BC Rural Rounds
Facial Trauma

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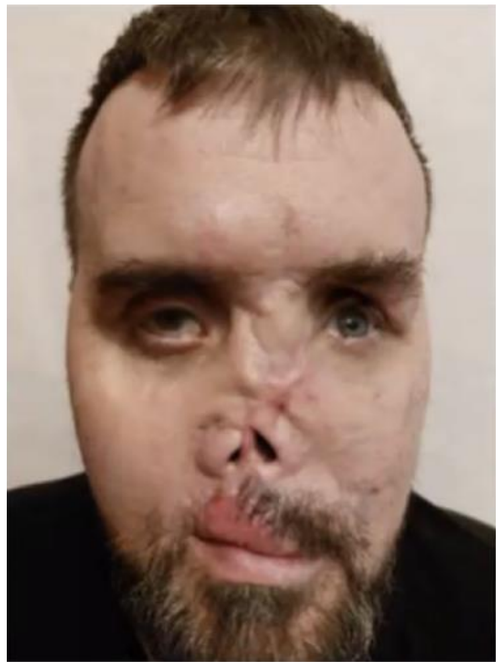
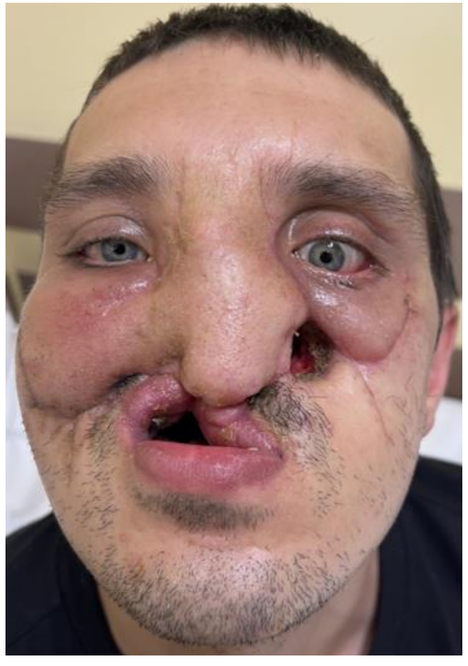
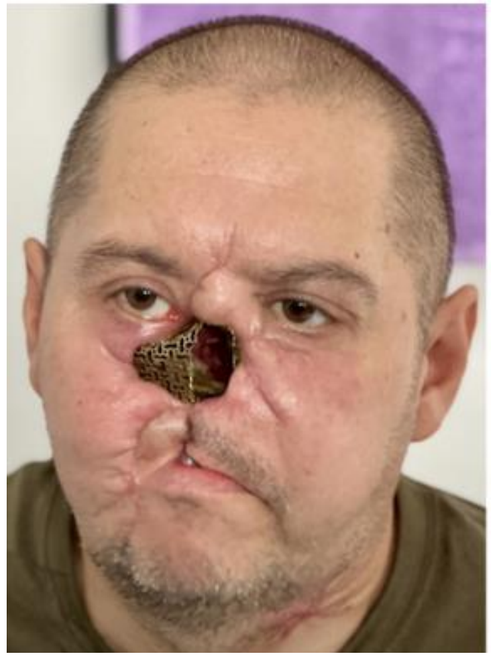
ADULT VASCULAR MALFORMATIONS · FACIAL TRAUMA · SKIN CANCER · MELANOMA · SEPTORHINOPLASTY · CLEFT LIP RHINOPLASTY · ORBIT RECONSTRUCTION






Presenter Disclosures

Dr. Tara Lynn Teshima

- Nothing to disclose.

Learning Objectives

1. Recognize and perform the initial assessment and stabilization of patients with facial trauma.

1. Identify common facial fractures and soft tissue injuries and initiate appropriate early management.

1. Determine when and how to appropriately refer patients with facial trauma to plastic surgery.

Clinical Scenario #1

- 40-year-old female
- Elbow to the nose playing flag football
- Doc my “nose looks crooked”
- ABC and secondary survey clear

Polling Question #1

A) Do nothing - because you live in a remote area and the nose is low priority.

B) Order and X-ray and do a closed reduction if fractured.

C) Order a CT scan and do a closed reduction if fractured.

D) Order imaging and refer to either ENT or plastics for treatment.

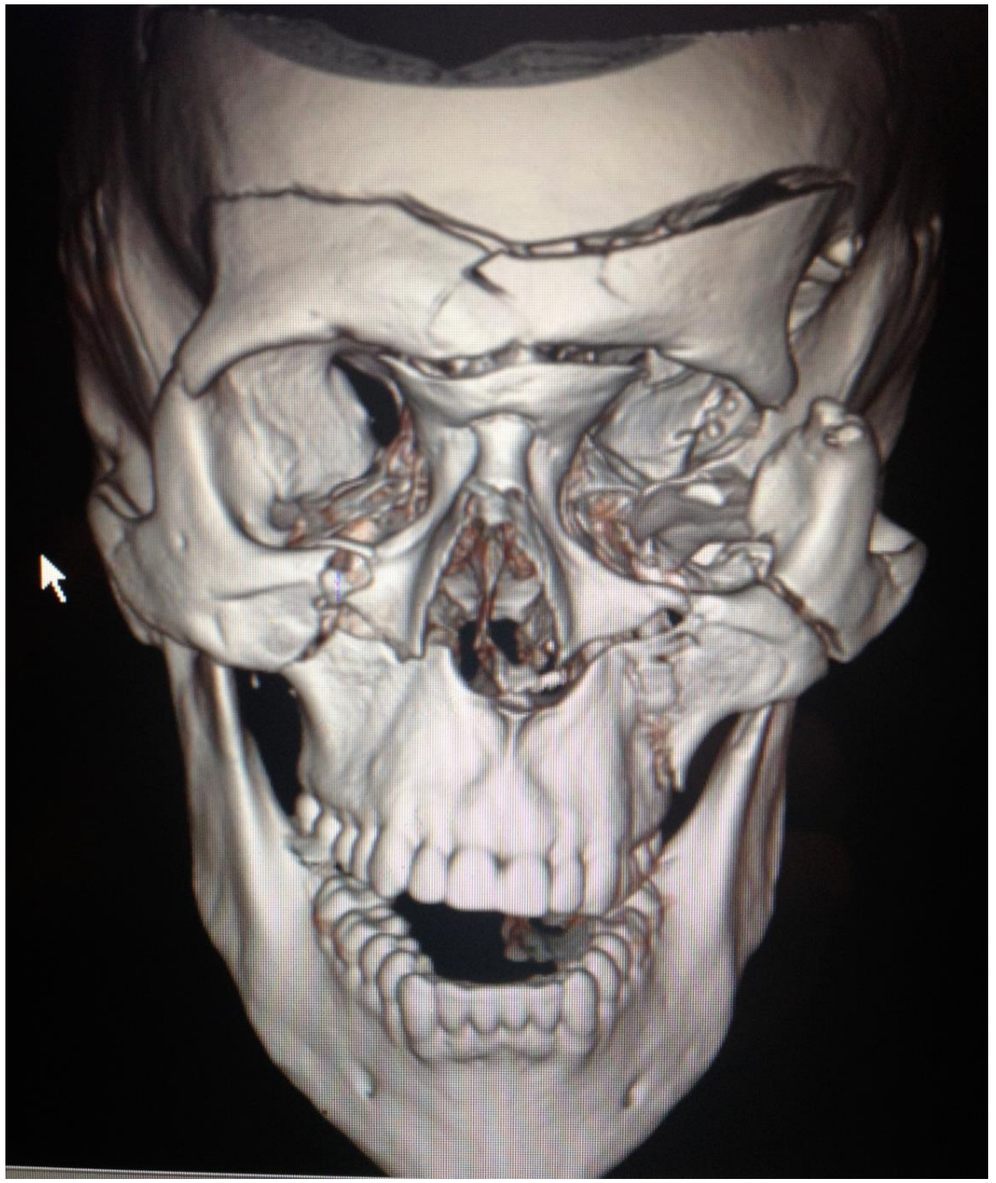
Clinical Problem

- Global incidence of 7.5 million new facial trauma cases in 2017
- Facial trauma primarily affects young adults resulting in 117,402 YLD’s (years lived with disability)
- Global Burden of Disease 2017 Study specifically highlighted the importance of providing adequate facial trauma repair

**Lalloo, R et al. Epidemiology of facial fractures: incidence, prevalence and years lived with disability estimates from the Global Burden of Disease 2017 study. Inj Prev 2020; 26:i27–i35*

Canadian Facial Trauma Facts

- 75% Male
- Mean age 35 years (18-39 years)
- 9% risk of brain injury or C-spine injury
- 20% patients consumed alcohol
- Violence > MVA > Falls

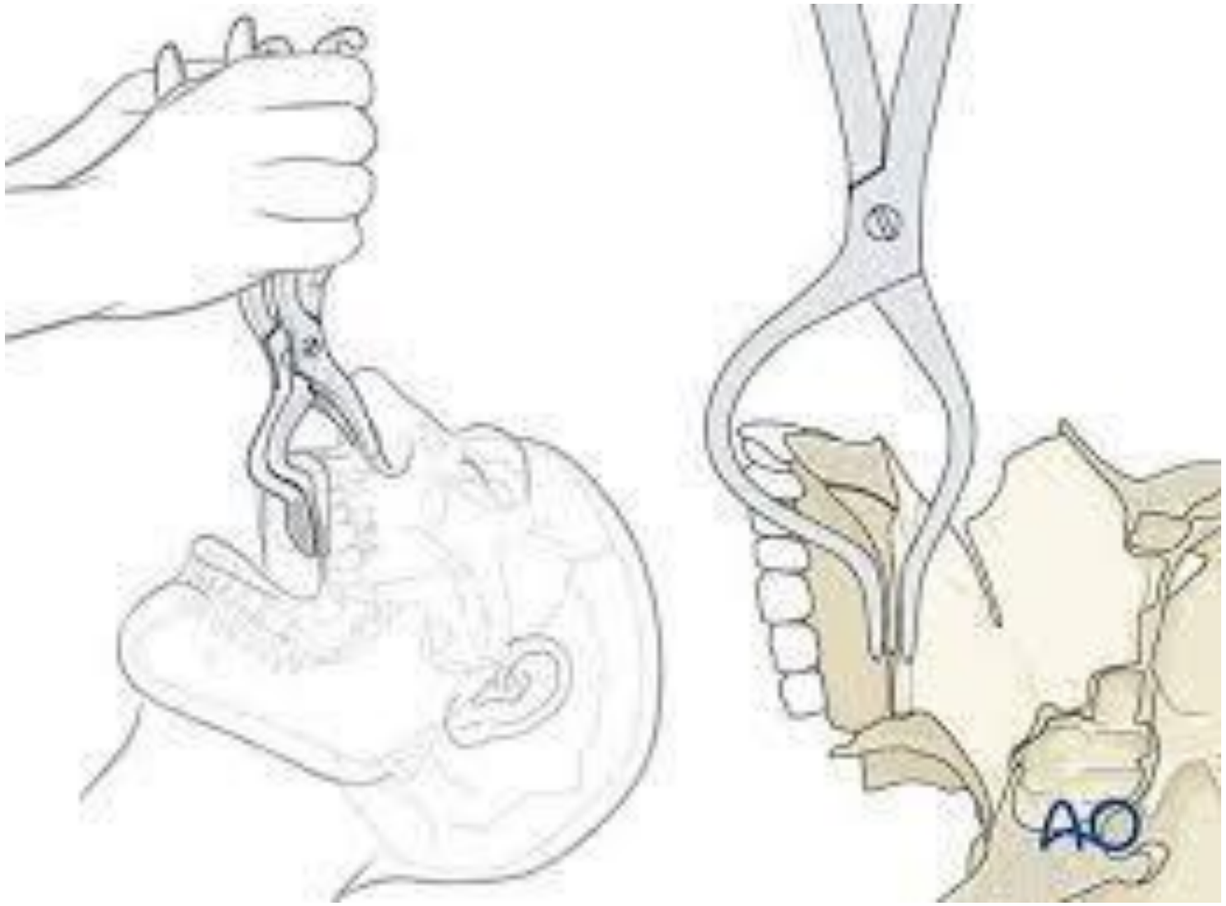


Ballistics in Canada

- In Canada violent crime is on the rise
- 14,000 incidences in 2022
- 12% increase in British Columbia
- Vancouver has had 24% increase in from 2021 to 2022

ABC and C-Spine

- Manipulation
- Mallet (hammer)
- Osteotomes
- Drills
- Saws
- Rowes disimpaction forceps



Mechanism of Injury

- High velocity vs low velocity
- Location of impact

- Will help guide you on how aggressive you need to be in your work-up.
- Urgency for patient to be assessed by specialist.

CRANIOFACIAL FRACTURE THRESHOLDS

APPROXIMATE FORCE (NEWTONS) REQUIRED TO CAUSE FRACTURE OF SPECIFIC REGIONS

VALUES REPRESENT MEANS OR RANGES REPORTED IN BIOMECHANICAL STUDIES*

1 FRONTAL SINUS (ANTERIOR TABLE)

1,000 – 2,500+ N

Thick cortical bone; requires high-energy impact. Fractures usually associated with significant mechanisms (e.g., MVC).

2 NASAL BONES

50 – 150 N

Thin bones with minimal structural support; fracture with low force.

3 ZYGOMATIC ARCH

150 – 400 N

Arched structure but relatively thin; fractures with moderate force, often with lateral blows.

4 ORBIT (ORBITAL RIM)

200 – 500 N

Rim is relatively thin; susceptible to fracture with modest force.

5 MAXILLA (LE FORT I REGION)

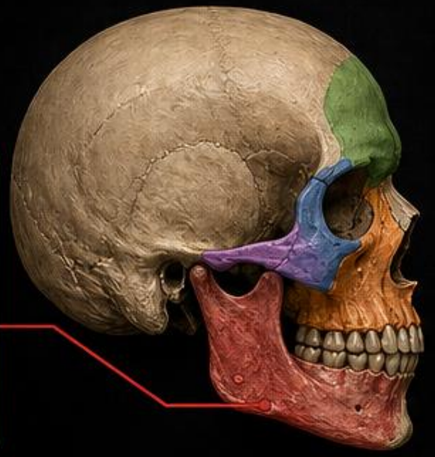
300 – 600 N

Buttressed bone; higher force required than nasal/zygomatic, but less than frontal or mandible.

6 MANDIBLE – ANGLE

600 – 1,200 N

One of the most common fracture sites of the mandible; weaker due to change in geometry, thinner cross-section, and presence of third molars.



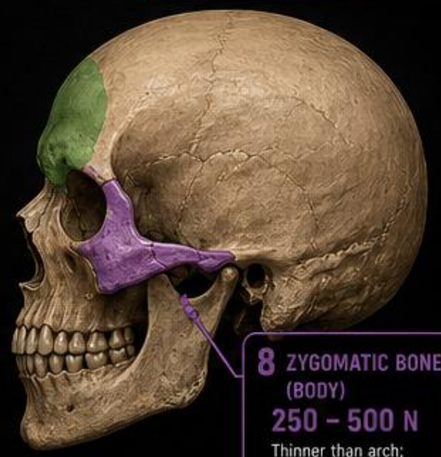
7 MANDIBLE – BODY (SYMPHYSIS)

400 – 800 N

Stronger than angle due to thicker cross-section and favorable biomechanics, but still less than frontal sinus.

ABOUT THESE VALUES

- Force (Newtons) required to cause fracture in cadaveric and biomechanical studies.
- Actual fracture risk depends on: impact velocity, direction, area of contact, bone quality, age, and individual variability.
- These are approximate ranges, not absolute thresholds.
- Higher numbers = more force/energy required to fracture.



8 ZYGOMATIC BONE (BODY)

250 – 500 N

Thinner than arch; fractures with moderate force, often from direct impact.

RELATIVE STRENGTH (HIGHEST TO LOWEST)

1. Frontal Sinus (Anterior Table)
2. Mandible – Angle
3. Mandible – Body (Symphysis)
4. Zygomatic Arch
5. Zygomatic Body
6. Orbit (Orbital Rim)
7. Maxilla (Le Fort I Region)
8. Nasal Bones

⚠ FOR EDUCATIONAL AND RESEARCH PURPOSES ONLY.
NOT INTENDED FOR USE IN VIOLENCE OR WEAPONS APPLICATION.

*Key Sources:

- Nahum, A. M., & Melvin, J. W. (1975). "Biomechanics of Maxillofacial Trauma." Journal of Oral Surgery.
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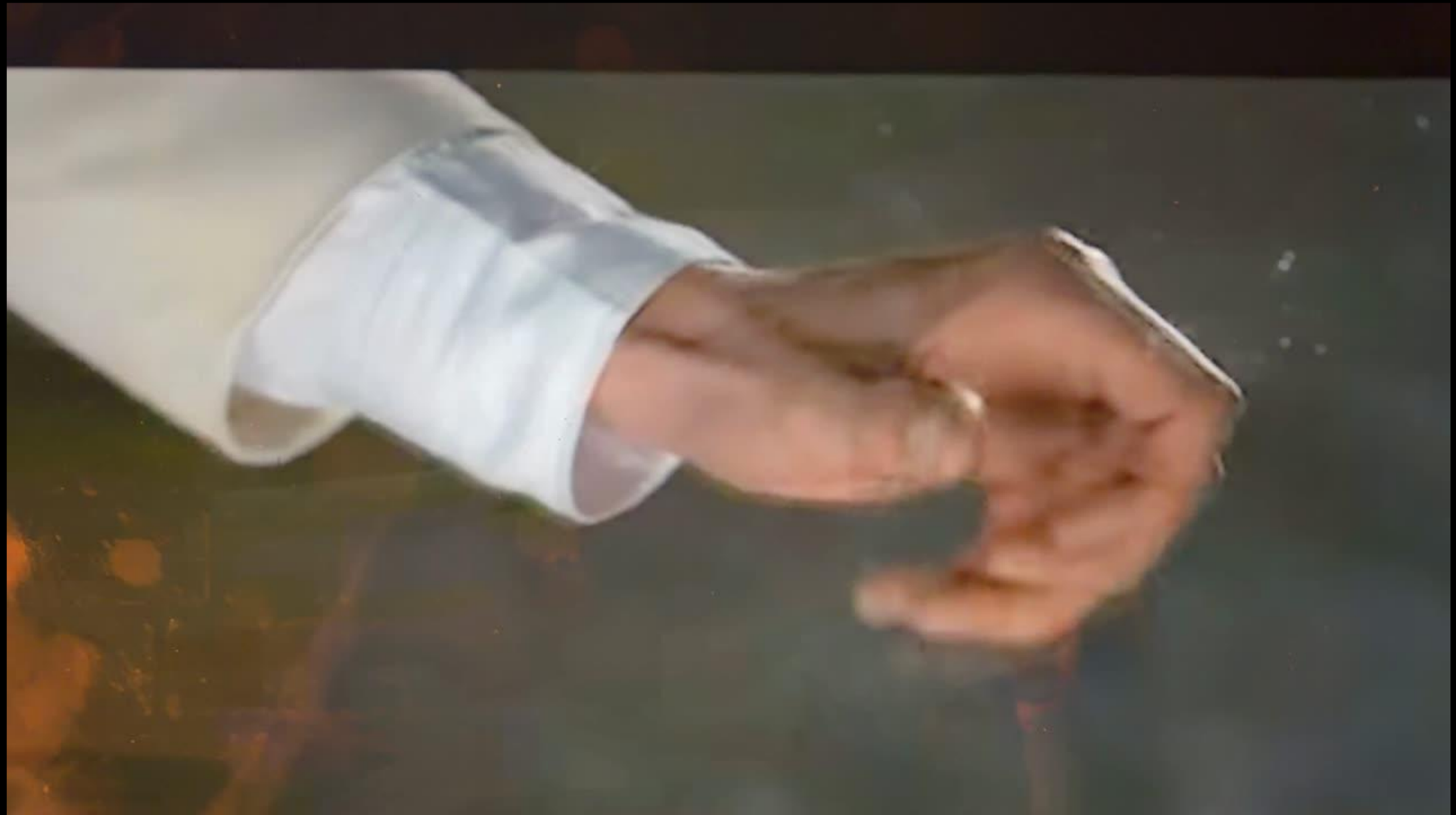
Low Velocity Injury



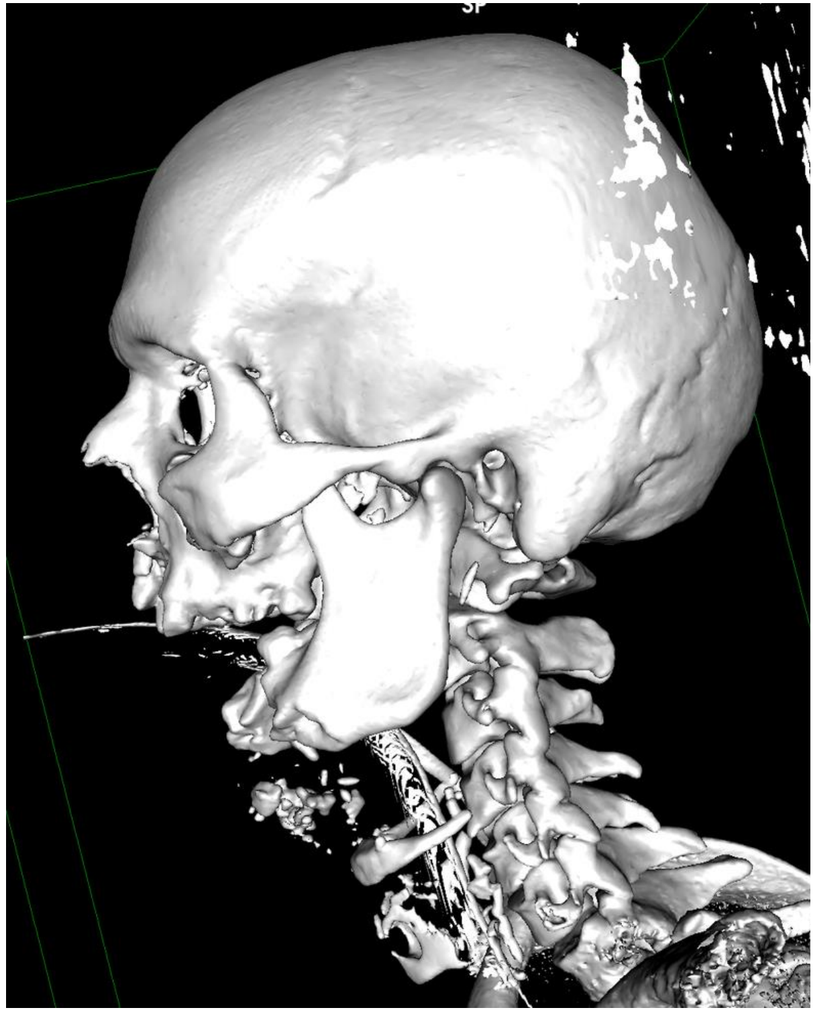
Credit | Ukrainian Forces video

High Velocity Injury

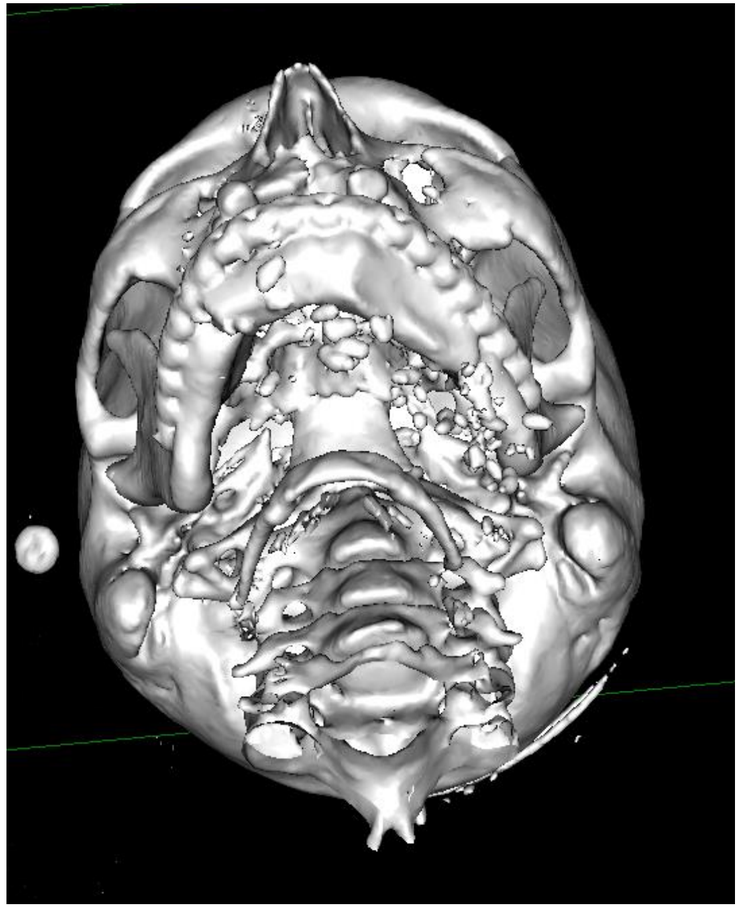
CBC NEWS

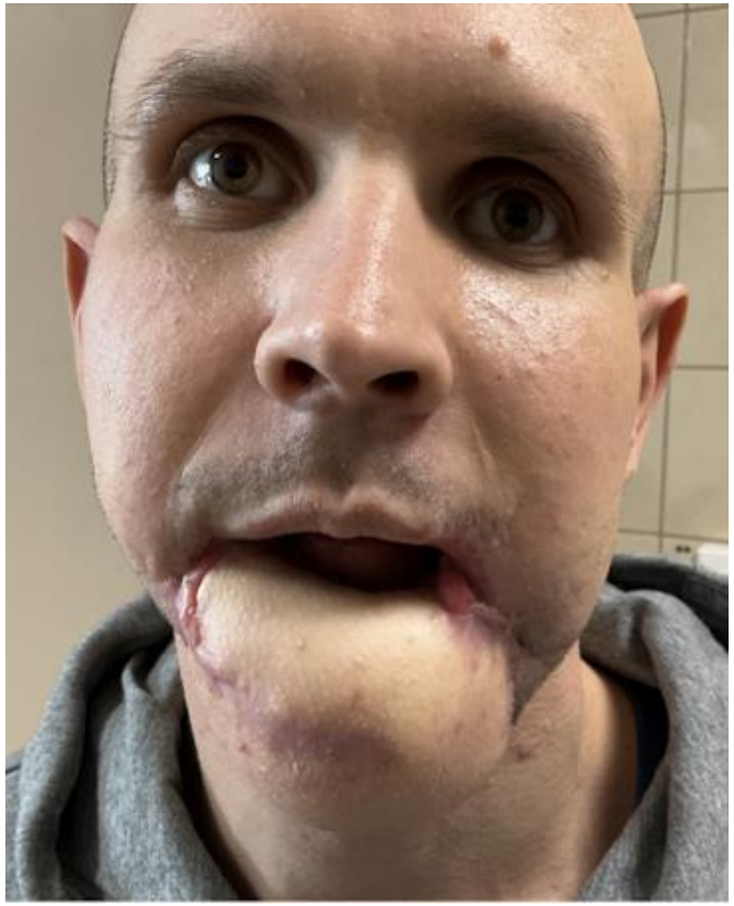
Canadian volunteers help Ukrainians heal from scars of war

Composite Defect of the Mandible



Scapular Composite Free Tissue Transfer





Translation - “We can not heal the body without healing the soul”

Facial Trauma Emergencies

- Expanding intracranial bleed
- C-spine injuries
- Retrobulbar hematoma
- Globe rupture
- Uncontrolled epistaxis
- Compromised airway

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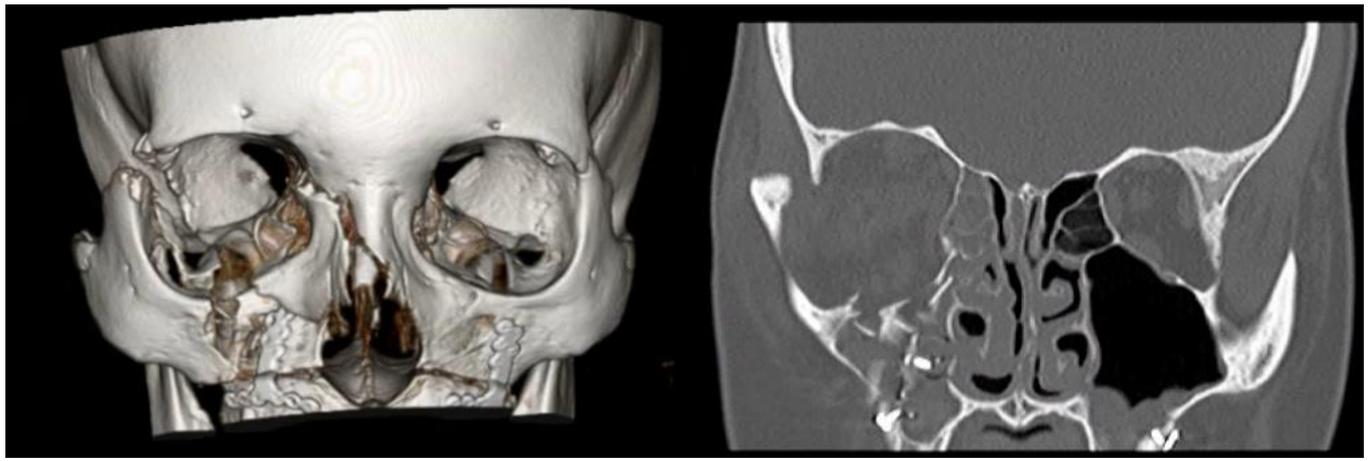
Patient Transfer Network

Reasons to Fix Facial Fractures

1. Support the globe



1. Breathing

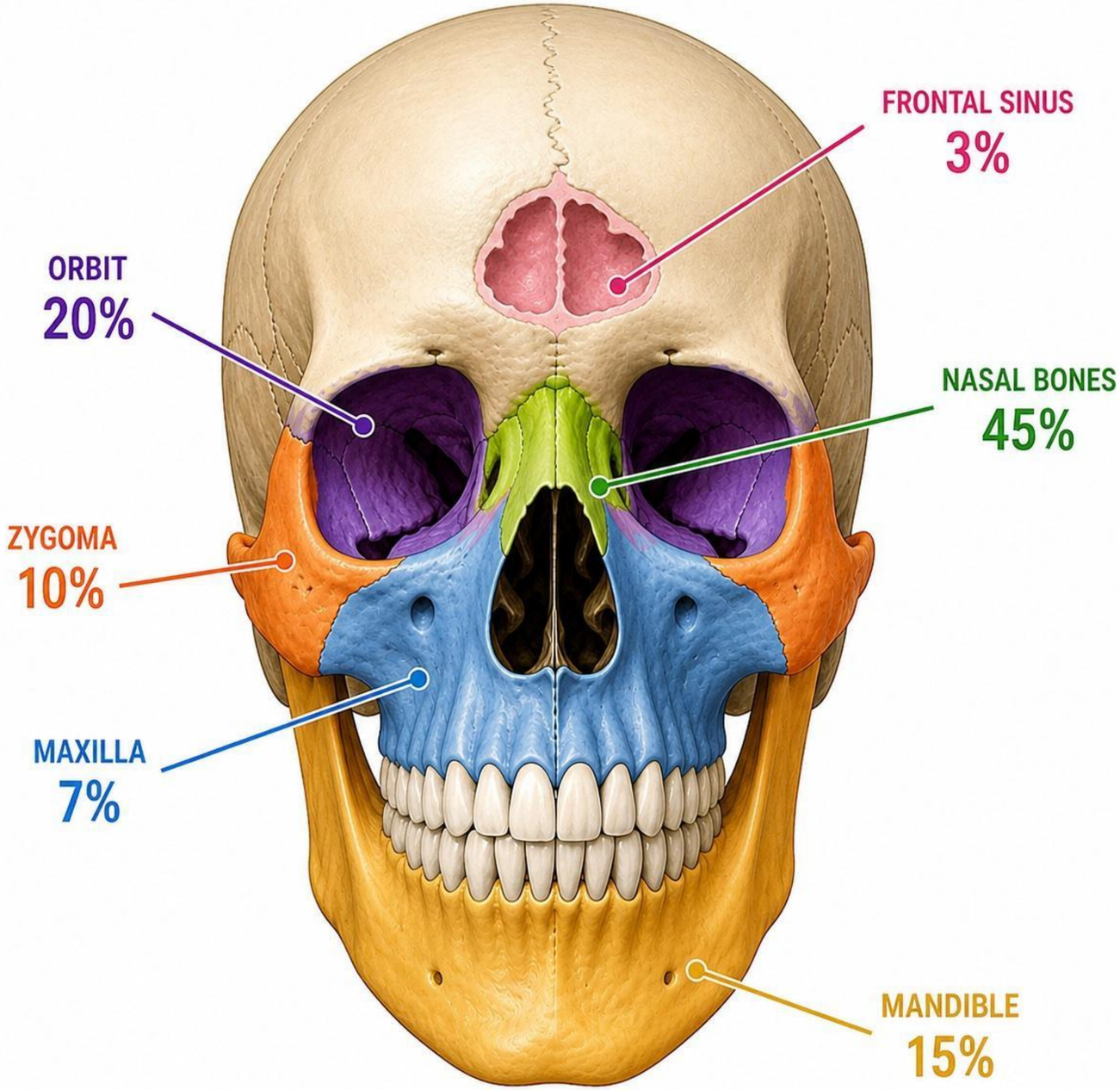
1. Occlusion

1. Cosmetics

Common Myths about Facial Trauma

- Facial fractures should be operated on as soon as possible….especially if there is numbness.
- Ophthalmology should always be consulted for orbital floor and zygoma fractures.
- Inferior rectus muscle entrapment only happens in kids.
- It is common for dog bites to have tissue loss.
- Antibiotics are mandatory for all facial fractures.

Incidence of Facial Fractures.



Polling Question #2

What is the number 1 cause of facial fractures in the world?

a.War related injuries

a.MVA

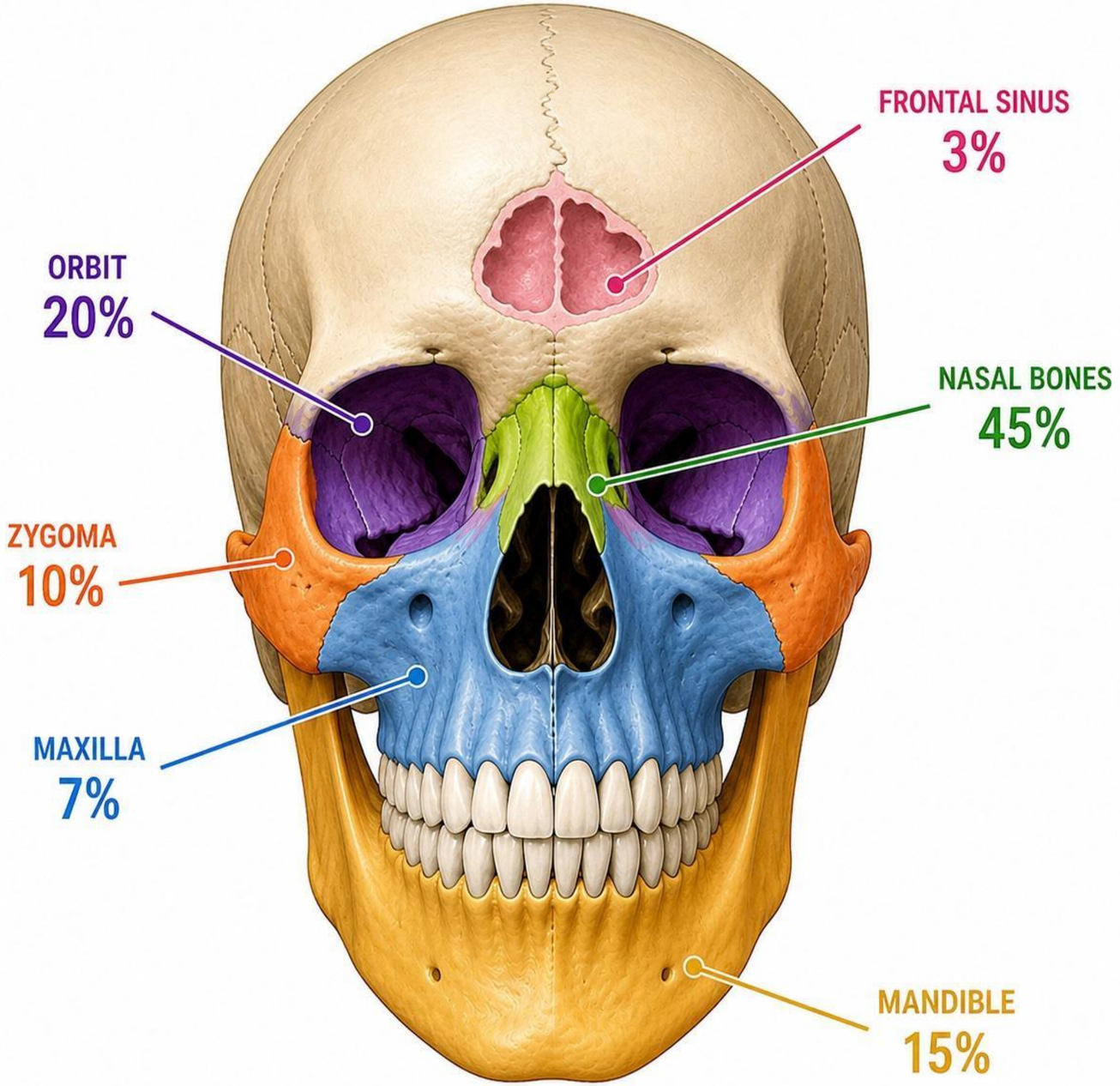
a.Assault

a.Falls

a.Sibling rivalry

Incidence of Facial Fractures.

- Falls
- Road Traffic Accidents
- Interpersonal violence
- Sports and recreation
- Workplace
- Animals

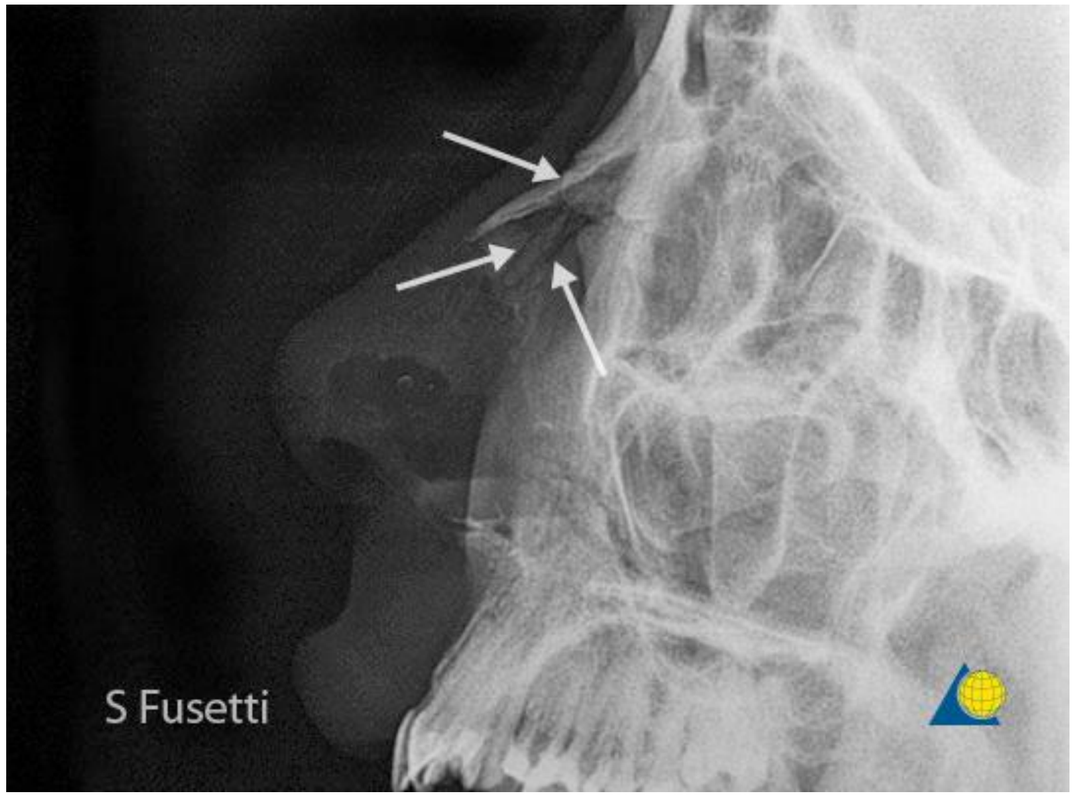


Nasal Bone Fractures

- Diagnosis made by history and physical exam
- Pre-existing nasal or septal deformities should be considered
- Epistaxis
- Intranasal exam → A septal hematoma requires immediate drainage

Nasal Bone Fractures - Imaging

- Plain films of the nose are only sometimes “helpful”

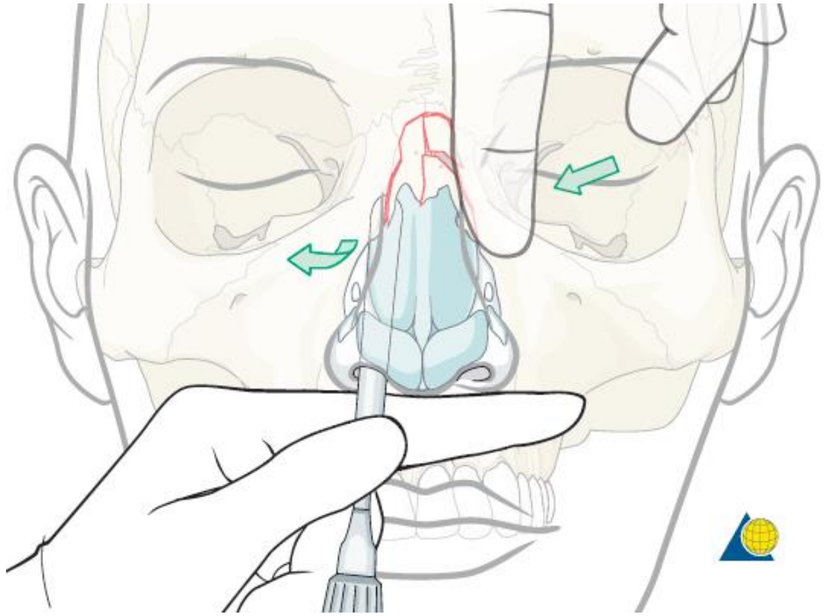


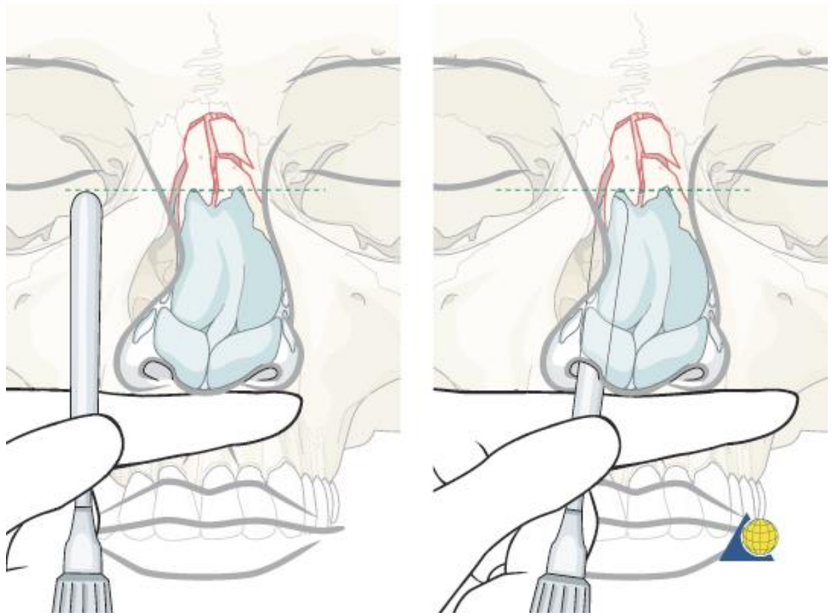
- Management is based primarily on clinical assessment

- CT facial bones should only be done if you think there are other

Closed Reduction Nasal Bone Fractures

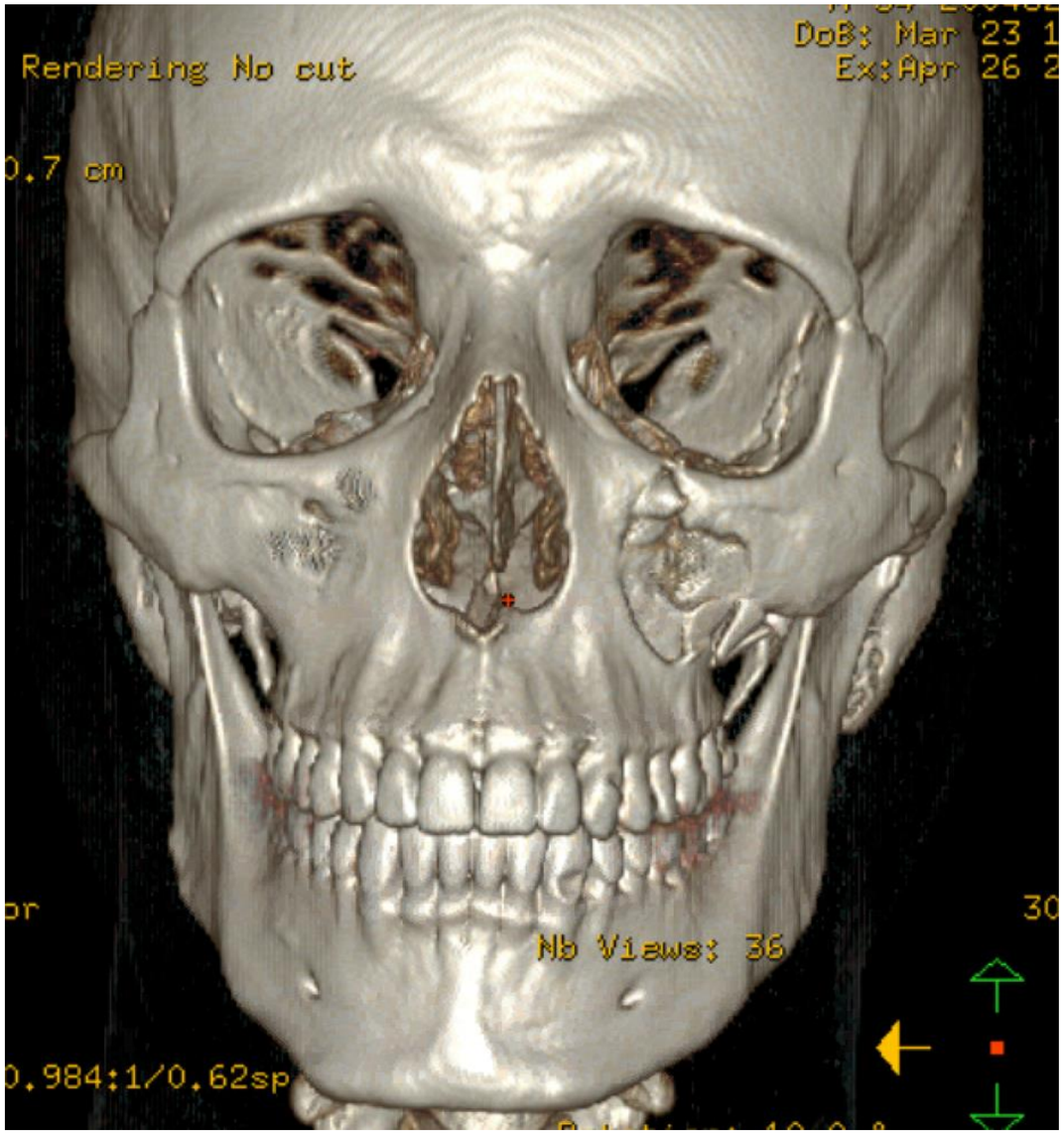
- Huge spectrum of management across subspecialties
- Closed reduction
  - Acute < 8-12 hours
  - Subacute 7-10 days
- Local vs Sedation vs General vs Nothing
- External vs Internal Nasal splinting is controversial





Clinical Scenario #3

- 18-year-old female
- Rugby tackle
- CT scan shows left zygoma fracture
- Her only complaint and physical finding is severe V2 numbness



Polling Question #3

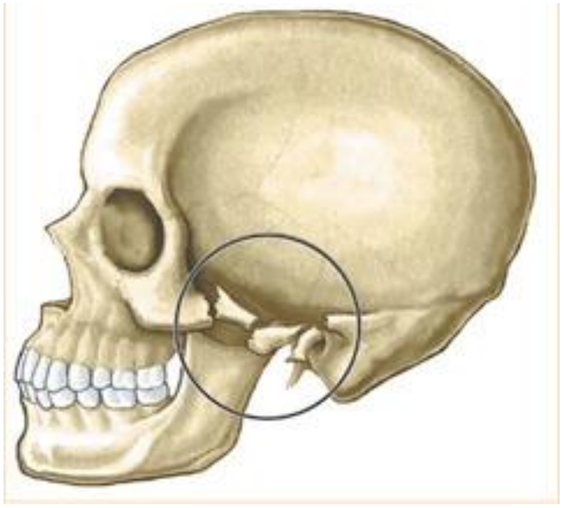
a.Refer the patient to plastic surgery.

a.Refer the patient to plastic surgery and inform her she is going to need surgery.

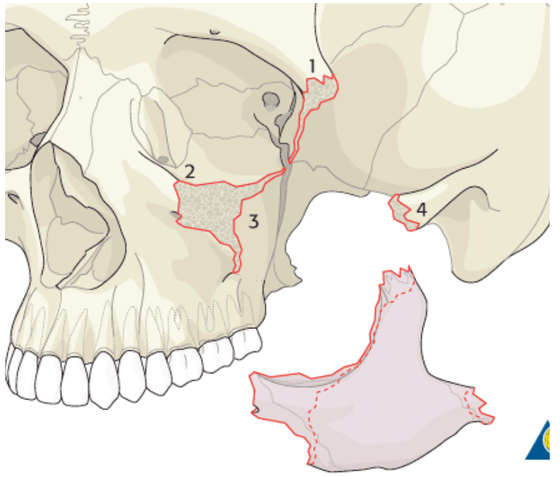
a. Refer her to plastic surgery and ophthalmology and inform her she is going to need surgery.

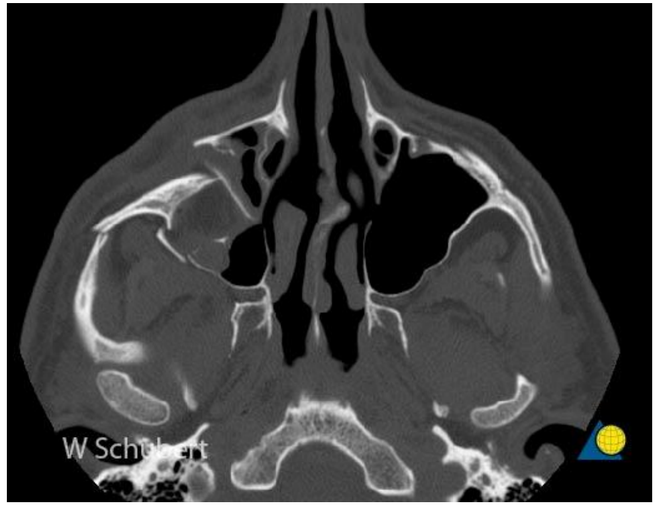
Zygoma Fractures

Arch Fracture



Zygoma Fracture





SPECTRUM OF ZYGOMA FRACTURES

From Minimal / Asymptomatic to Severe / Function-Threatening

LEAST SEVERE → **MOST SEVERE**

1. MINIMAL / ASYMPTOMATIC

Non-displaced hairline fracture

2. MINIMALLY DISPLACED

Minimal displacement without functional impact

3. MILD TO MODERATE DISPLACEMENT

Some displacement with mild functional or aesthetic effects

4. MODERATELY DISPLACED

Clear displacement with functional and cosmetic impact

5. SEVERELY DISPLACED / COMMINUTED

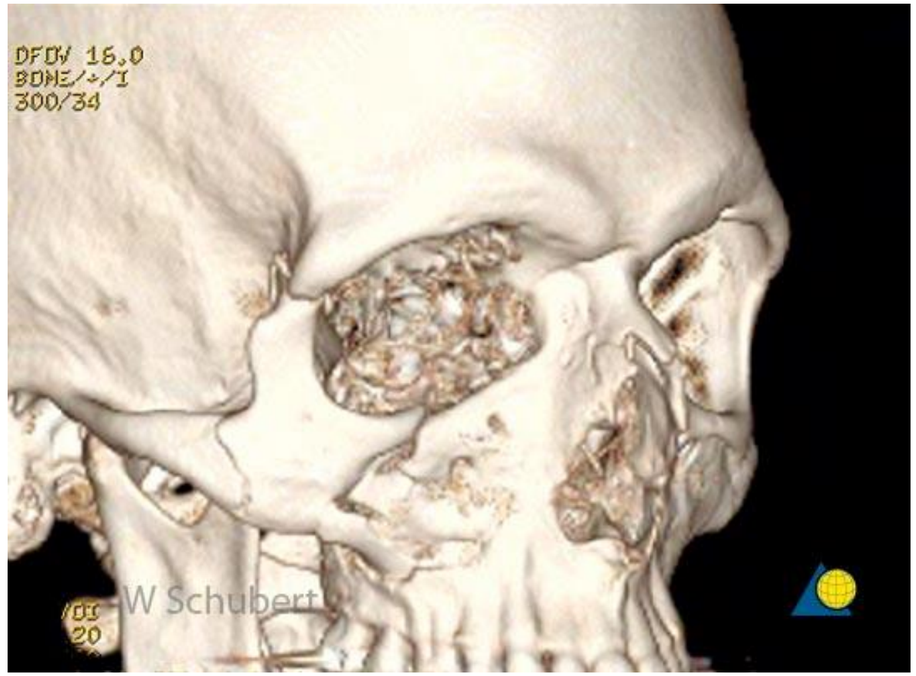
Marked displacement, comminution, or loss of buttresses

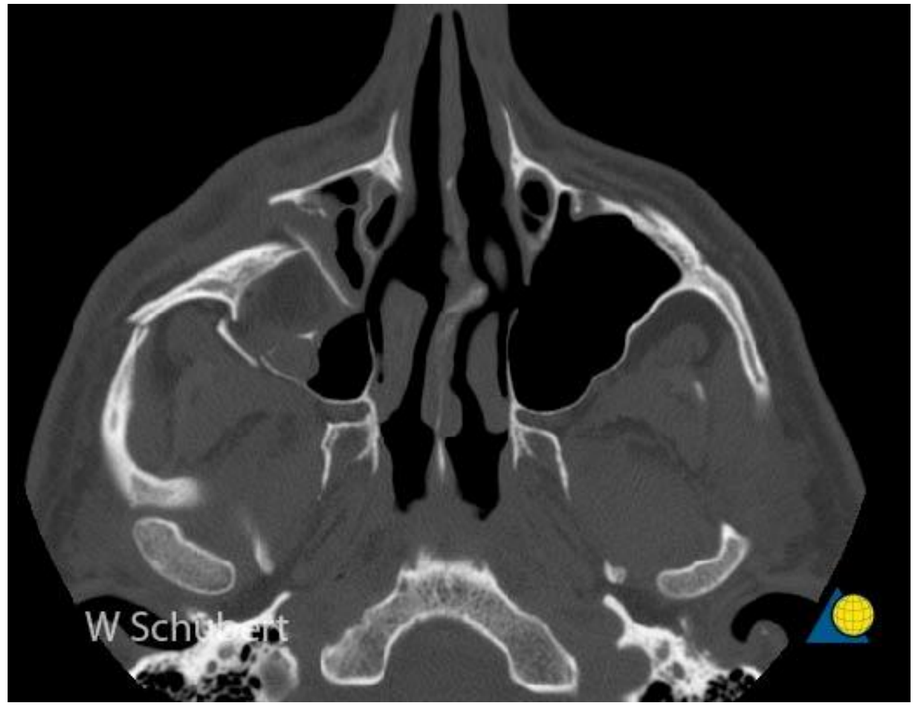
6. EXTREME / COMPLEX

Severe comminution with cranio-orbital involvement

Zygoma Fractures

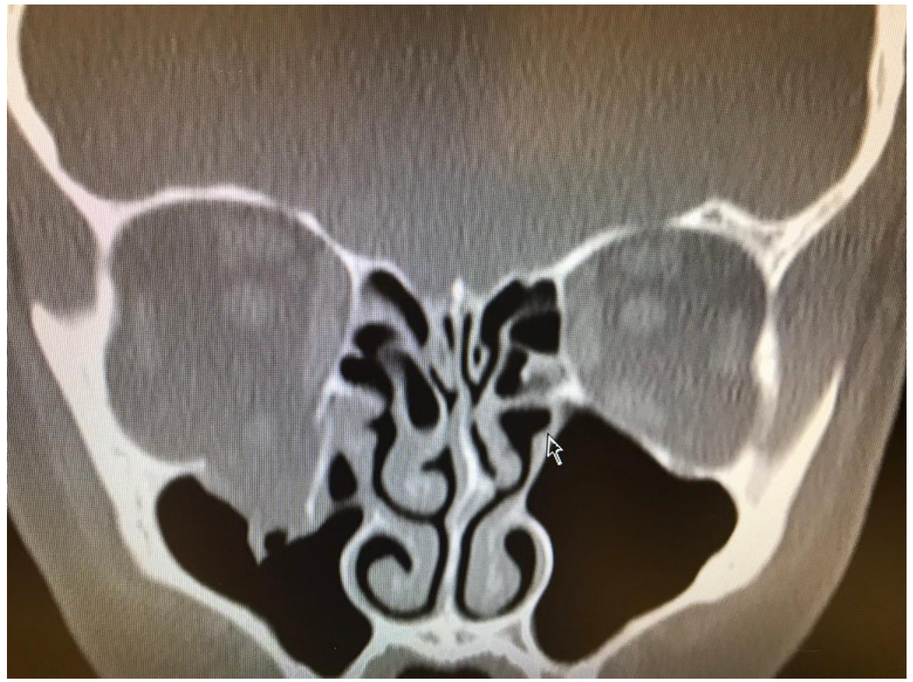
- CT facial bones 1mm cuts (CT head does not provide enough detail)
- 3D reconstructive views
- Rule out ocular findings or pathology.
- If patients are “asymptomatic” it is a cosmetic procedure.





Clinical Scenario #4

- 50-year-old female
- 1am
- Fell onto her face in the middle of night while going to the bathroom
- Only symptom is mild pain around her eye
- CT scan shows large right orbital floor fracture



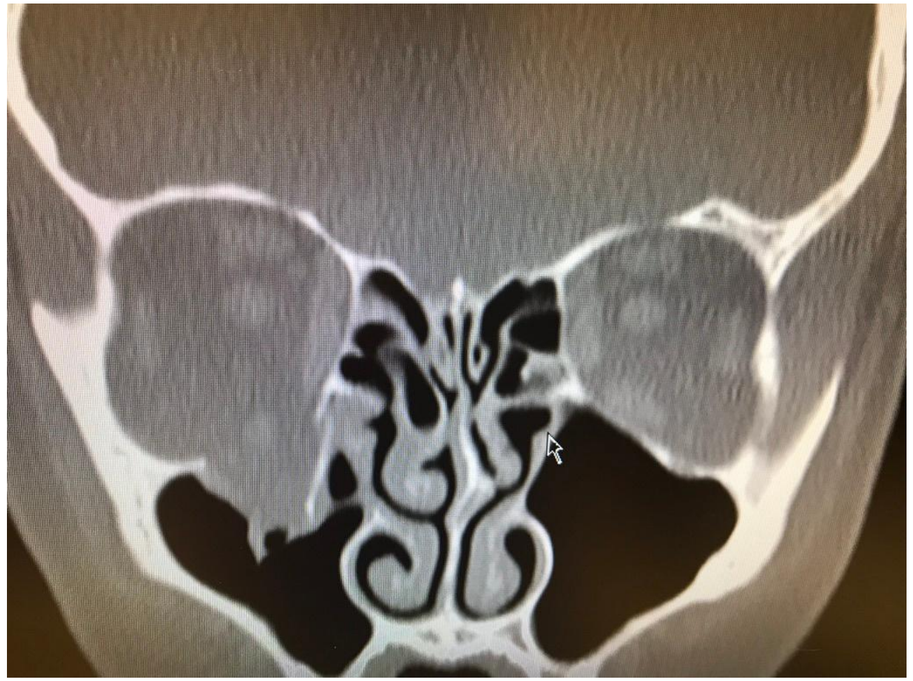
Polling Question #4

a. Immediately call plastic surgery

a. Immediately call plastic surgery and ophthalmology

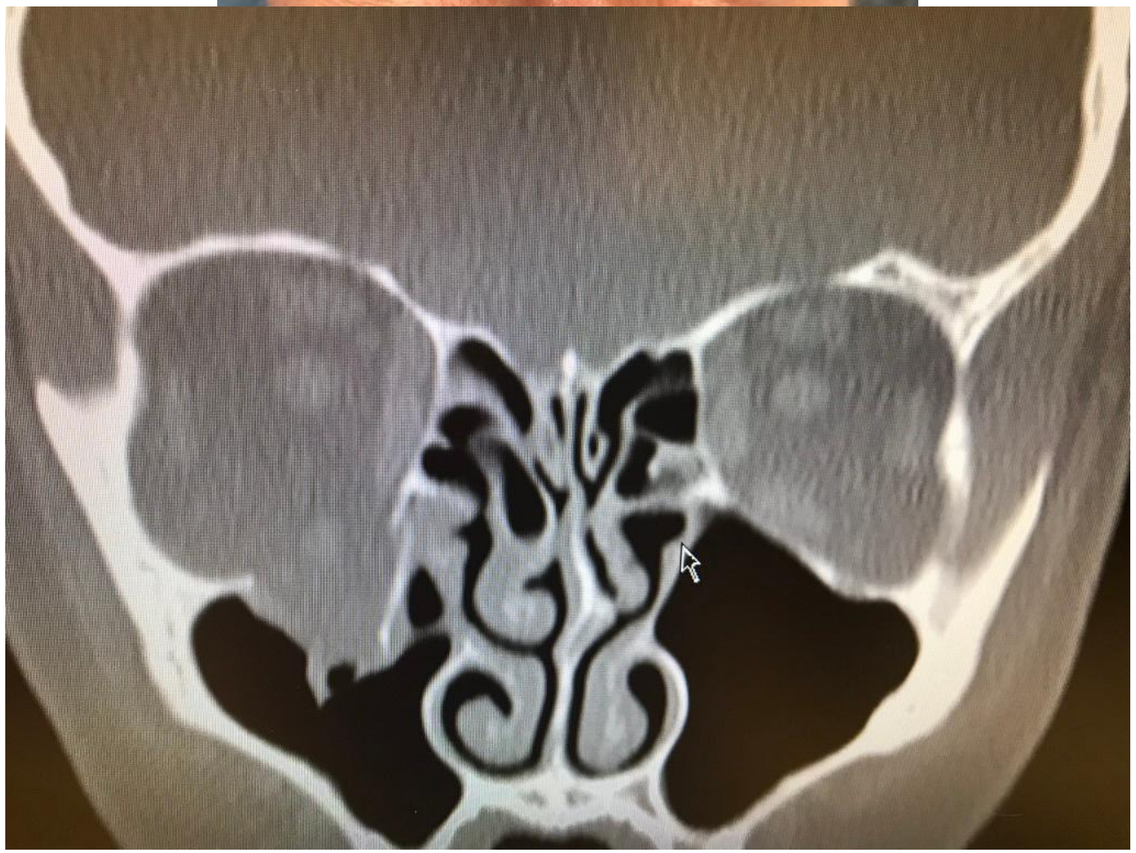
a. Wait until the morning to call plastic surgery

a. Wait until the morning to both plastic surgery and ophthalmology



Orbital blow-out fractures

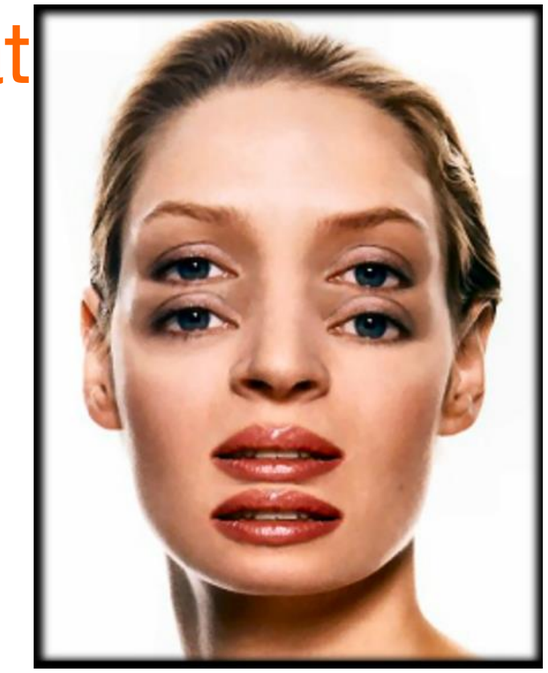
- Pain
- Swelling
- Irritation
- Bruising
- Asymptomatic



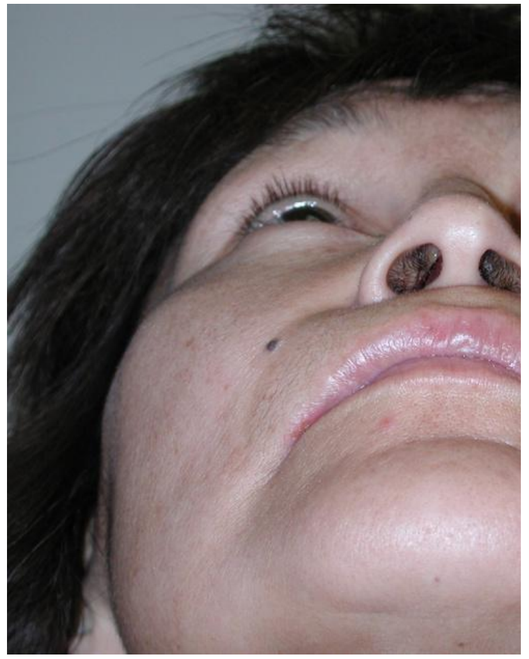
Indications for Surgical Repair

Symptomatic pat

Inferior rectus muscle entrapment



Diplopia (primary gaze)

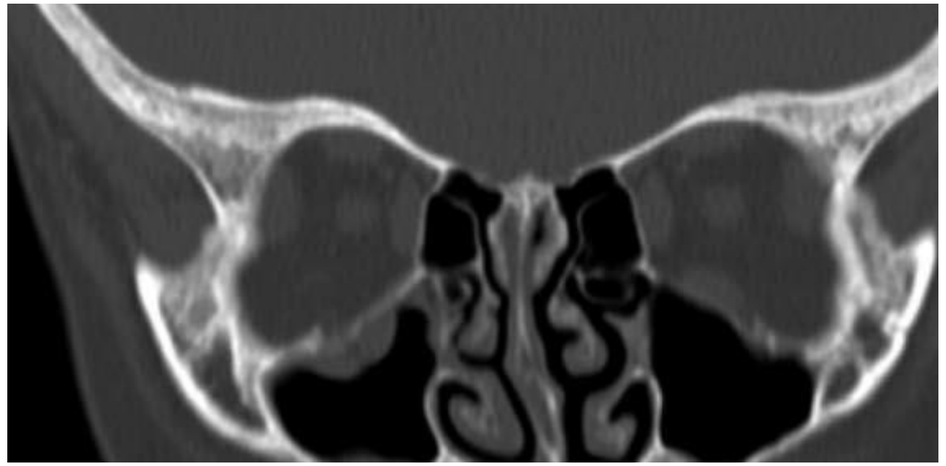


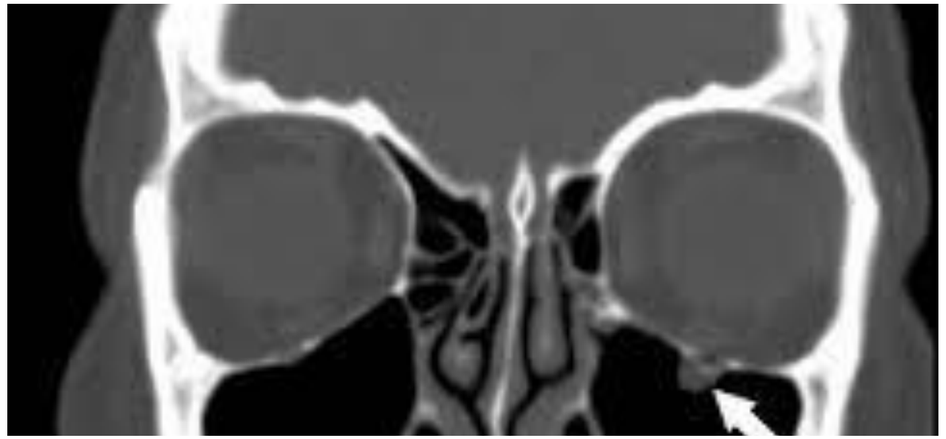
Enophthalmos (>2mm)

Asymptomatic patient

"Large" floor defects (> 50% of orbital floor or > 1.5 cm^2)

Inferior rectus muscle Entrapment

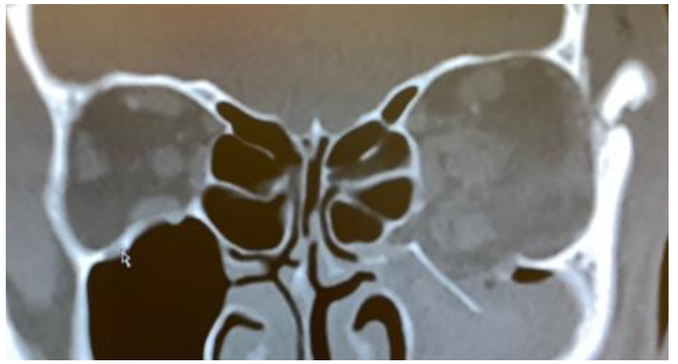


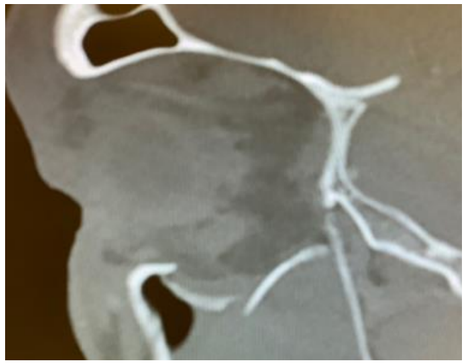


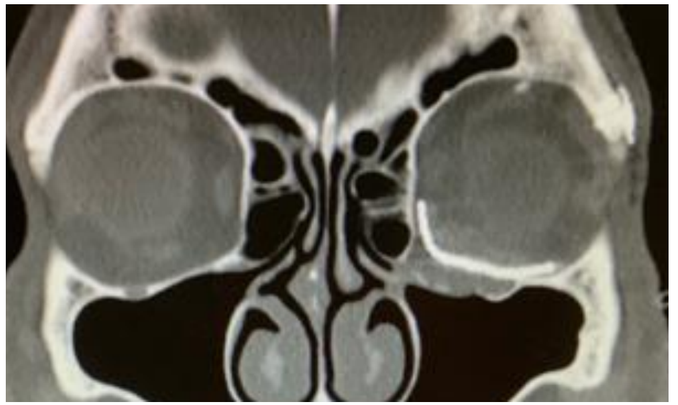
Clinical Tip – Inferior rectus muscle entrapment is extremely rare, typically (but not always) seen in pediatrics, and is a clinical diagnosis.

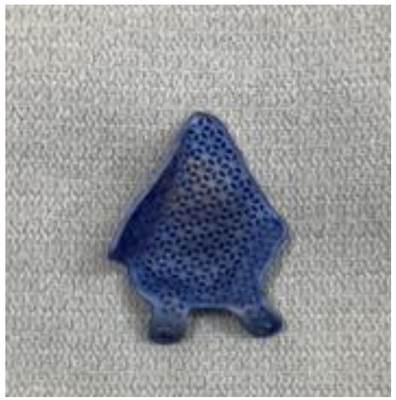
Management of Orbital Blow-out Fractures

- Surgery within 1-2 weeks
- No nose blowing “sinus precautions”
- Custom vs off the shelf implants
- *“Routine ophthalmology consult is not warranted in visually asymptomatic patients with orbital fractures requiring surgical repair”*









› J Oral Maxillofac Surg. 2021 Jul;79(7):1507-1513. doi: 10.1016/j.joms.2021.02.026. Epub 2021 Feb 23.

Evidence-Based Protocol for Ophthalmology Consult for Orbital Fractures

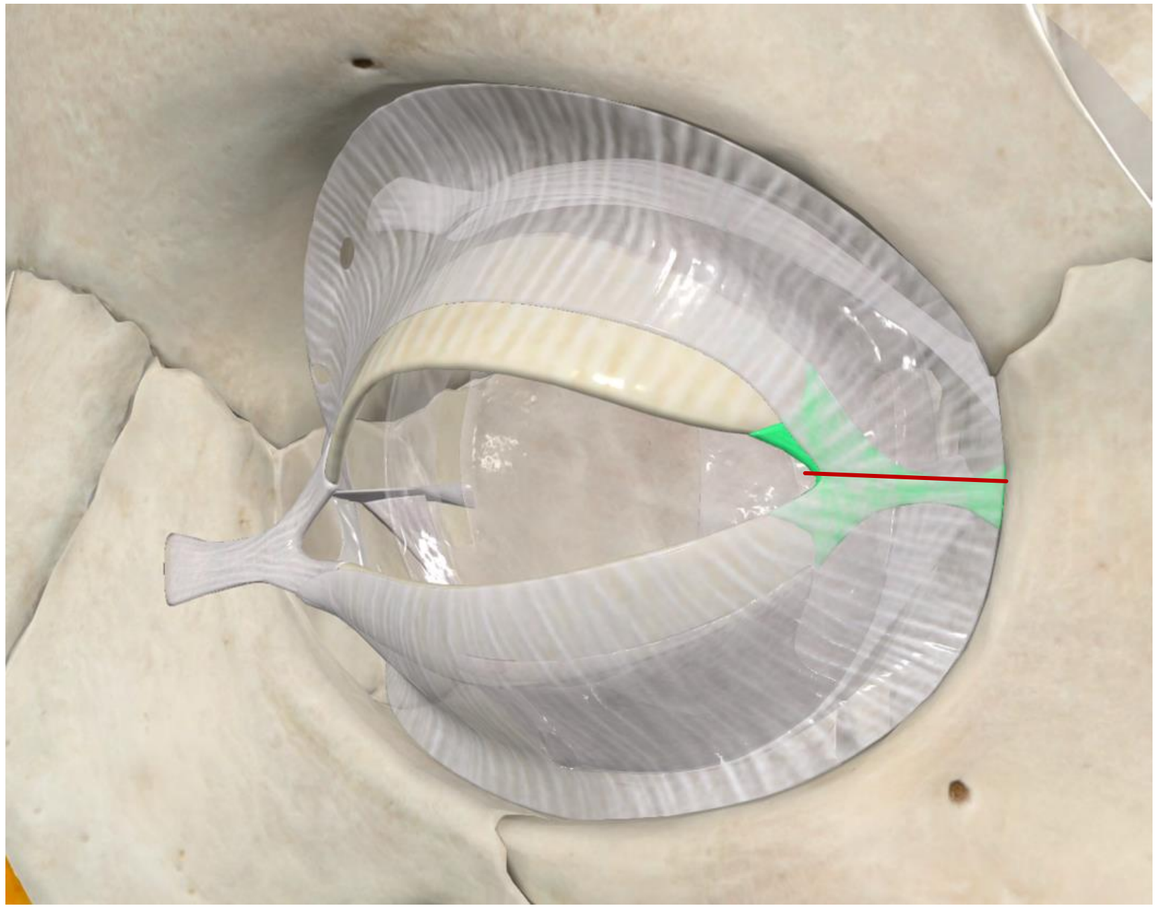
Andrew Rockafellow [1], Evan Busby [1], Darrell WuDunn [2], Sandeep Grover [3], Salam O Salman [4]

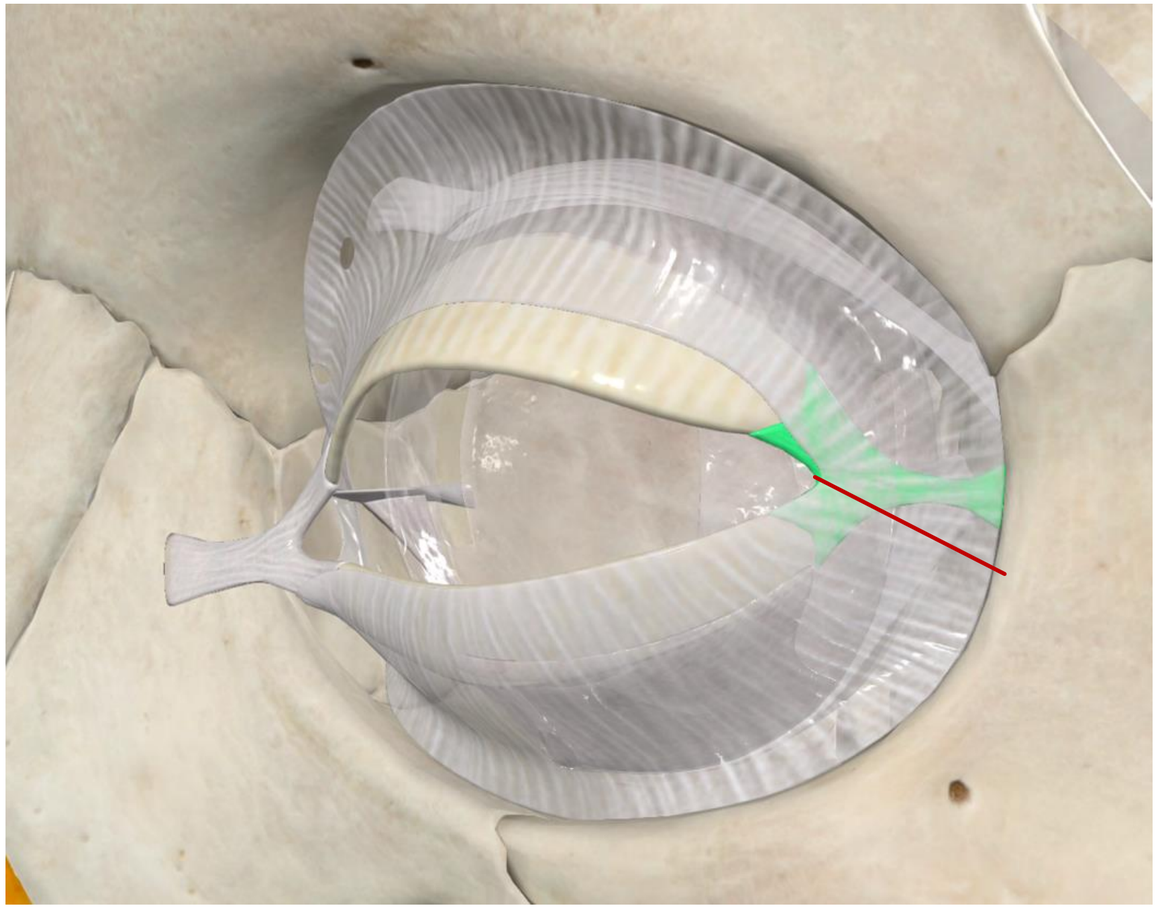
Affiliations + expand

PMID: 33757741 DOI: 10.1016/j.joms.2021.02.026

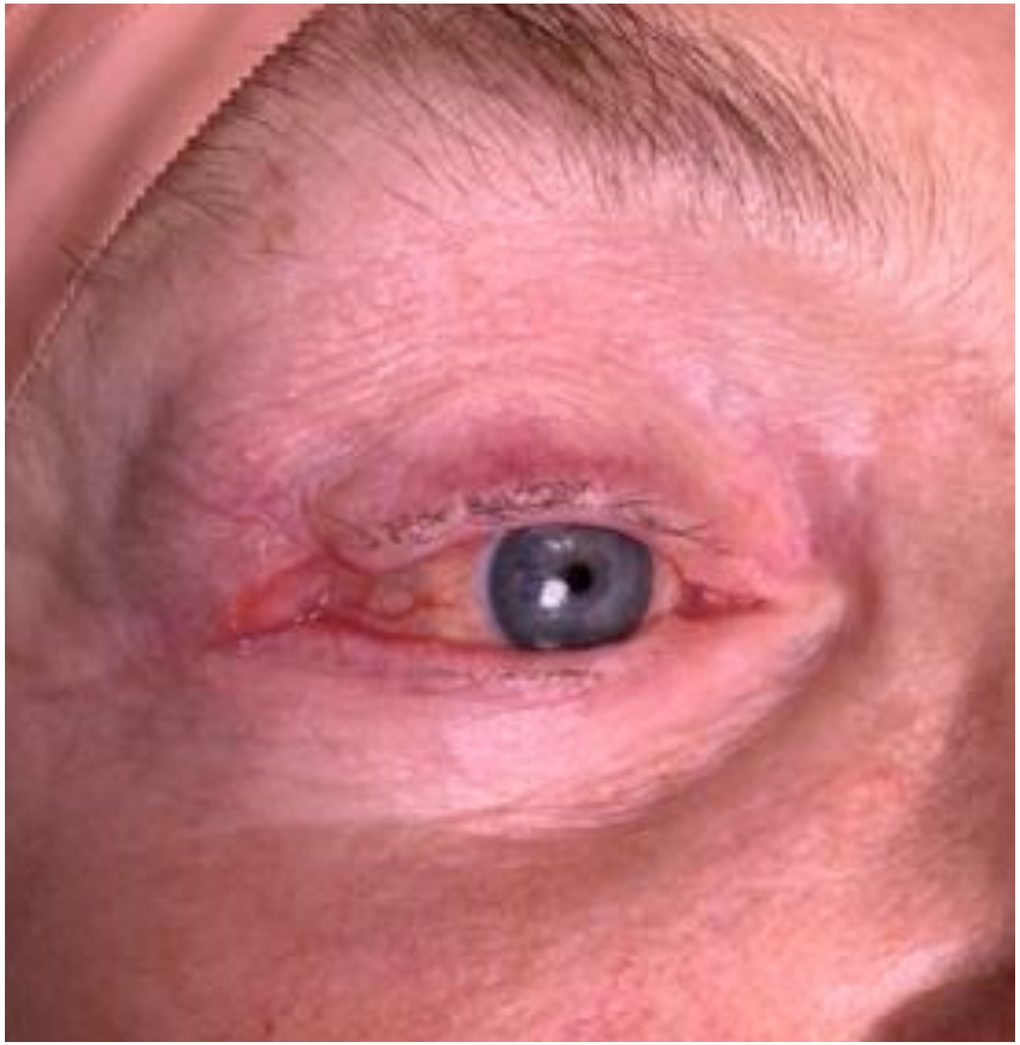
Retrobulbar Hematoma

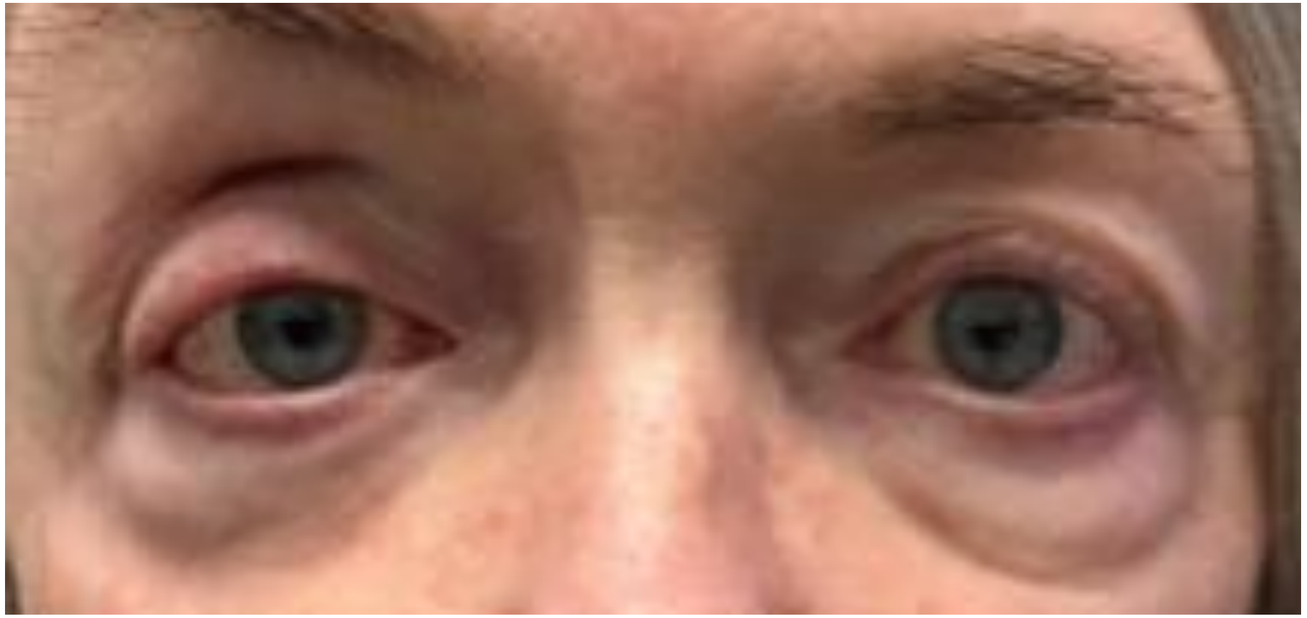
Orbital Compartment Syndrome





Lateral Canthotomy and Cantholysis





Mandible Fractures

- Malocclusion = Operation
- All mandible fractures are considered open
- V3 Numbness
- Loose or missing teeth
- The mandible breaks like a life saver
- 10% incidence of C-spine

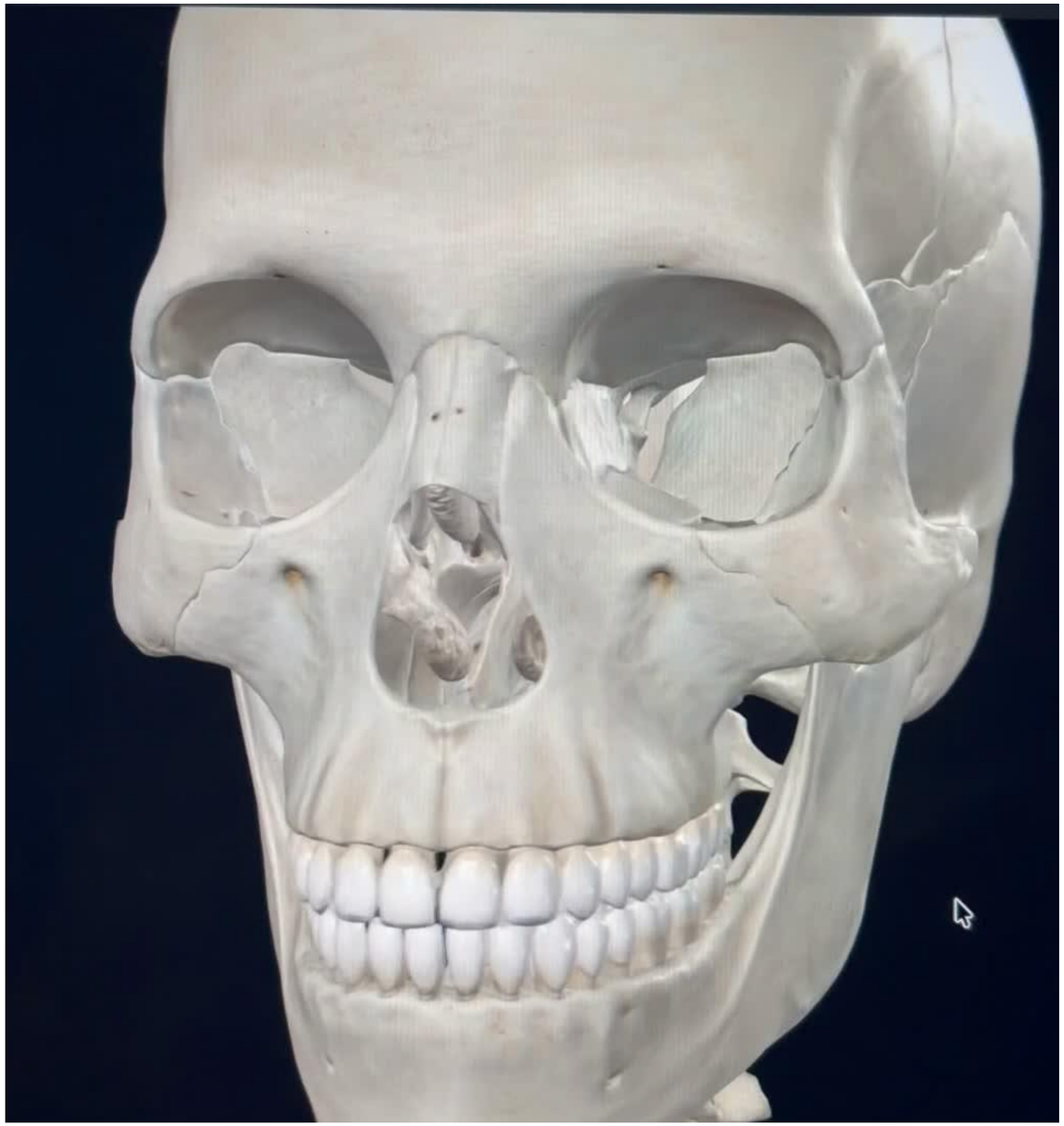
Imaging of Mandible Fractures

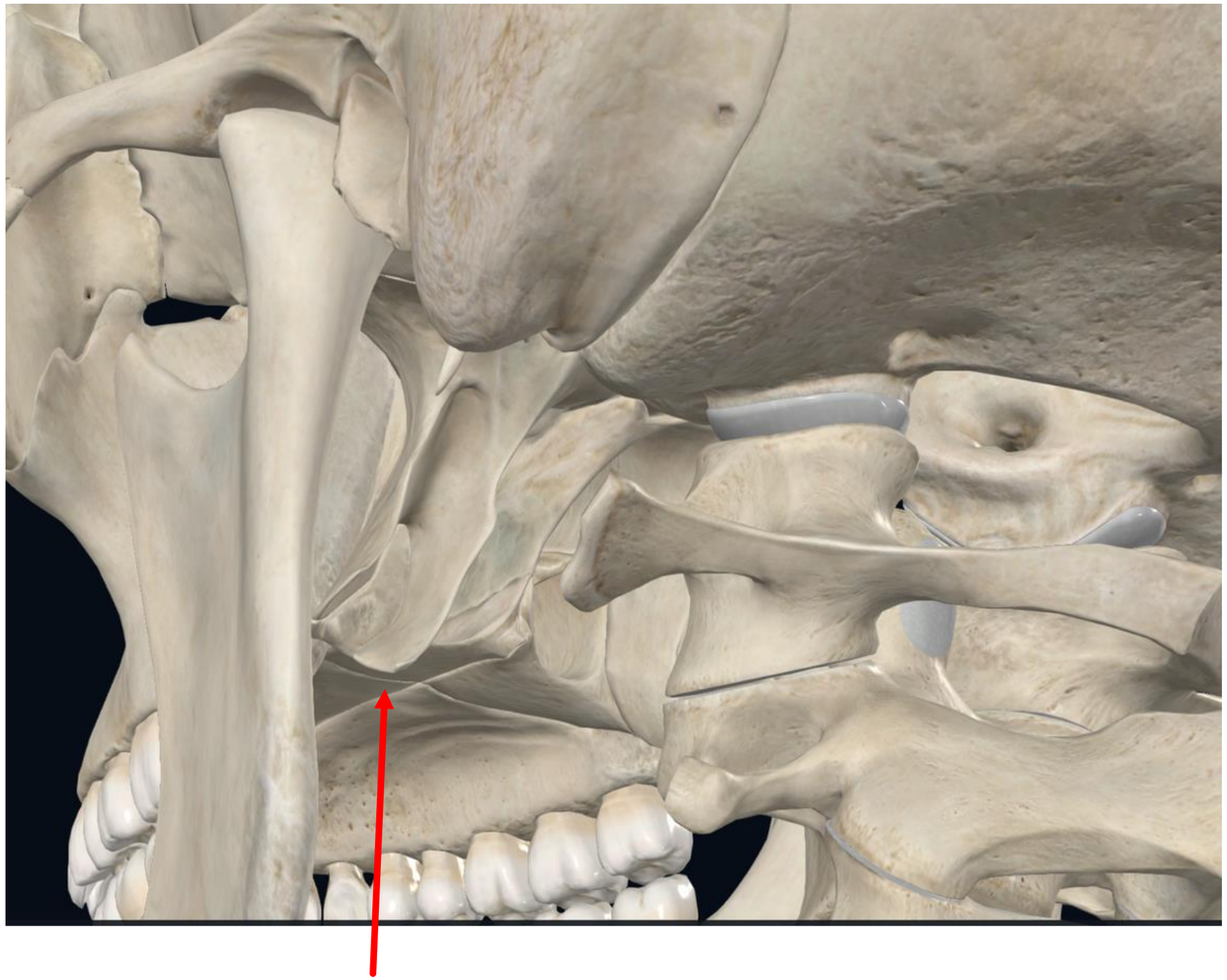
- Panorex
- CT Facial bones with 3D reconstructive views
- Include the mid-face

Timing and Leaving the ER

- Soft Diet
- Pain control
- Chlorohexidine mouthwash. (or Listerine)
- No strong evidence for pre-operative antibiotics

LeFort Fractures

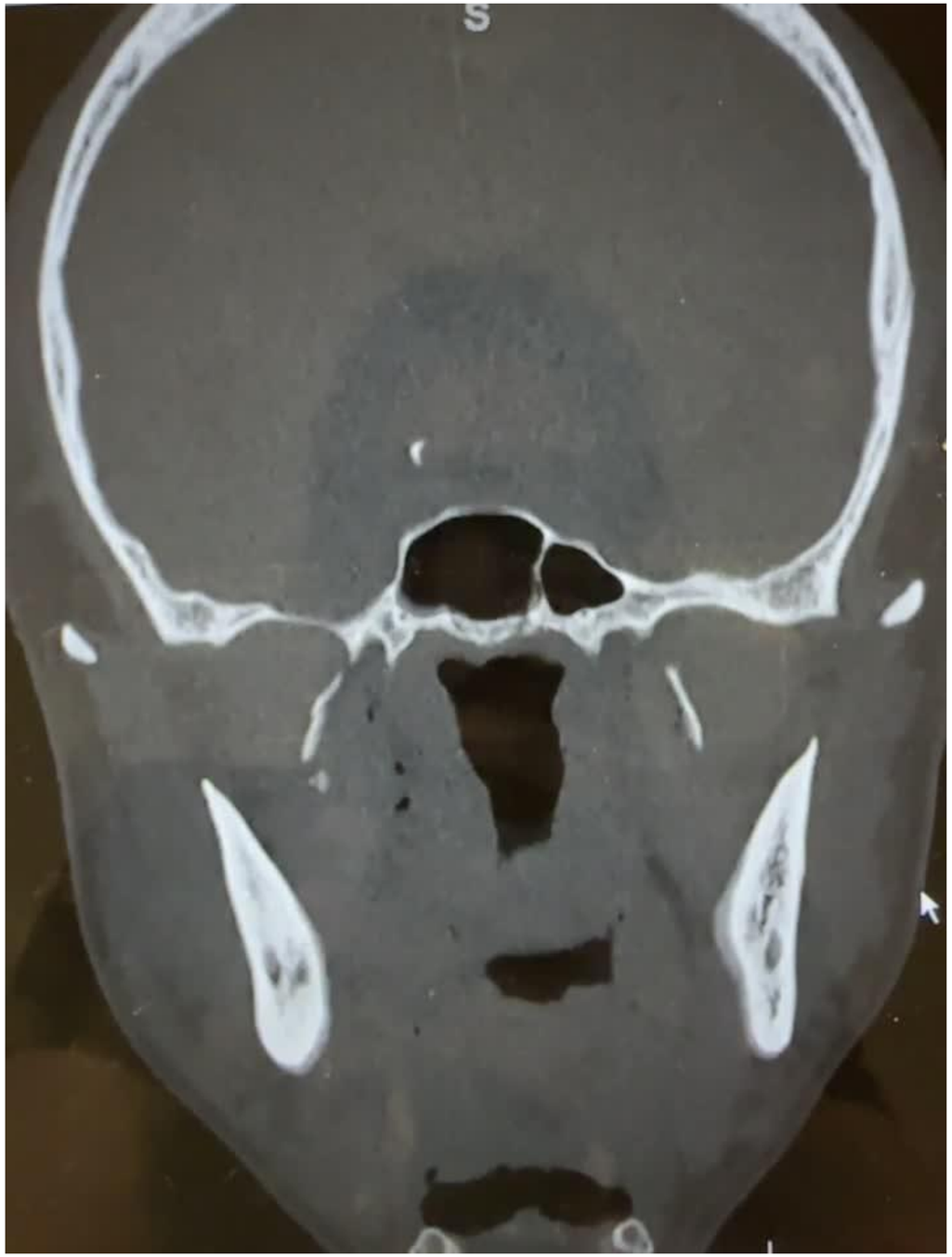




Medial and Lateral Pterygoid Plates

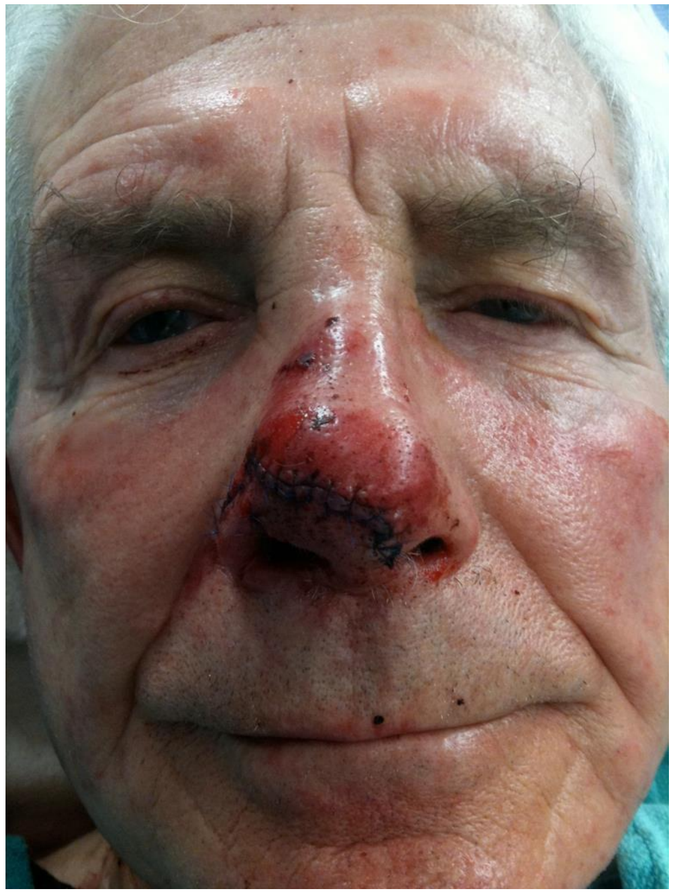
LeFort Fractures

- Fracture of pterygoid plates
- Equals malocclusion
- Rarely occurs as a classic LeFort I, II, III pattern



Facial Lacerations

- The injury already happened — a thoughtful ER closure does not make it worse
- The injury determines the scar.
- The sutures help it heal.

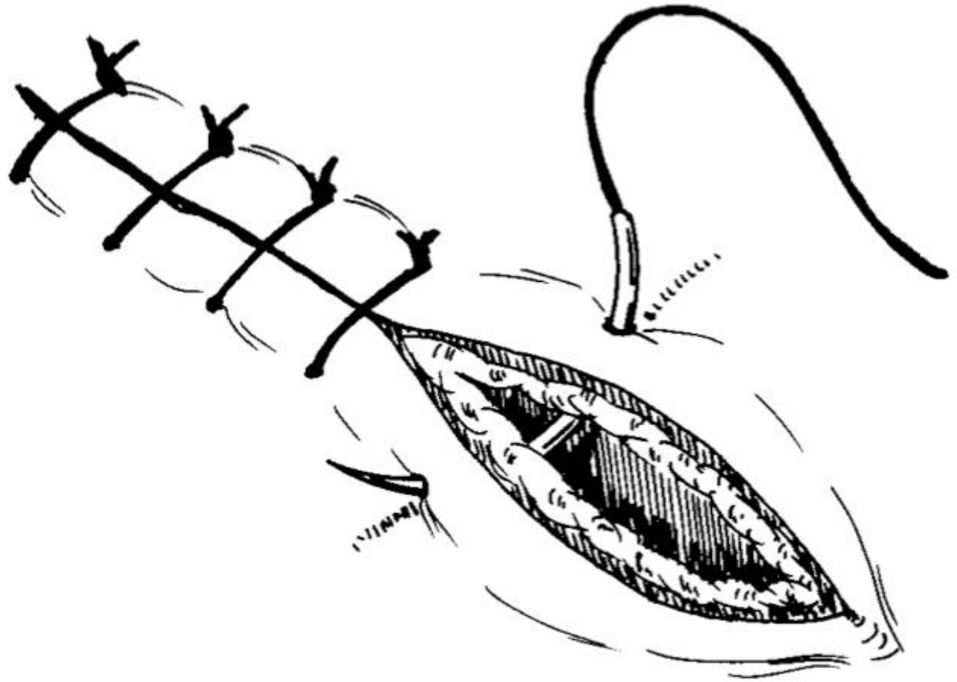


Facial Lacerations

- Tetanus
- Irrigate
- Close the wound if located on the face
- Ignore cartilage (nose and ear)
- Rule of 5’s

Suturing the Face

- Rule of 5’s for the Skin
  - 5.0 suture (Vicryl deep/Prolene skin)
  - 5mm away from the skin edge
  - Travel 5mm between stitches
  - Remove sutures in 5 days
- Simple interrupted or running
- Shower and polysporin



“High Yield Pearls” That Change Management

- CT entire face when the mechanism is significant
- CT Facial bones not just a CT head
- DAT, Brush, and clean can do no harm
- Shower

Conclusion

1. Recognize and perform the initial assessment and stabilization of patients with facial trauma.

1. Identify common facial fractures and soft tissue injuries and initiate appropriate early management.

1. Determine when and how to appropriately refer patients with facial trauma to plastic surgery.