

# Facial Fractures

Brain Protection Patterns



Roderick Zickler MD

# Physics of Force & Energy

- ▶ Kinetic Energy =  $\frac{1}{2} m v^2$
- ▶ 1 Newton (N) =  $1 \text{ kg m/sec}^2$
- ▶ 1 Joule (J) = work (energy) done by 1 N over 1 m  
=  $1 \text{ kg m}^2/\text{sec}^2$

# Energy of injury



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# Energy of Injury fall from standing height



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# Energy of Injury

- ▶ Fall from standing      less than 1,000j

# Energy of Injury



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# Energy of Injury



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# Energy of Injury

- ▶ Fall from standing      less than 1,000j
- ▶ “2 dudes”                      1,000– 3,000j



# Energy of Injury



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# Energy of Injury

- |                           |                  |
|---------------------------|------------------|
| ▶ Fall from standing      | less than 1,000j |
| ▶ “2 dudes”               | 1,000–3,000j     |
| ▶ Fall from height (30ft) | 10,000j          |

# Energy of Injury



# Energy of Injury

- |                           |                  |
|---------------------------|------------------|
| ▶ Fall from standing      | less than 1,000j |
| ▶ “2 dudes”               | 1,000–3,000j     |
| ▶ Fall from height (30ft) | 10,000j          |
| ▶ Bullet impact (rifle)   | 2,070j           |

# Energy of Injury



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# Energy of Injury

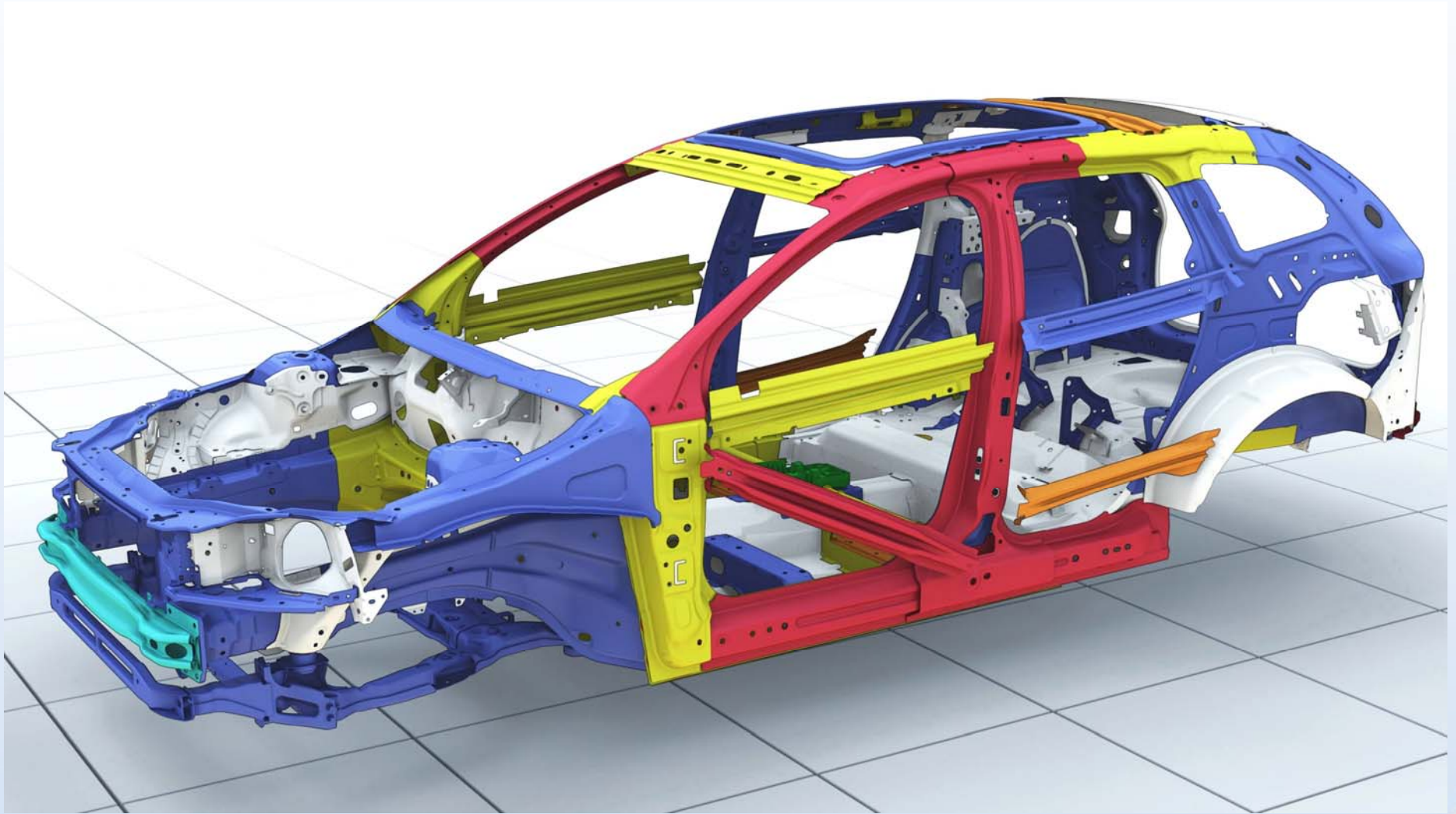
▶ Fall from standing	less than 1,000j
▶ “2 dudes”	1,000–3,000j
▶ Fall from height (30ft)	10,000j
▶ Bullet impact (rifle)	2,070j
▶ MVA (37mph)	13,916j
▶ (56mph)	31,360j

# Protect the Brain



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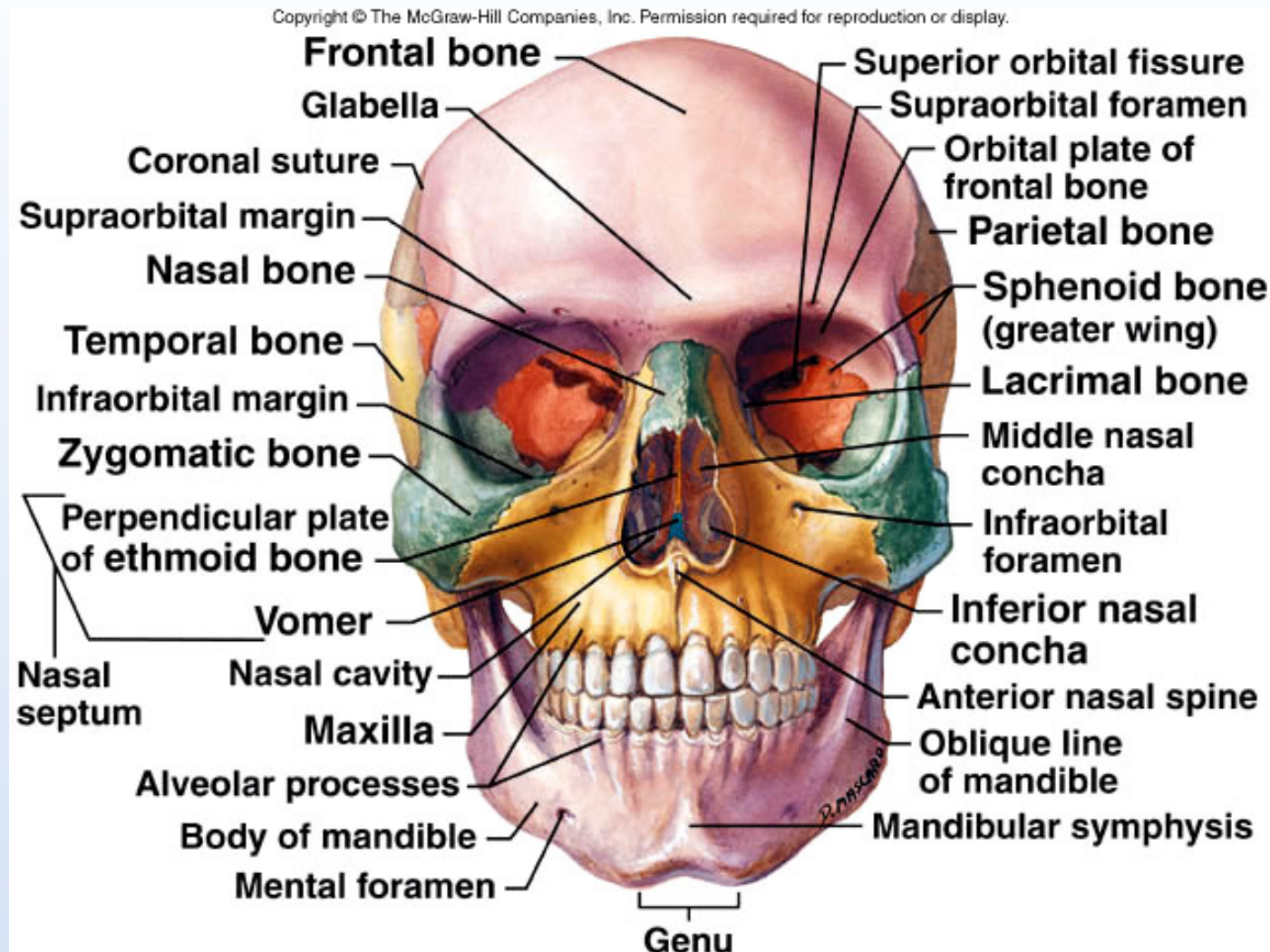
# Protect the Brain



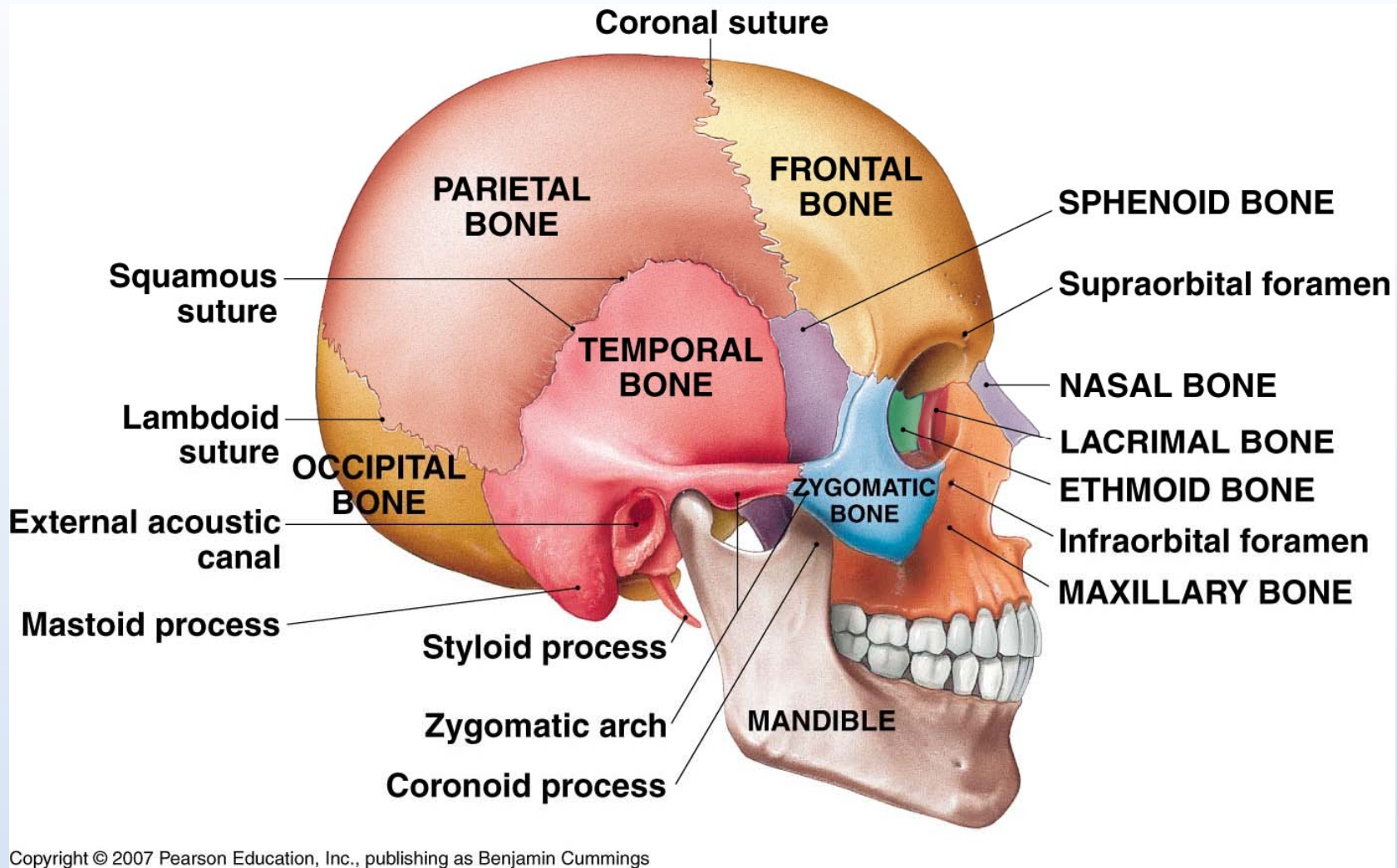
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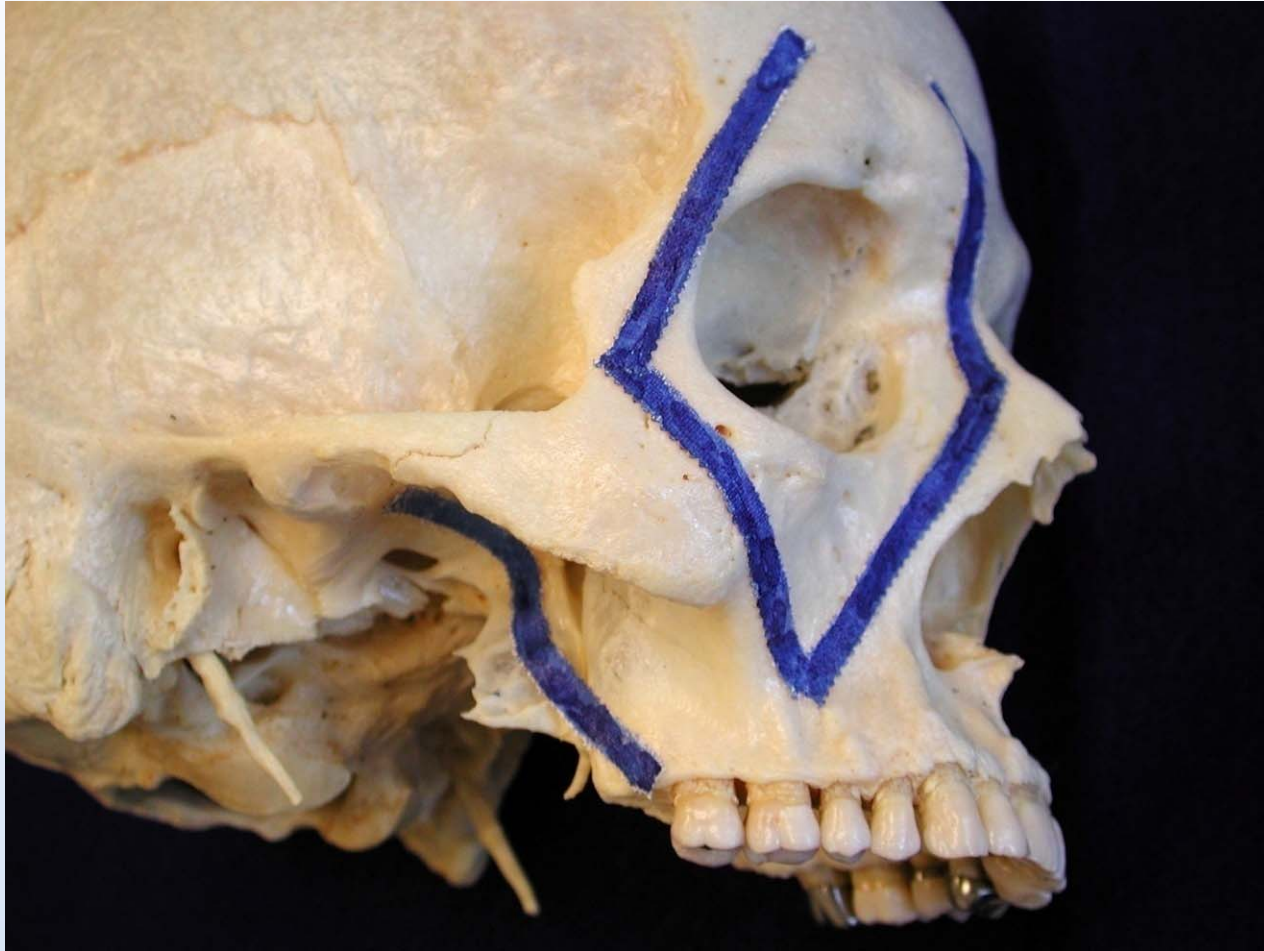
# Protect the Brain



# Protect the Brain



# Protect the Brain



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# Protect the Brain



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# Protect the Brain

- ▶ Face as Crumple Zone

# Nasal Fractures

- ▶ Most common facial fracture (all sources)
- ▶ Most common facial fracture from MVA
- ▶ 50% risk of fracture @450–850N
- ▶ (even average “dude” has 50% chance of scoring a fracture)

# Nasal Fracture



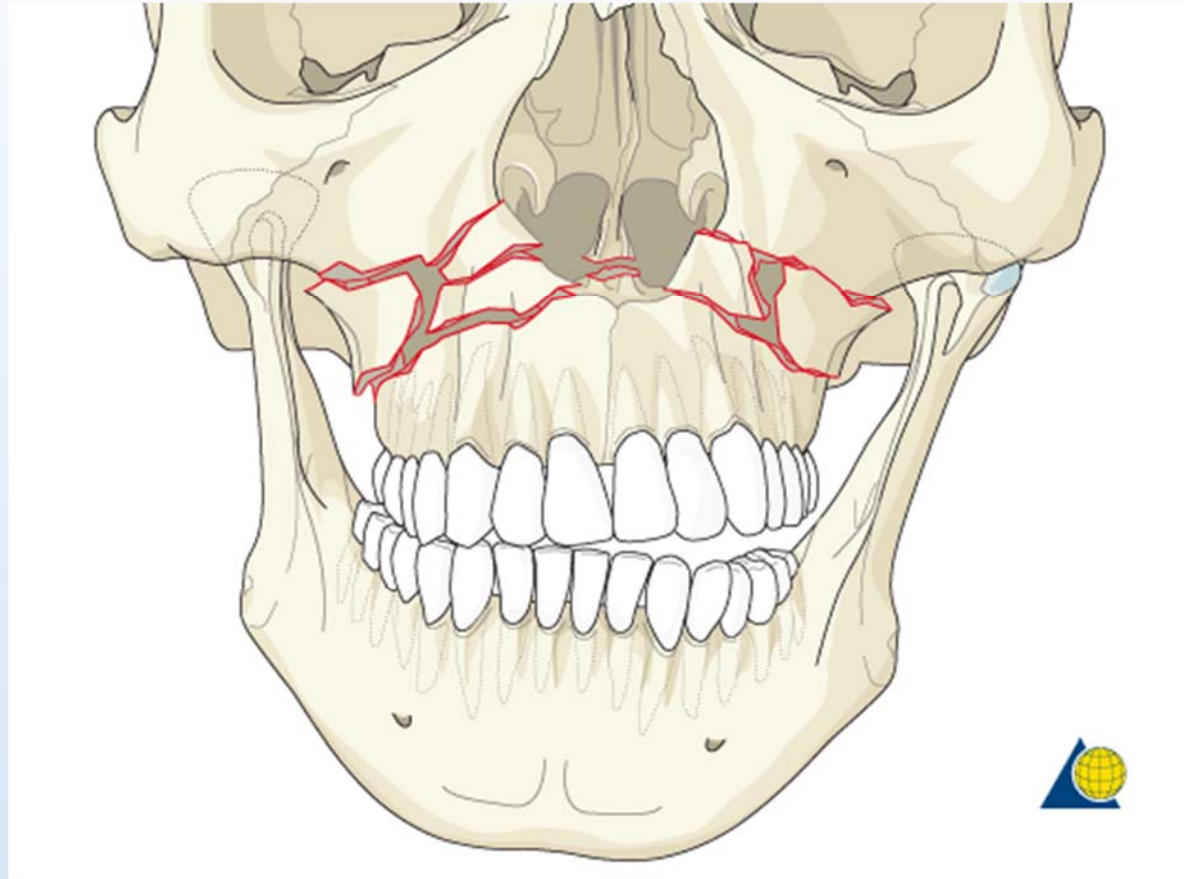
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# Maxillary Fractures

- ▶ 50% risk of fracture with 970–1223N
- ▶ Old bone even easier to break

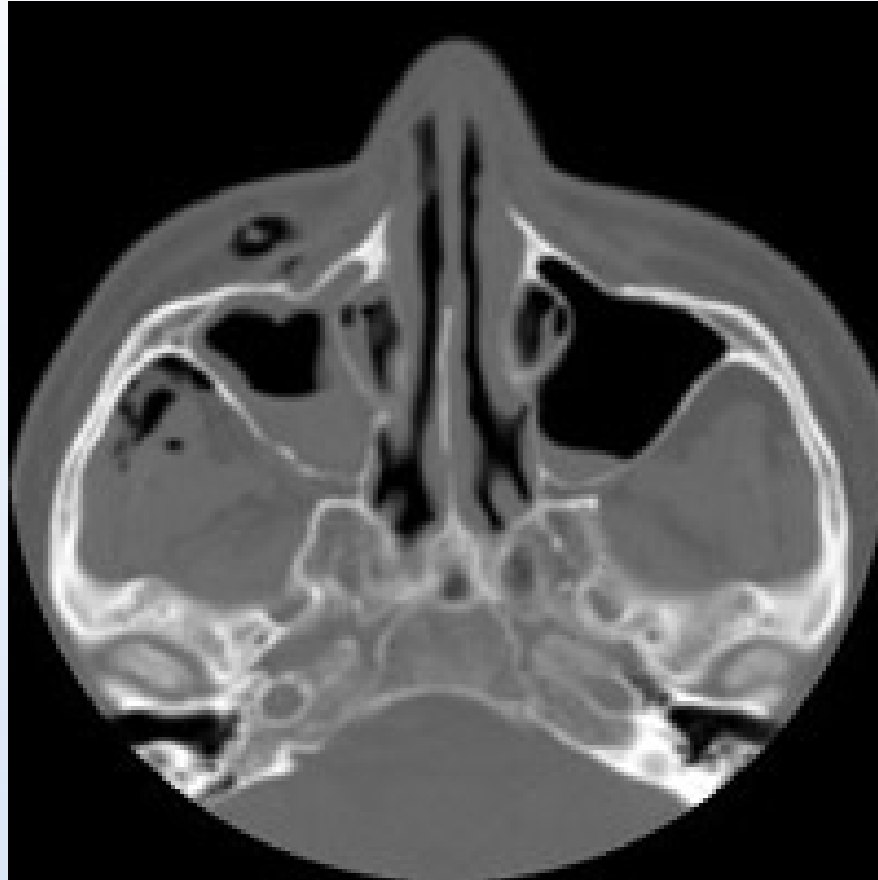


# Maxillary Fractures



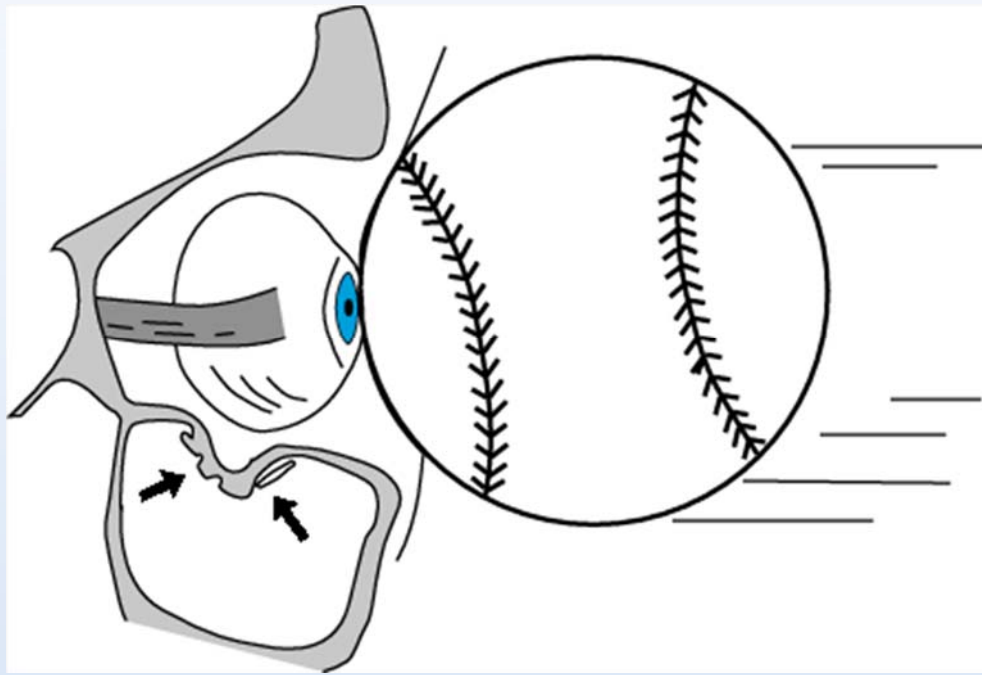
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# Maxillary Fracture



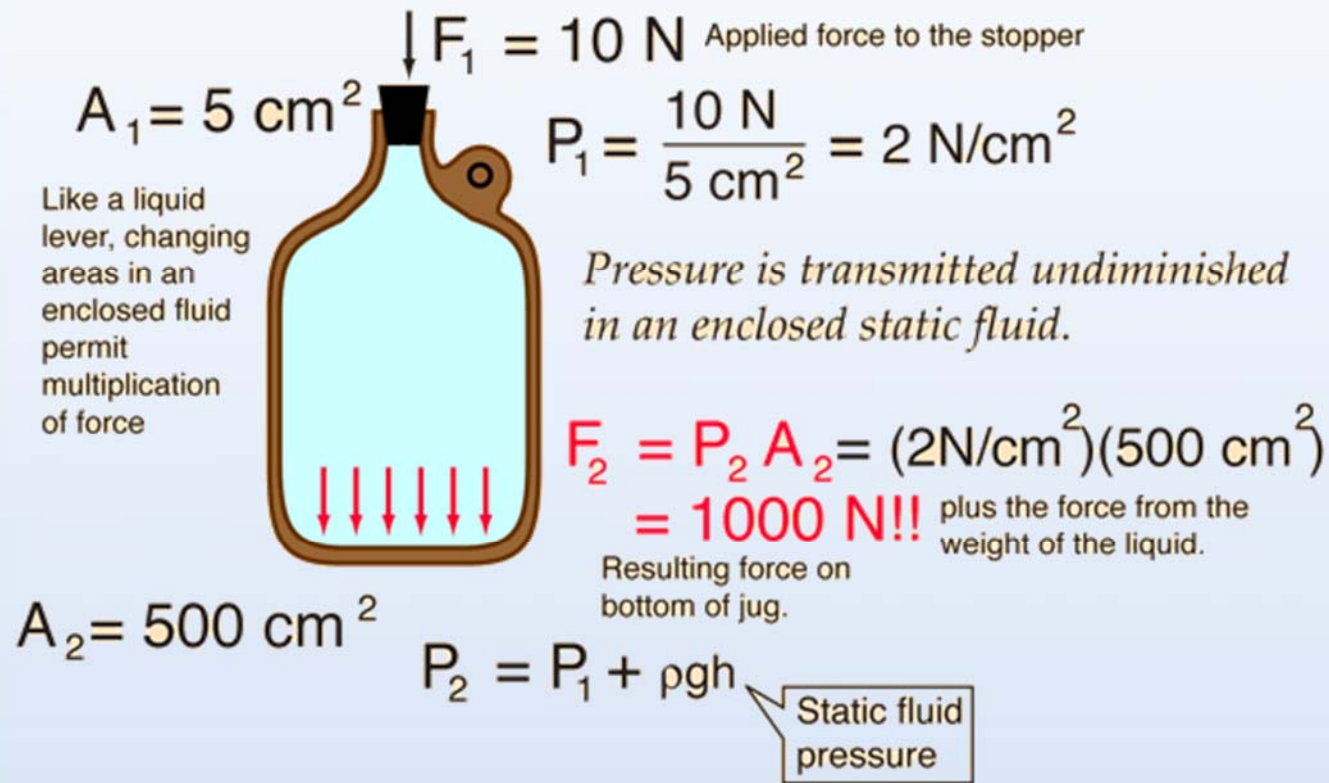
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# Blowout fractures

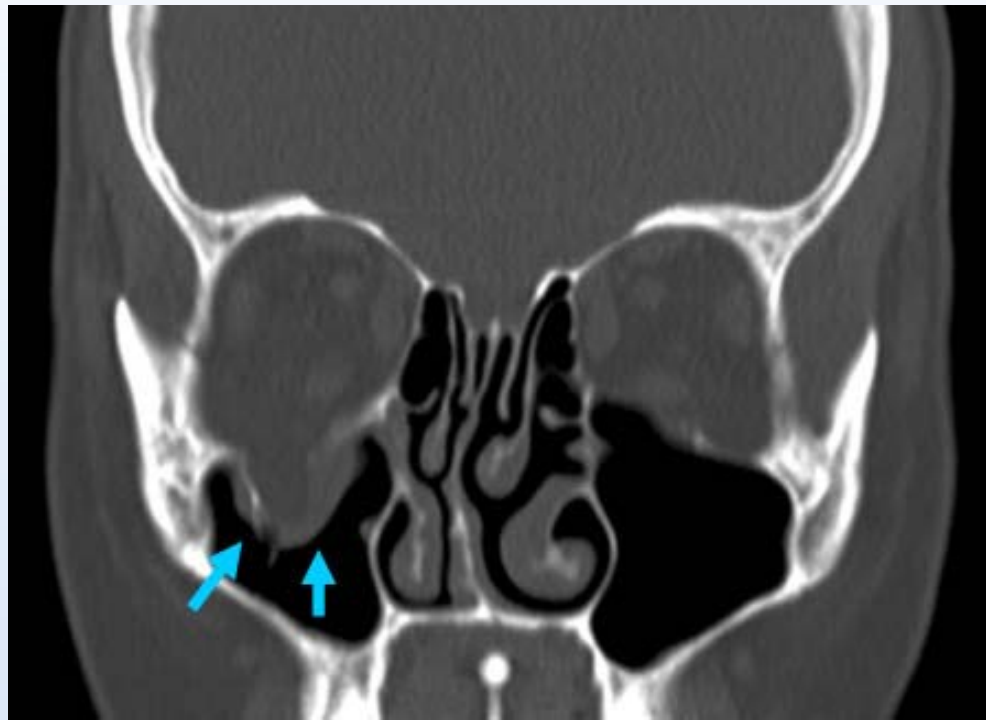


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# Blowout Fracture

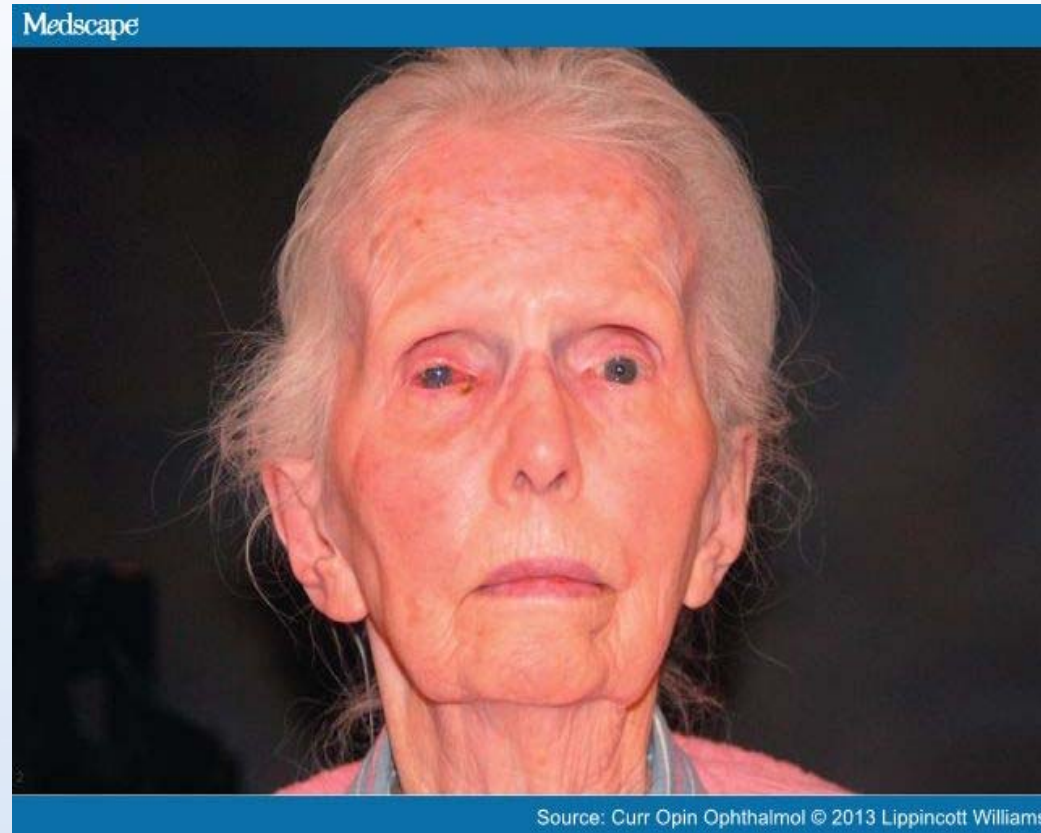


# Blowout Fracture



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# Enophthalmos



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# Enophthalmos



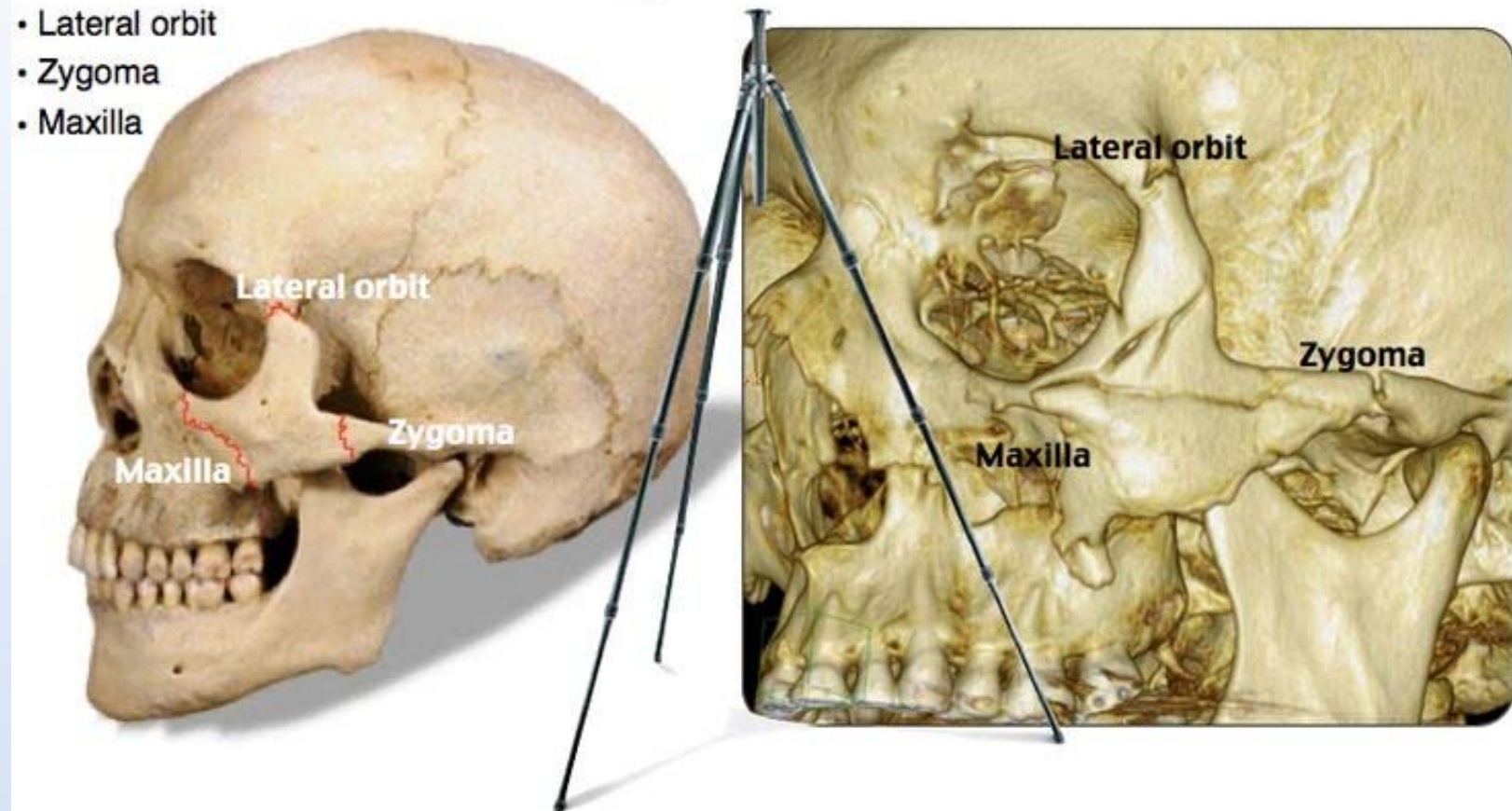
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# Tripod fracture

## Zygomaxillary complex (Tripod) fracture

Direct blow to the malar eminence of the zygomatic bone

- Lateral orbit
- Zygoma
- Maxilla



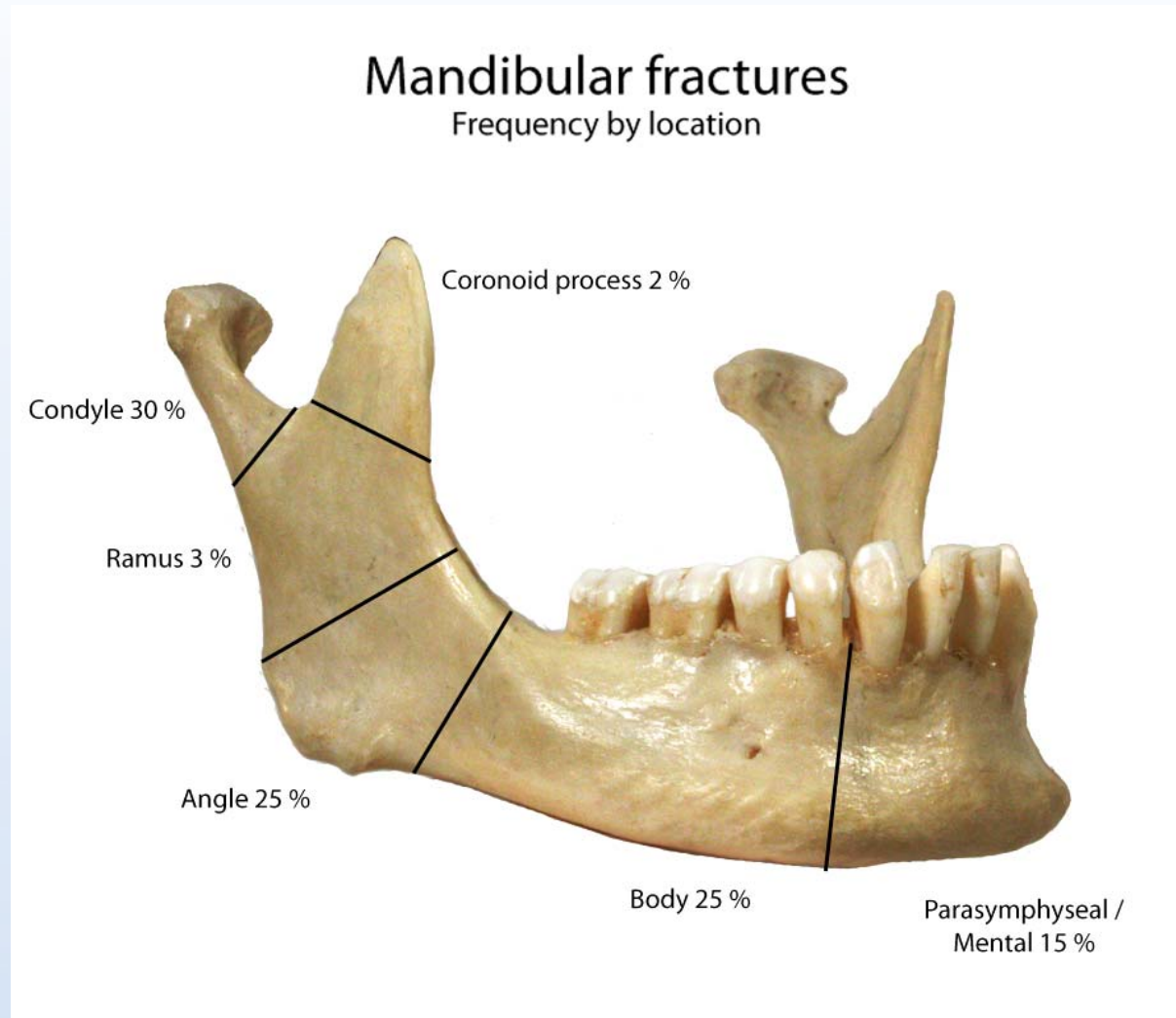


# Tripod Fracture

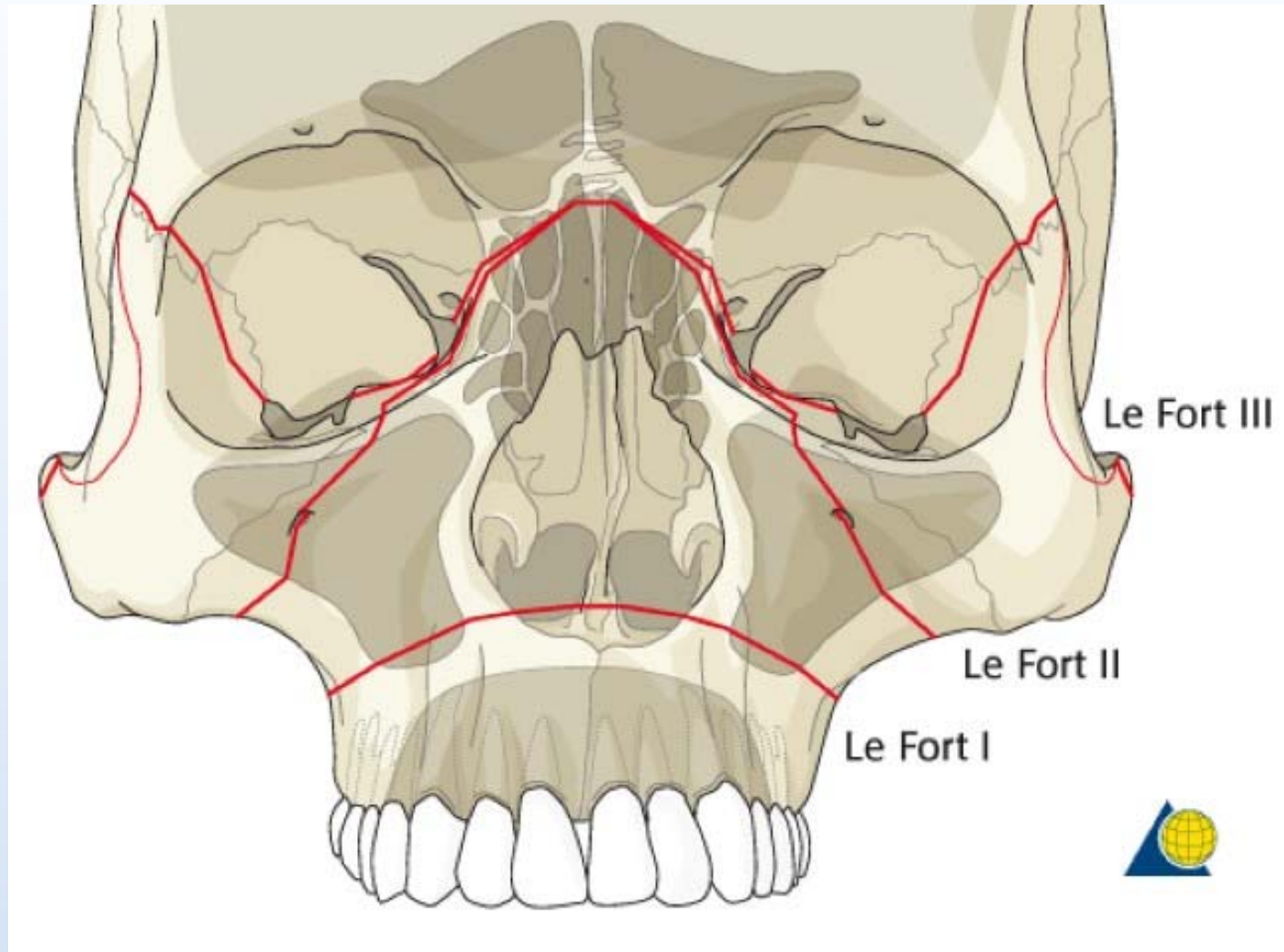


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# Mandible Fractures

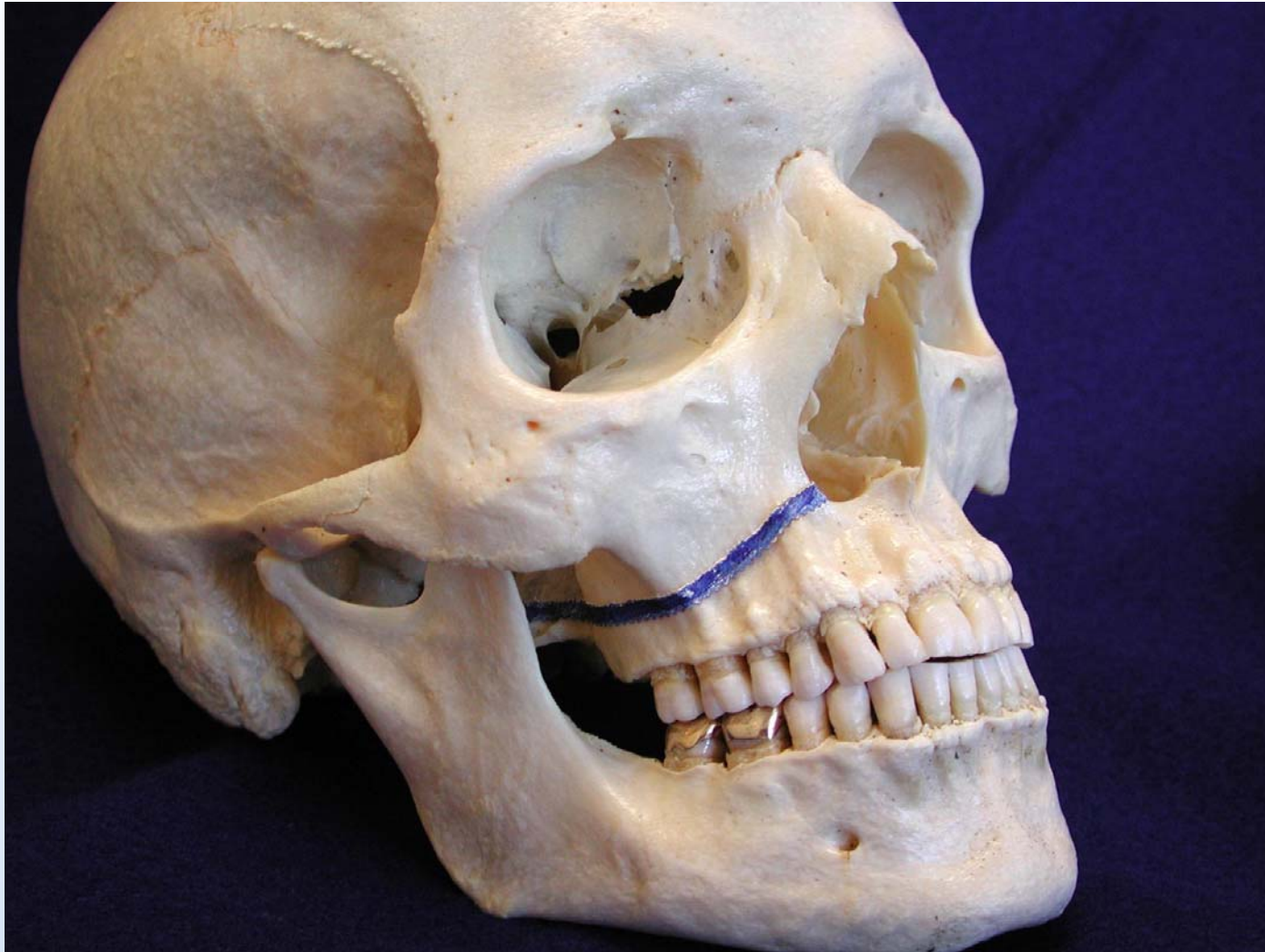


# LeFort Fractures



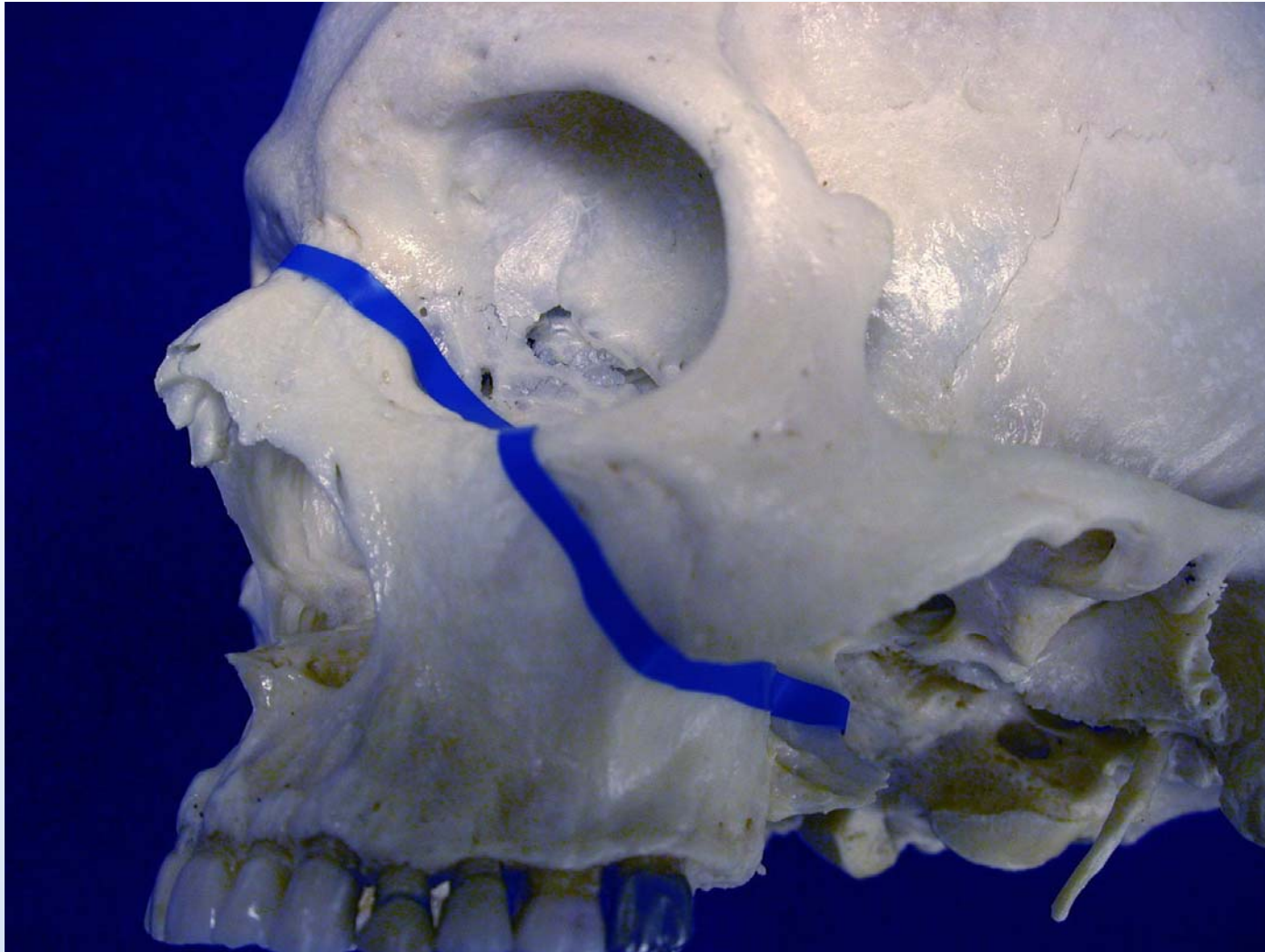
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# LeFort I Fractures



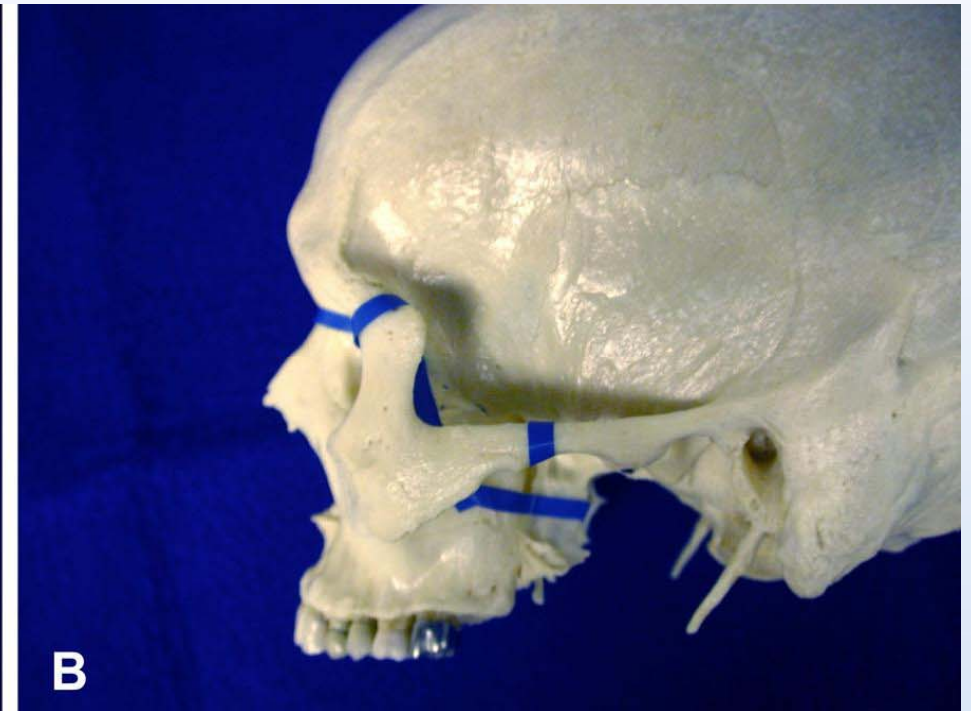
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# LeFort II Fractures

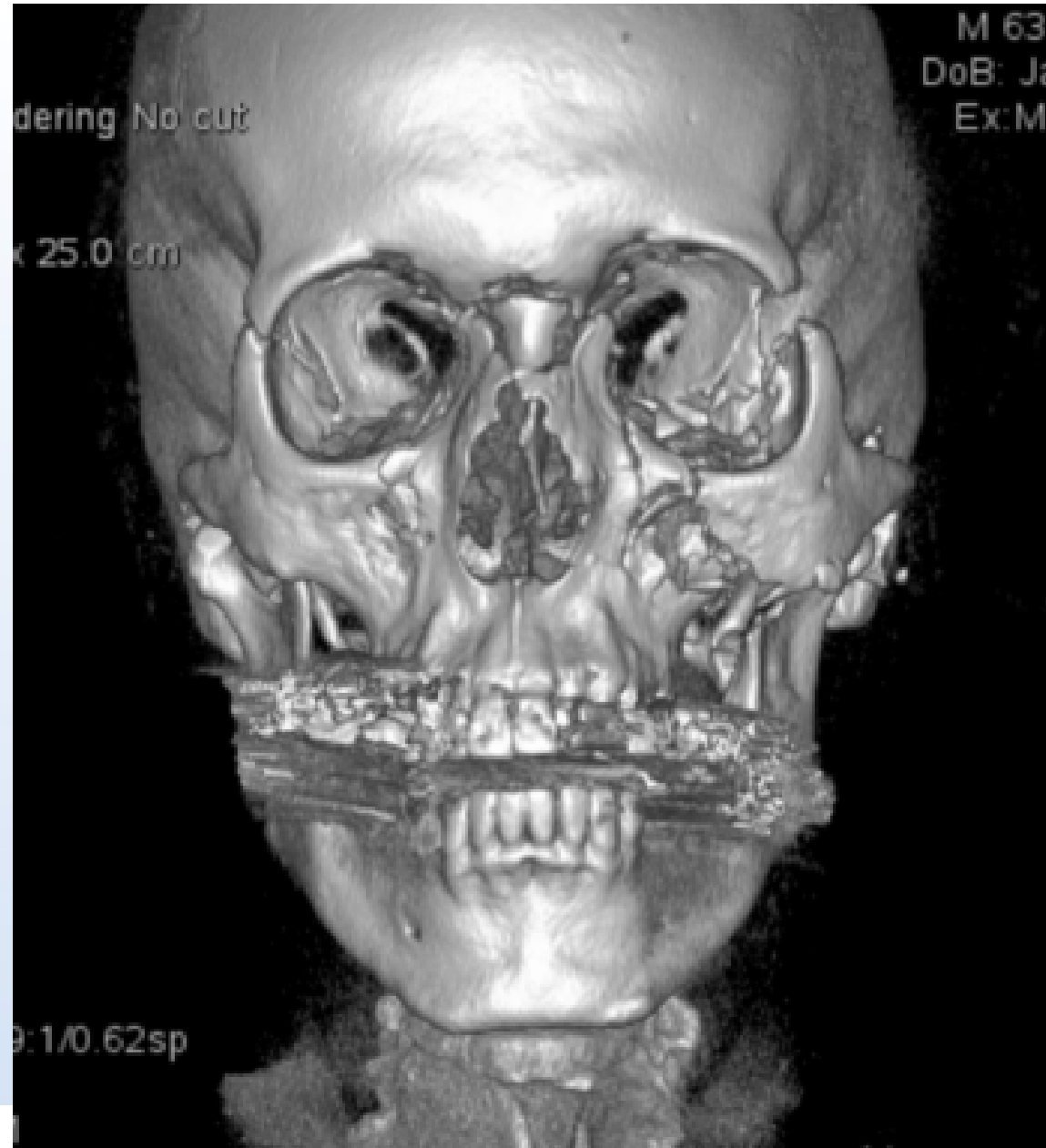


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# LeFort III Fractures



# LeFort III



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# LeFort III



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# Le Fort III



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# LeFort III



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# Le Fort III



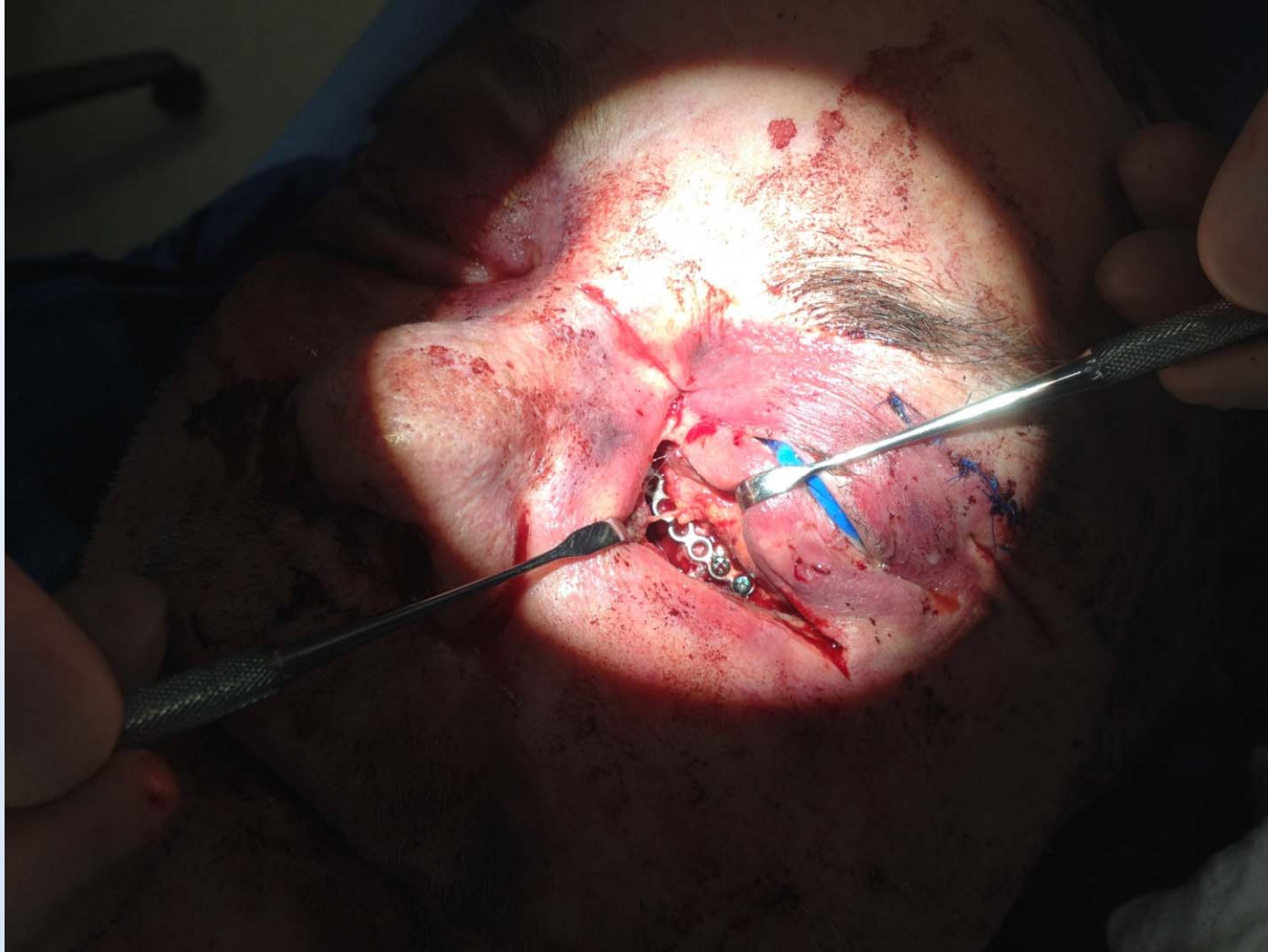
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# LeFort III



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# LeFort III



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# LeFort III



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# LeFort Fractures



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# LeFort Fractures



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# LeFort Fractures



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# Frontal Bone Fractures

- ▶ Supraorbit fractures
- ▶ Almost always head injury
- ▶ Worry about orbital Apex/superior orbital fissure

# Summary slides coming



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# Low energy fractures

- ▶ Nasal fracture: reexamine after soft tissue swelling subsides and treat if deformity
- ▶ Maxillary fracture: isolated sinus fractures can often be left untreated
- ▶ Orbital Blowout fracture: often can be left untreated if no diplopia. Treatment if diplopia after rectus muscle swelling resolves or risk of enophthalmos with large defect.
- ▶ Low probability of c-spine injury

# Moderate energy fractures

- ▶ Tripod fracture : usually displaced and will require non-urgent treatment to prevent deformity (usually within 2wks)
- ▶ Mandible fracture: usually will require prompt treatment for pain control or open bite (usually within 24 hrs). If high energy mechanism worry about airway swelling
- ▶ Think about c-spine injury

# High energy fractures

- ▶ LeFort fractures (esp II & III): Will likely need urgent airway protection. Often closed head injury. Probably c-spine injury. Fracture repair after other injuries stabilized (usually within 2wks)
- ▶ Supraorbital fractures: Call the neurosurgeon first. Almost always closed (or open) head injury. Possible orbital apex/superior orbital fissure injuries.

# Facial Fractures

Brain Protection Patterns



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Trauma Conference  
10/26/17

# Thank You



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