatment modalities for necrotizing fasciitis

Interpersonal and Communication Skills: This case allowed me to interact and discuss with the patient the diagnosis of necrotizing fasciitis

Professionalism: The patient was provided with testing studies and appropriate follow-up

Systems-Based Practice: This case allowed the integration of diagnostic services available at SIUH with management of patients in our Eye clinic

Sources

- American Academy of Ophthalmology. Section 7: Orbits, Eyelids and Lacrimal System. Basic and Clinical Science Course. 2013-2014.
- Wladis EJ1, Levin F, Shinder R. Clinical Parameters and Outcomes in Periorbital Necrotizing Fasciitis. *Ophthal Plast Reconstr Surg*. 2015 Nov-Dec;31(6):467-9
- Amrith S1, Hosdurga Pai V, Ling WW. Periorbital necrotizing fasciitis a review. *Acta Ophthalmol.* 2013 Nov;91(7):596-603.
- Tambe K, Tripathi A, Burns J, Sampath R. Multidisciplinary management of periocular necrotising fasciitis: a series of 11 patients. *Eye (Lond)* 2012;26(3):463-467.
- Luksich JA, Holds JB, Hartstein ME. Conservative management of necrotizing fasciitis of the eyelids. *Ophthalmology* 2002;109(11):2118-2122.
- Wong CH, Khin LW, Heng KS, Tan KC, Low CO. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score: a tool for distinguishing necrotizing fasciitis from other soft tissue infections. *Crit Care Med*. 2004;32(7):1535-41.
- Garcia GH1, Harris GJ. Criteria for nonsurgical management of subperiosteal abscess of the orbit: analysis of outcomes 1988-1998. *Ophthalmology*. 2000 Aug;107(8):1454-6; discussion 1457-8.

Thank You!