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Mini-Medical School Presentation Anatomy of the Head with Clinical Correlations

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Some of the medical images/videos used in this presentation may be considered disturbing/traumatizing.



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Learning Objectives

1. Define anatomy and physiology. Why is it important in medicine?
2. Describe the main features of the skull. Apply them to radiographic imaging.
3. List and describe the meninges and their associated spaces in the skull – include their position in relation to each other.
4. Describe the blood supply to the meninges.
5. Identify and describe the anatomical features of the brain, including the main function(s) of these structures.
6. List and describe the twelve pairs of cranial nerves.



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What is **anatomy**?

Structure and the relationships among them

What is **physiology**?

Function and how things work

Why is it important in medicine?



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Patient Background

A 58-year-old individual was in an altercation due to a road rage incident. During this altercation, the individual was struck on the side of the head with a baseball bat. At the scene, the individual was treated for some superficial injuries and noted to paramedics that he felt fine and refused transportation to the hospital. About an hour after this, the individual began to not feel well and was taken to the emergency department.



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Physical Examination

- Pupil on right side was widely dilated and did not respond to light
- The patient eye was also continuing to swell, as well as a hematoma on the head
- The patient was sent for computed tomography (CT) scans of his head
 - Why would an X-ray not be the best imaging technique here?





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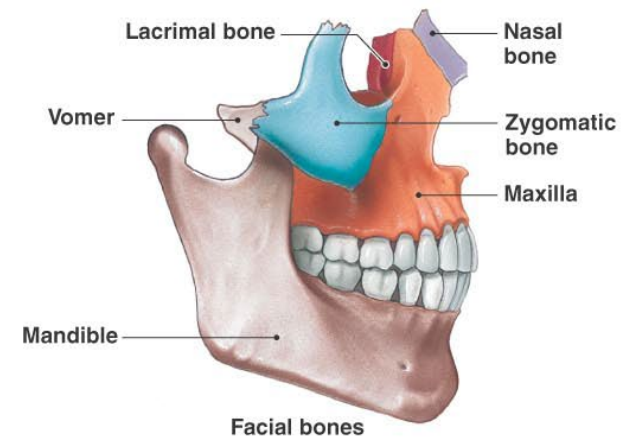
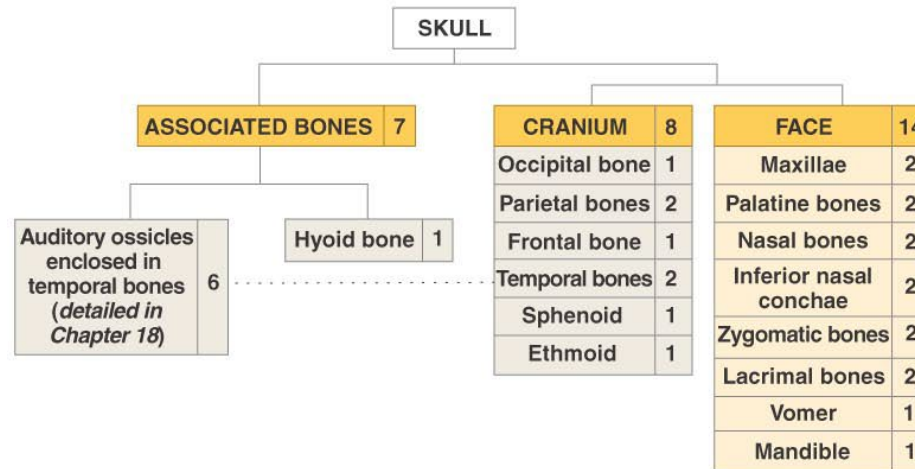
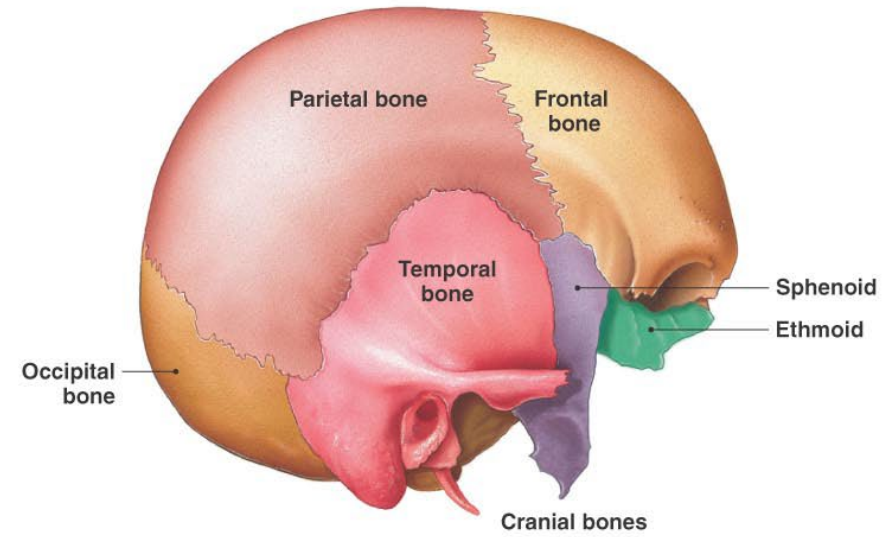
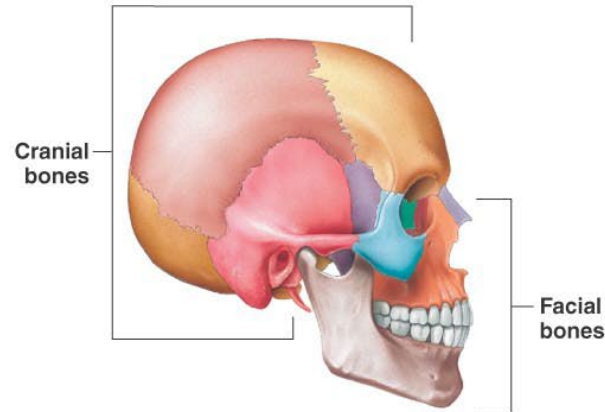
What structures
would you be
concerned about
being injured?



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The Skull

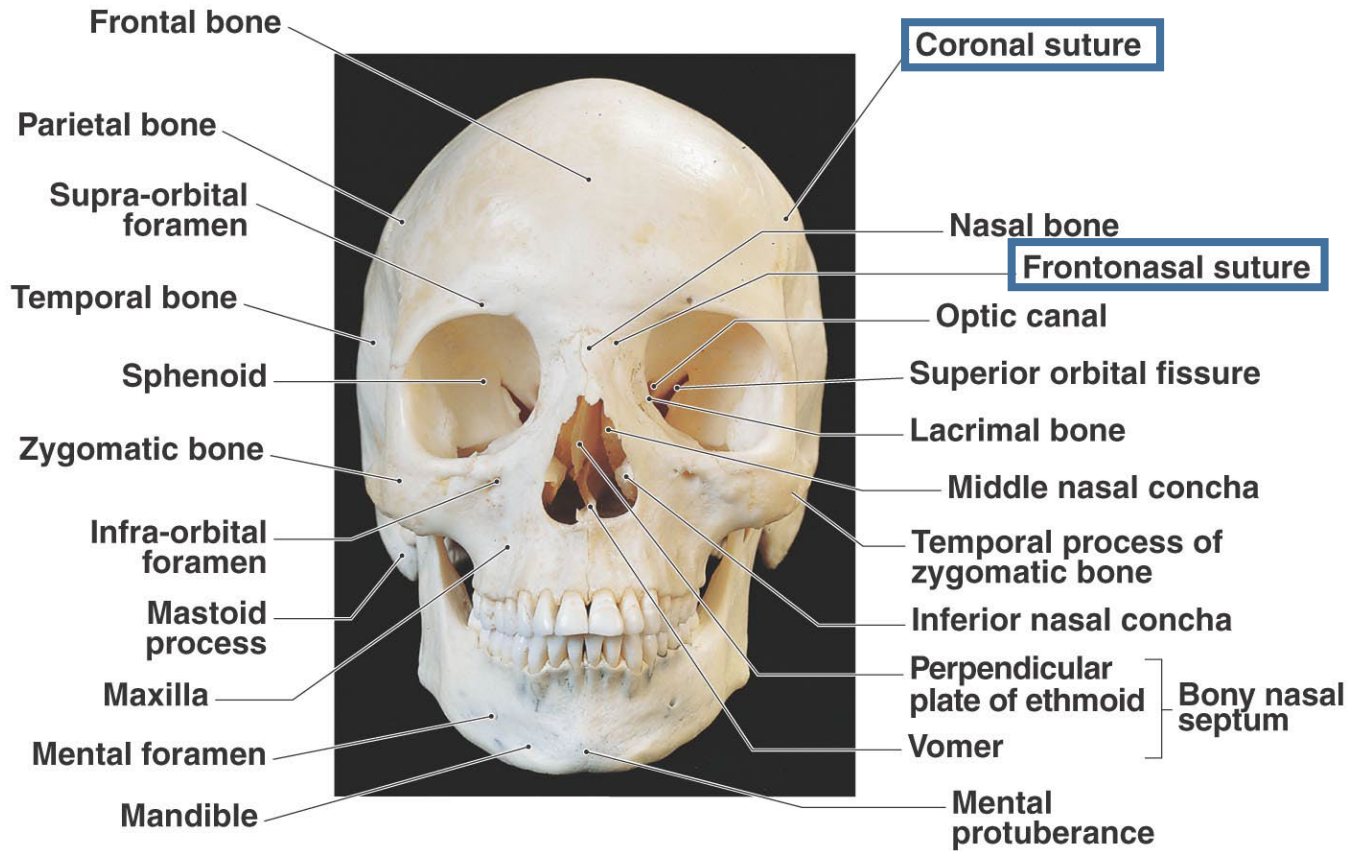




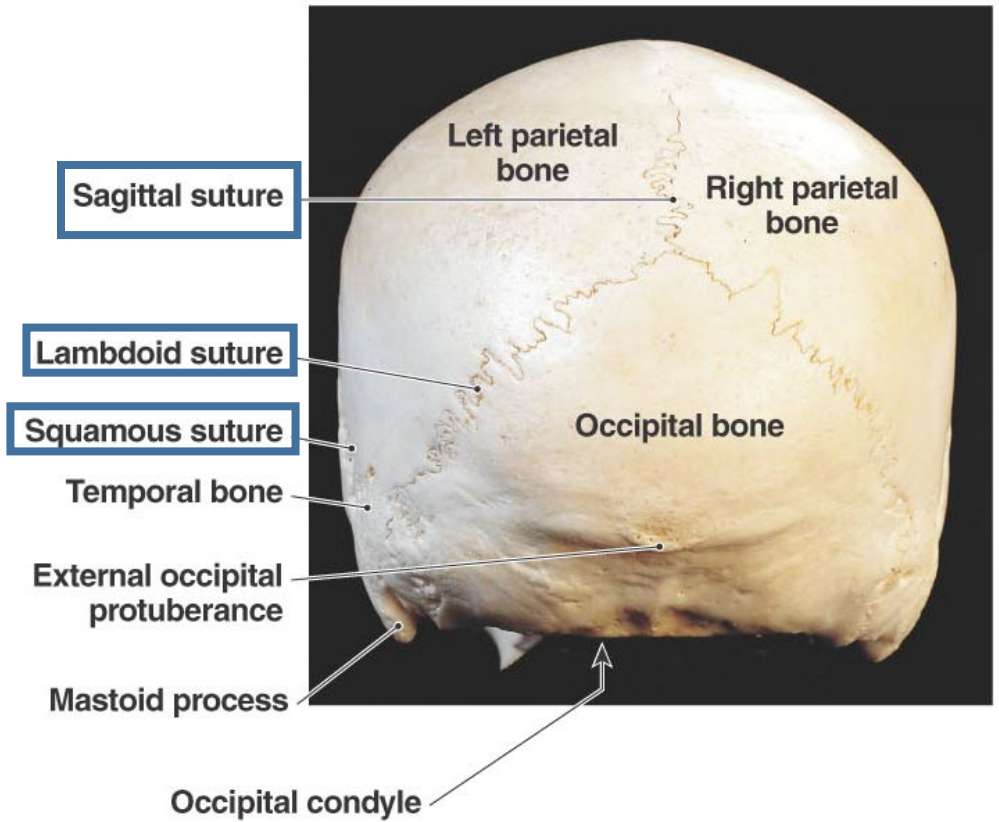
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The Skull



Anterior View



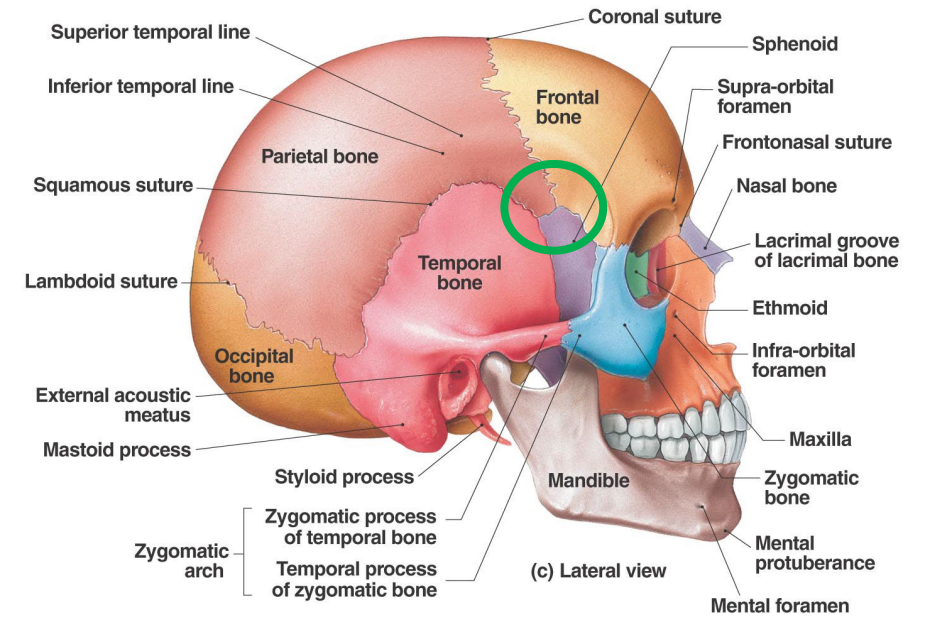
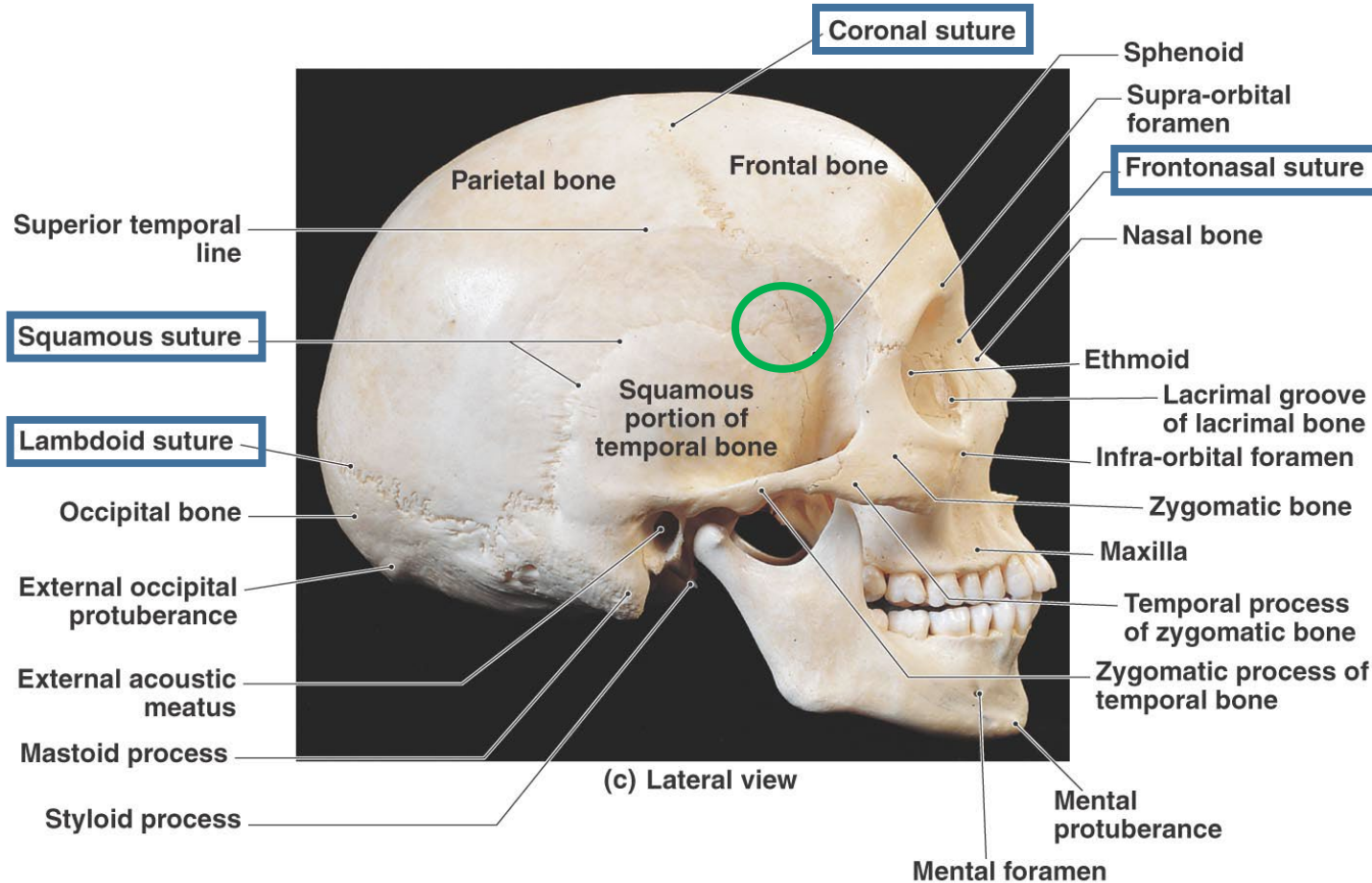
Posterior View



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The Skull



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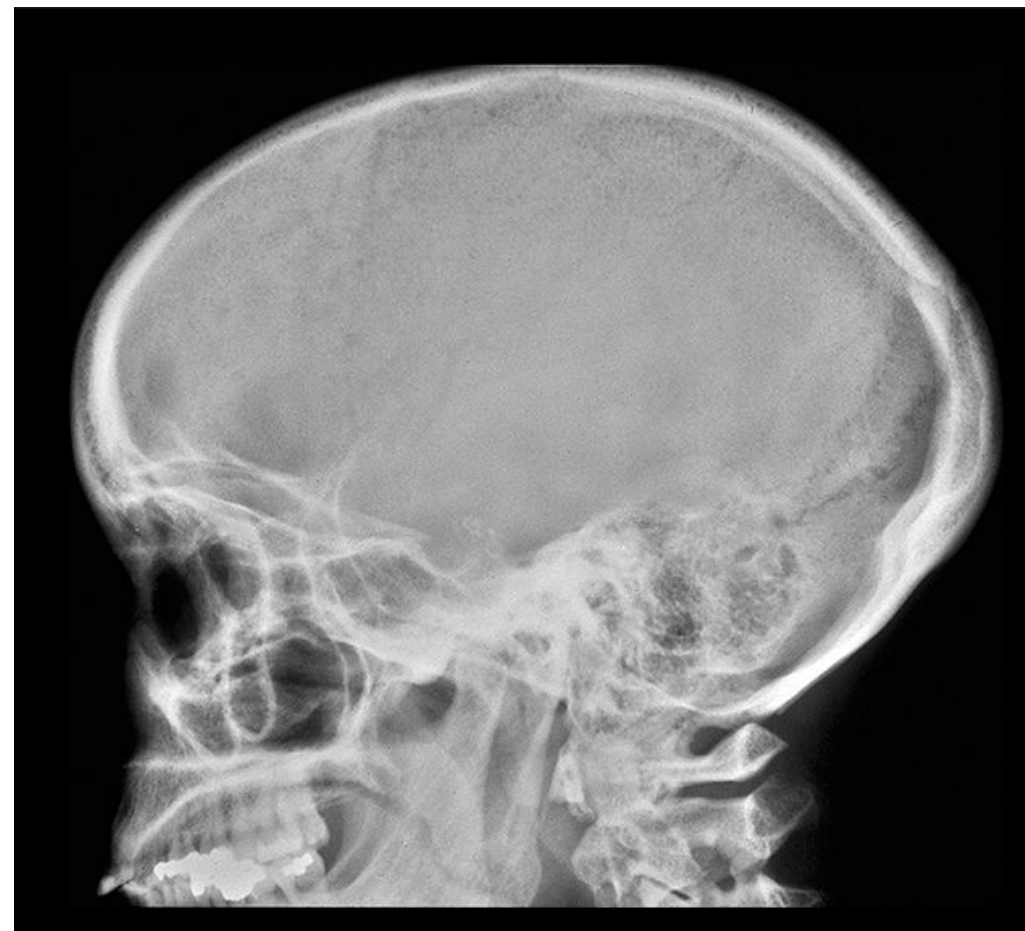
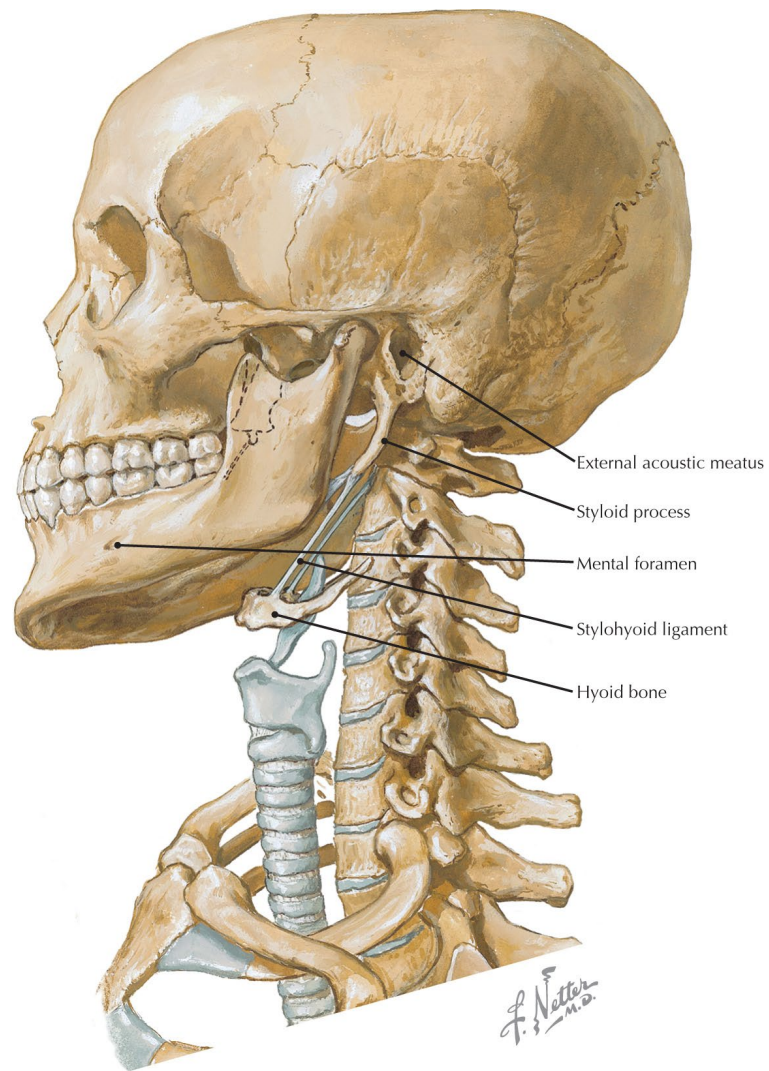
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The Skull





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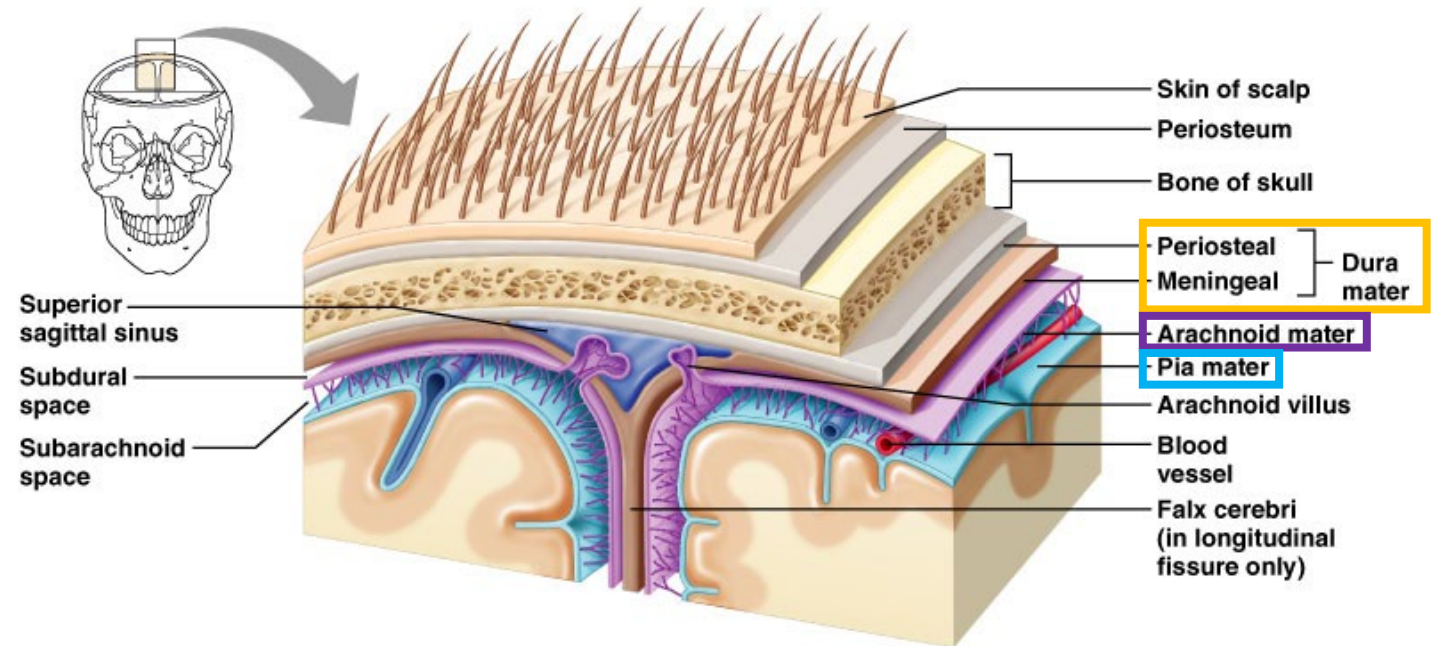


Three Cranial Meninges (from superficial to deep):

- 1) Dura Mater
- 2) Arachnoid Mater
- 3) Pia Mater

Function of the Meninges:

- Cover and protect the brain and the spinal cord
- Protect and support blood vessels
- Encloses dural venous sinuses
- Contain cerebrospinal fluid
- Partition the skull



(a)

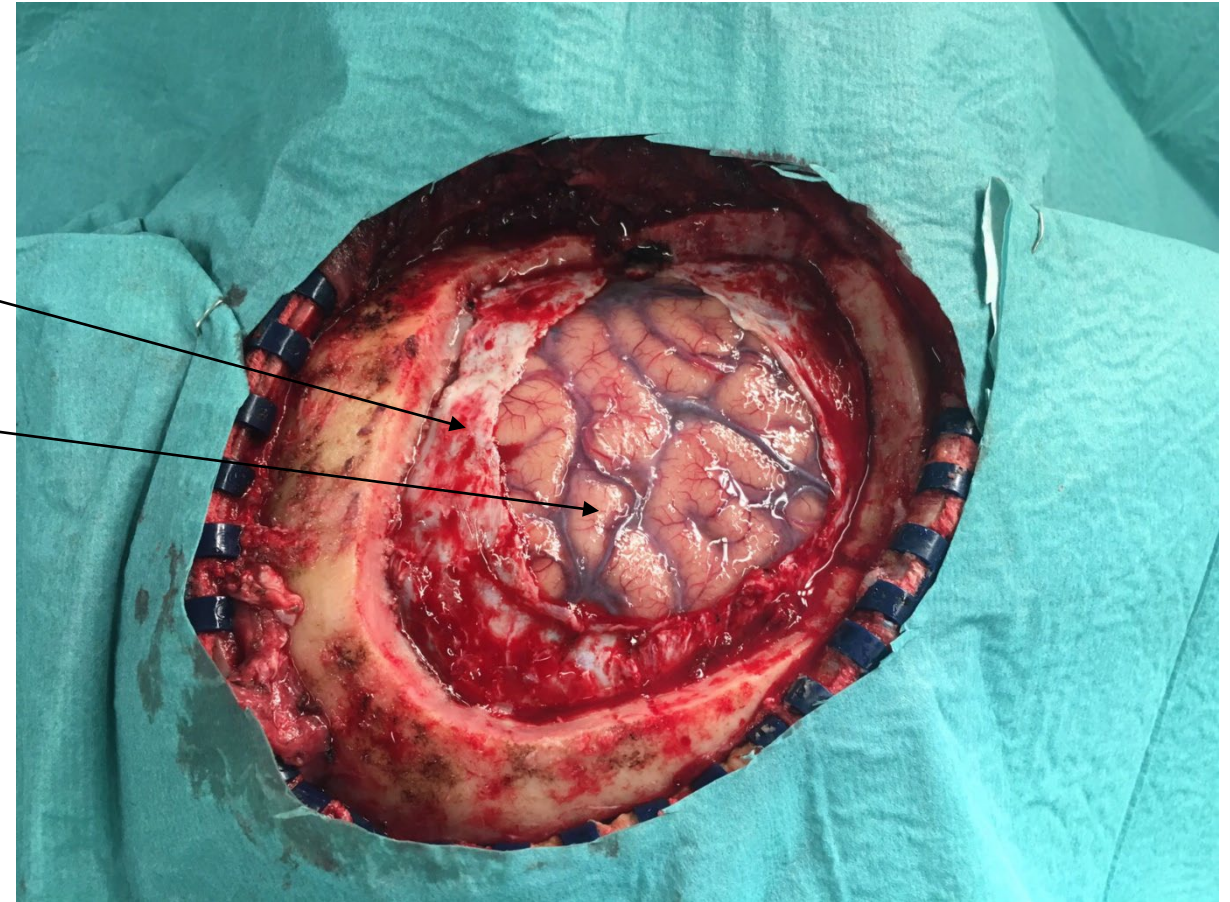
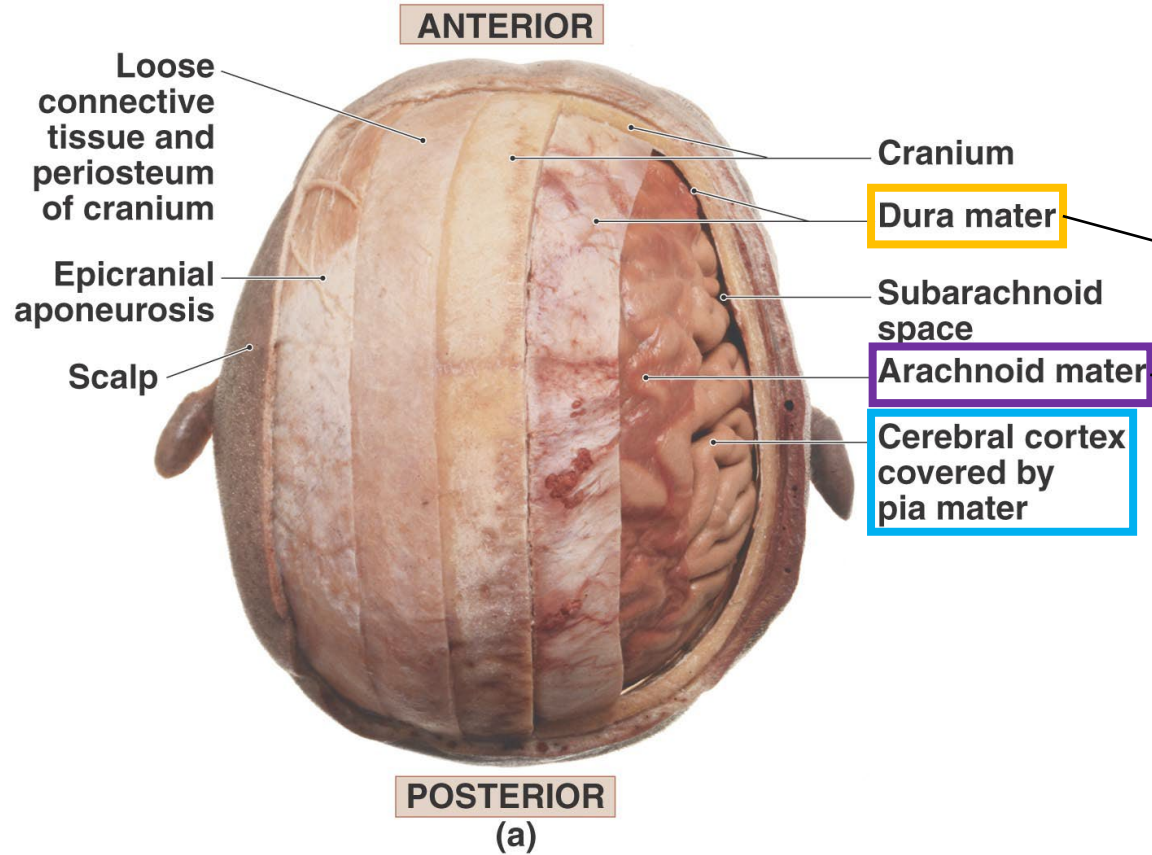
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Meninges

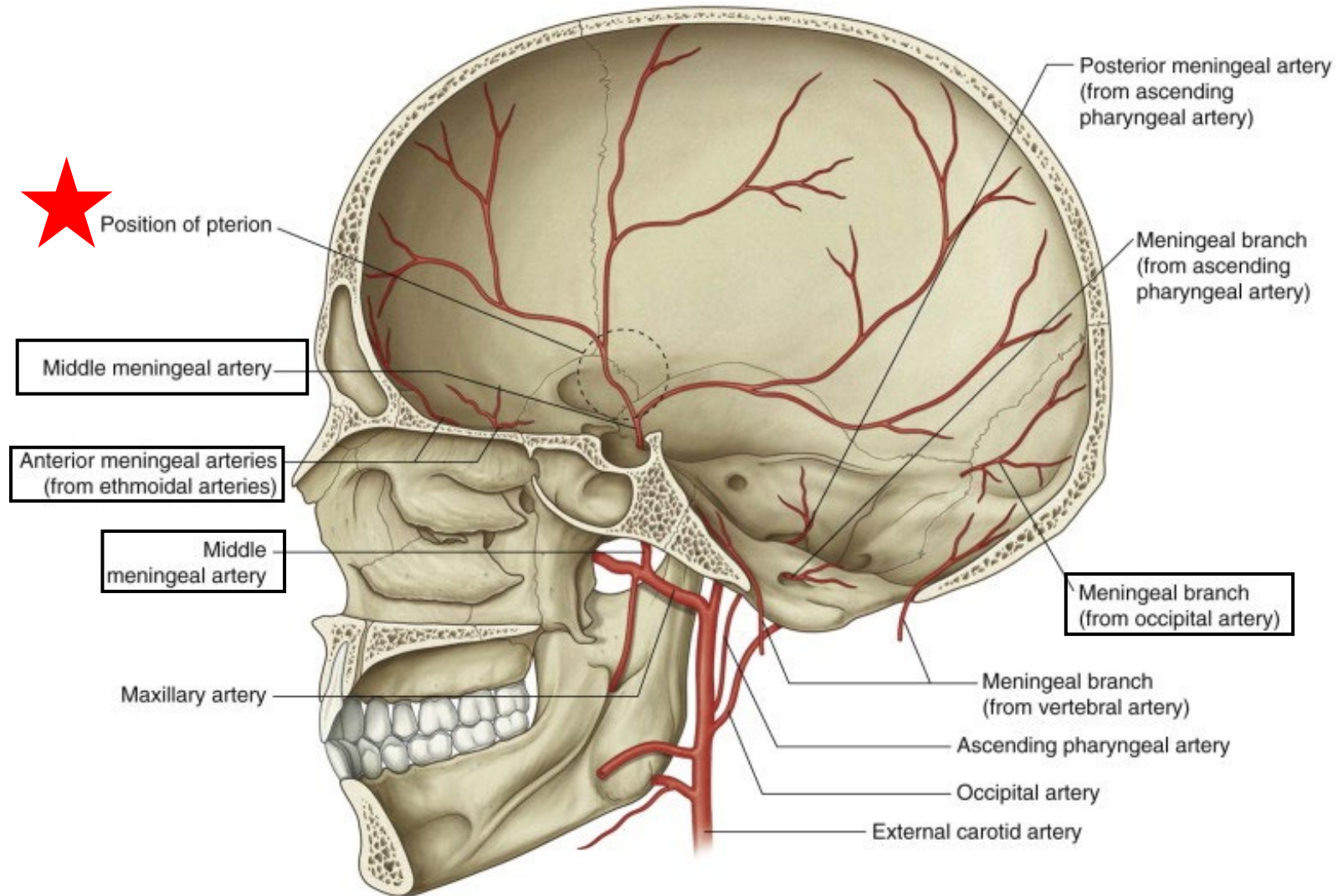




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Meningeal Blood Supply





Meningeal Spaces

Three Cranial Meninges with Spaces (from superficial to deep):

1) Epidural Space

- Potential space

2) Dura Mater

3) Subdural Space*

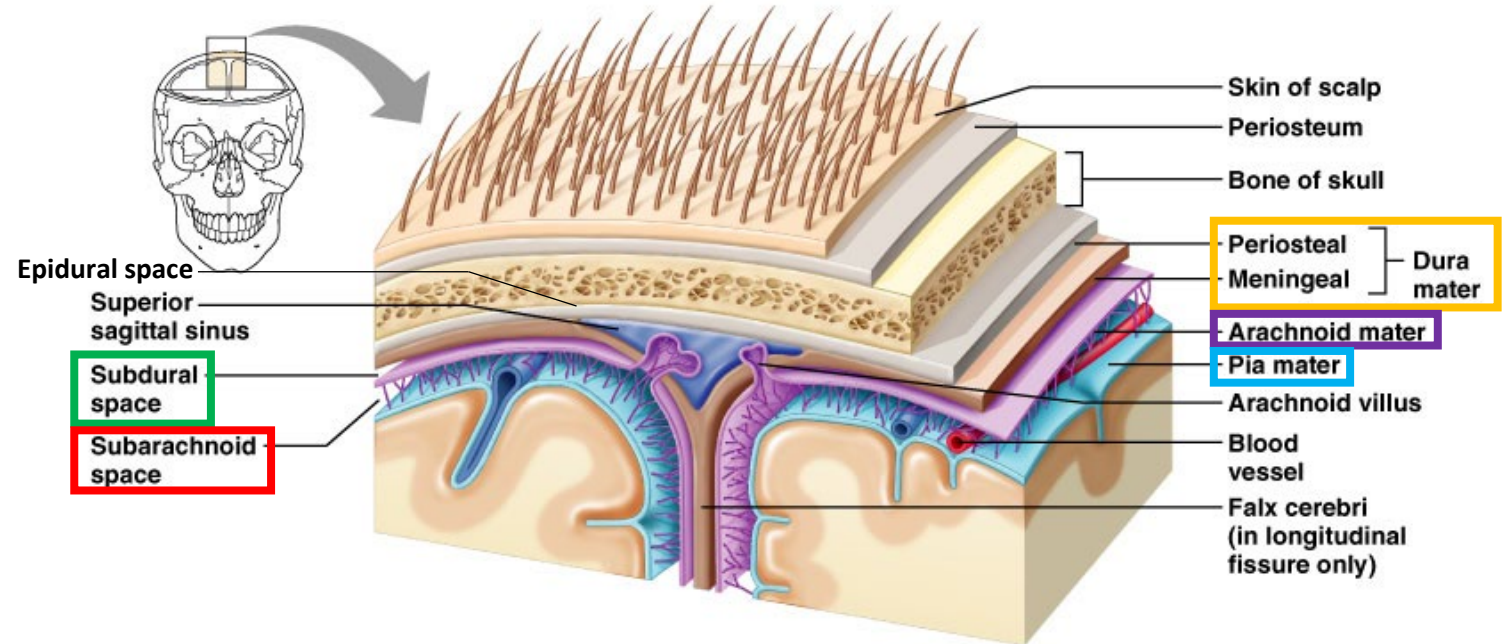
- Potential space

4) Arachnoid Mater

5) Subarachnoid Space

- Contains CSF

6) Pia Mater



(a)

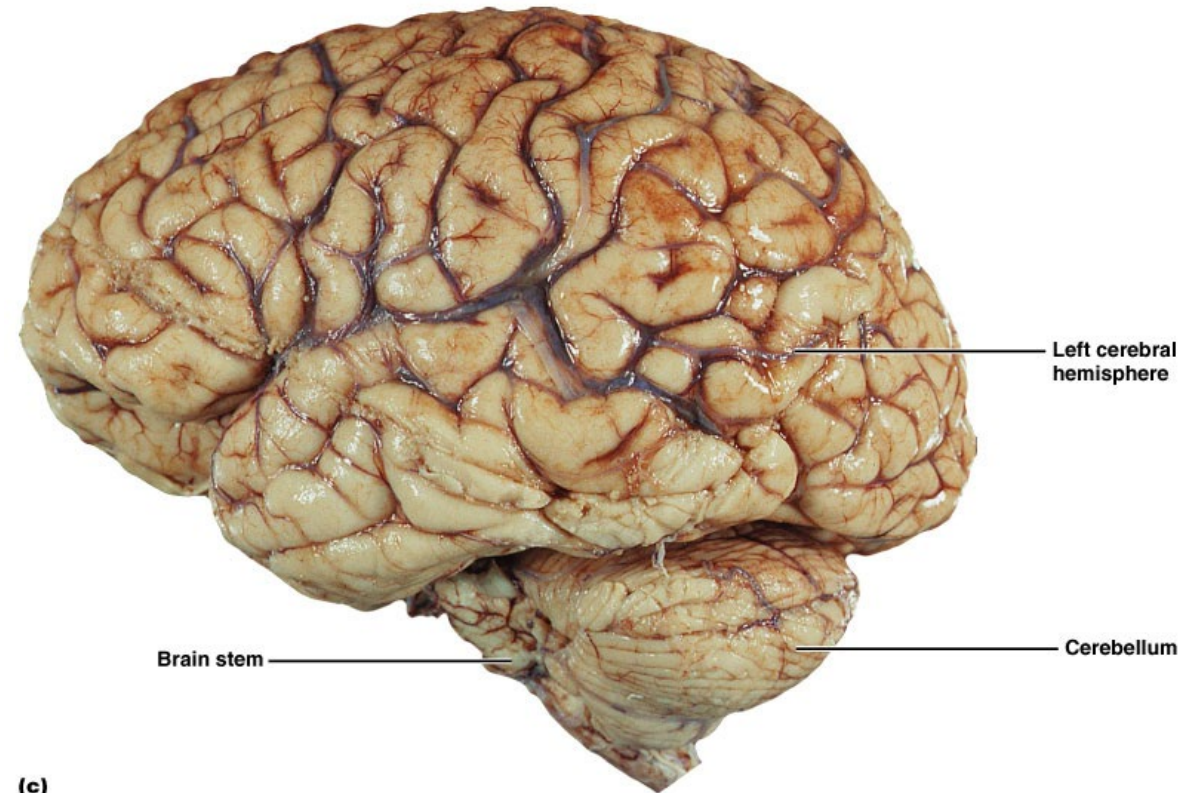


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Brain – Overview

- Part of CNS
- Main functions:
 - Receive and process sensory/afferent information
 - Plan and execute motor/efferent actions
 - Maintain homeostasis
 - Cognitive functions
- Main Components
 - Cerebrum
 - Diencephalon
 - Cerebellum
 - Brainstem



(c)

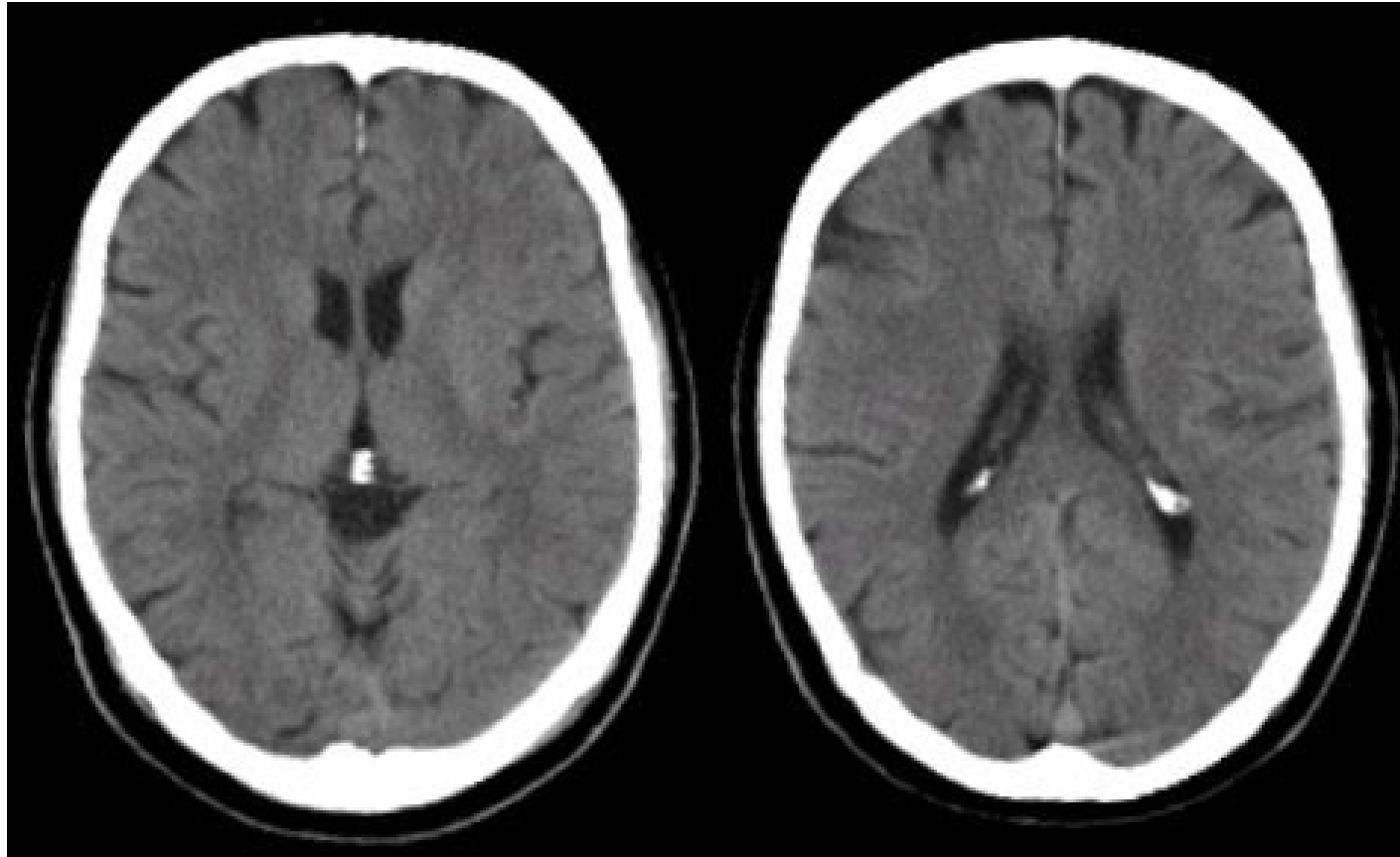
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Brain – Overview





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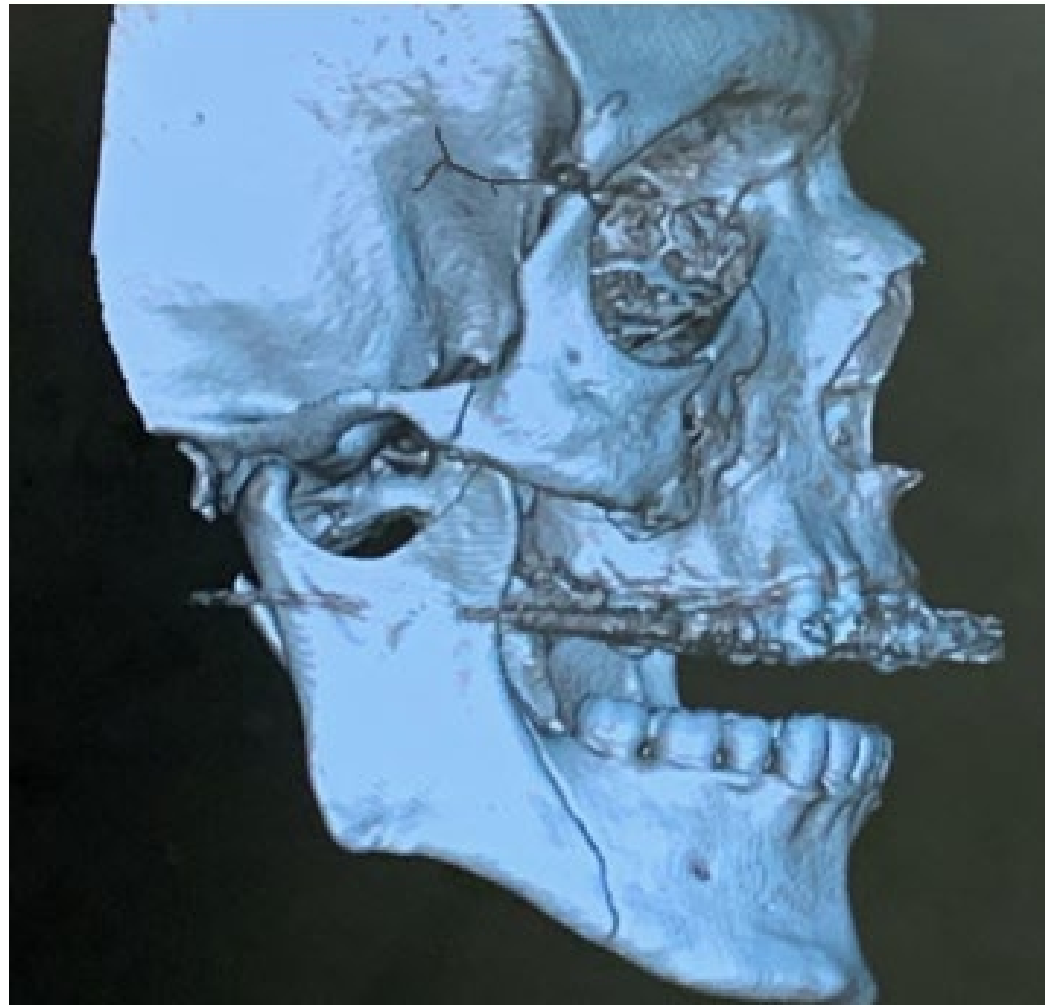
Patient Imaging



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Patient Imaging





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Patient Imaging





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What is the
diagnosis?



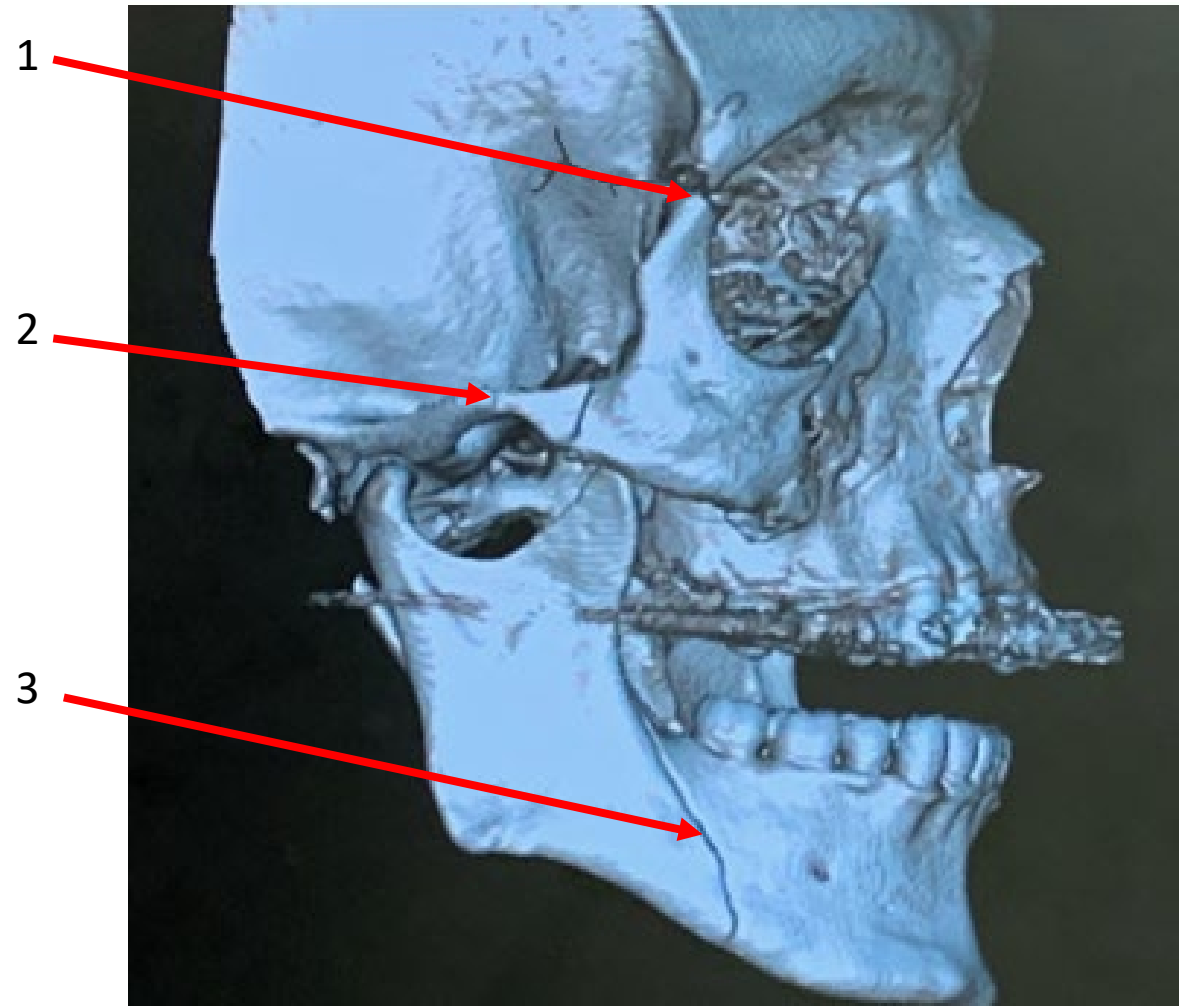
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Diagnosis

- Diagnosis:

1. Fractured orbit
2. Fractured zygomatic arch
3. Fractured mandible
4. Hematoma





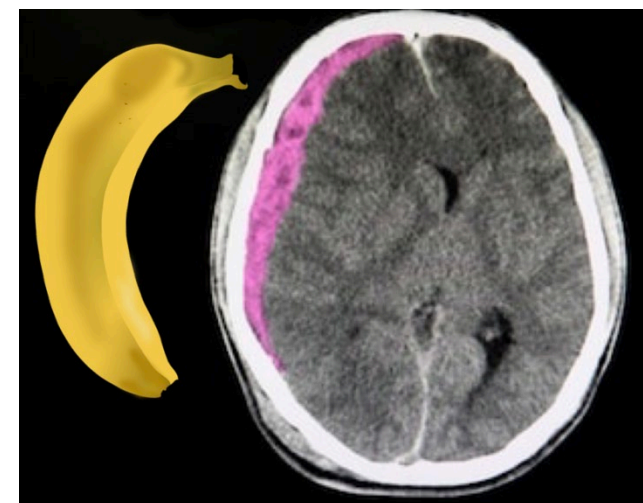
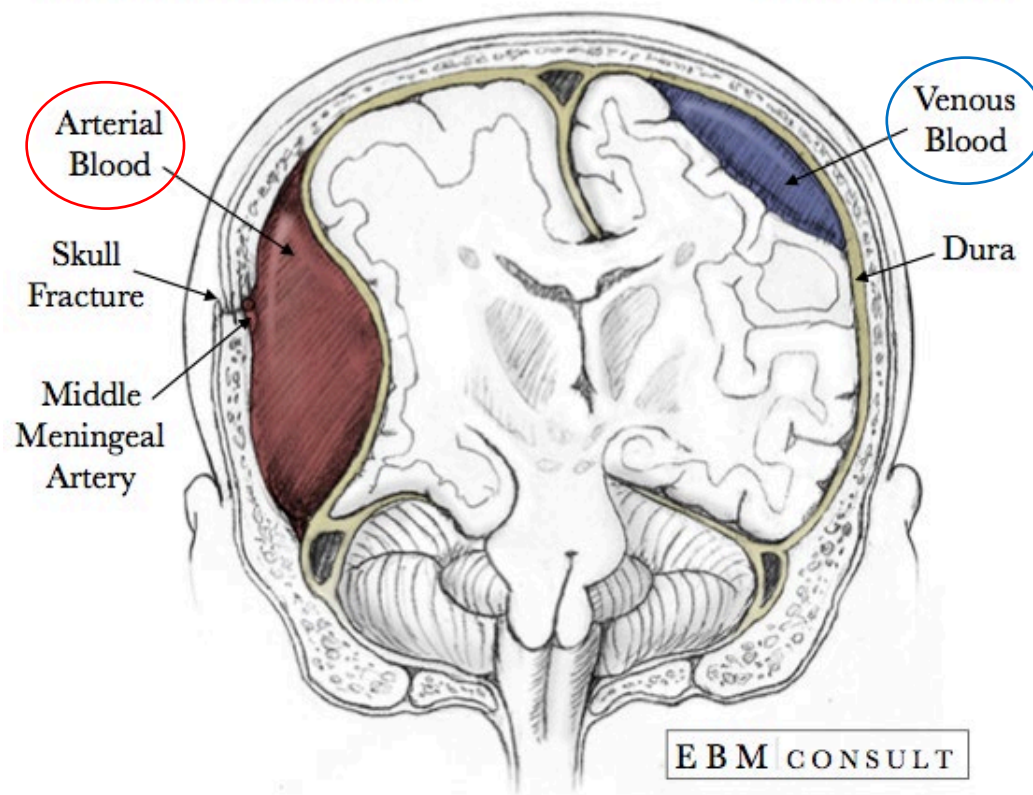
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Hematomas

Epidural Hematoma

Subdural Hematoma





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Patient Imaging





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Concerns from Diagnosis

Epidural Hematomas

- Symptoms

- Loss of consciousness
- Severe headache
- Nausea and vomiting
- An enlarged pupil in one
- Confusion
- Slurred speech
- Dizziness
- Weakness on one side of the body
- Seizures
- Breathing problems
- Loss of brain function
- Coma
- Death

- Treatments

- Surgery
- No treatment if minor
- May need rehabilitation therapy



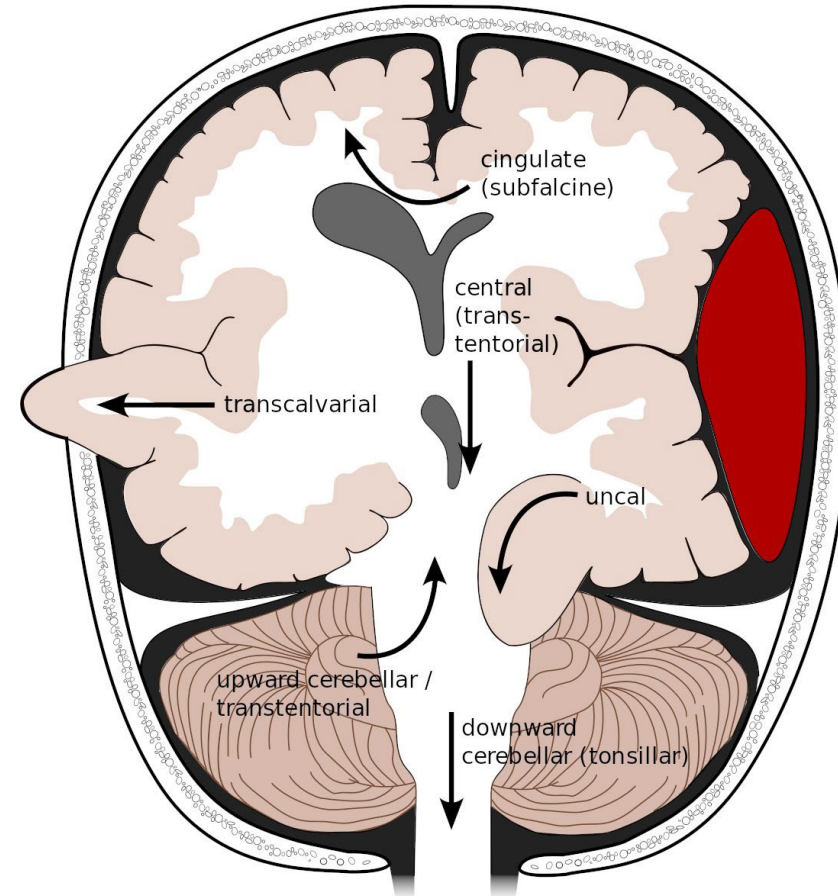
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Concerns from Diagnosis

Why did the patient's epidural hematoma produce a pupil that did not respond to light?

- Cranium is non expansible → the intracranial pressure increases → **forces part of the brain through the tentorial notch, squeezing the oculomotor nerve (CN III) → Results in a dilated, non-reacting pupil on the side of the lesion**





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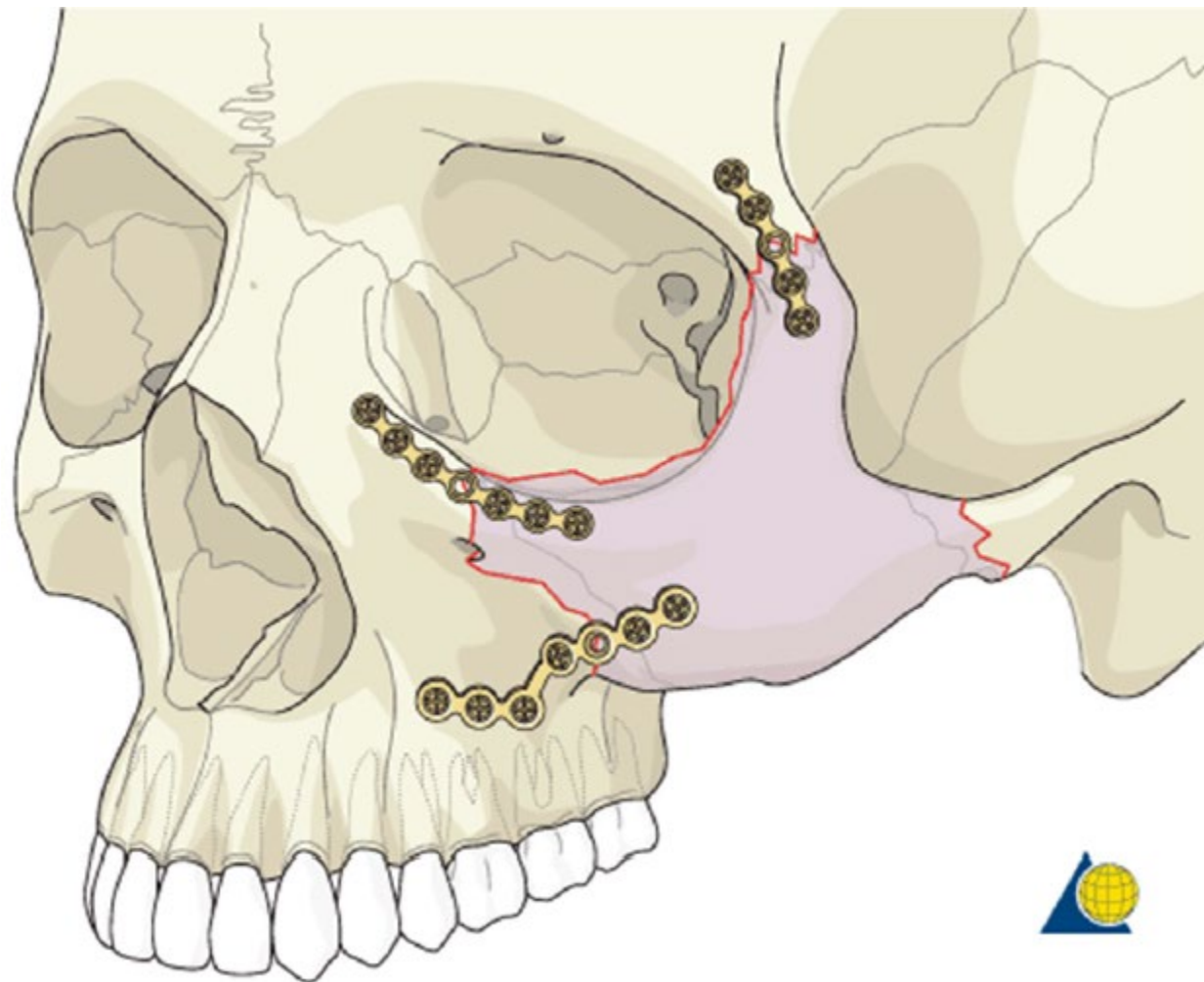
Treatment

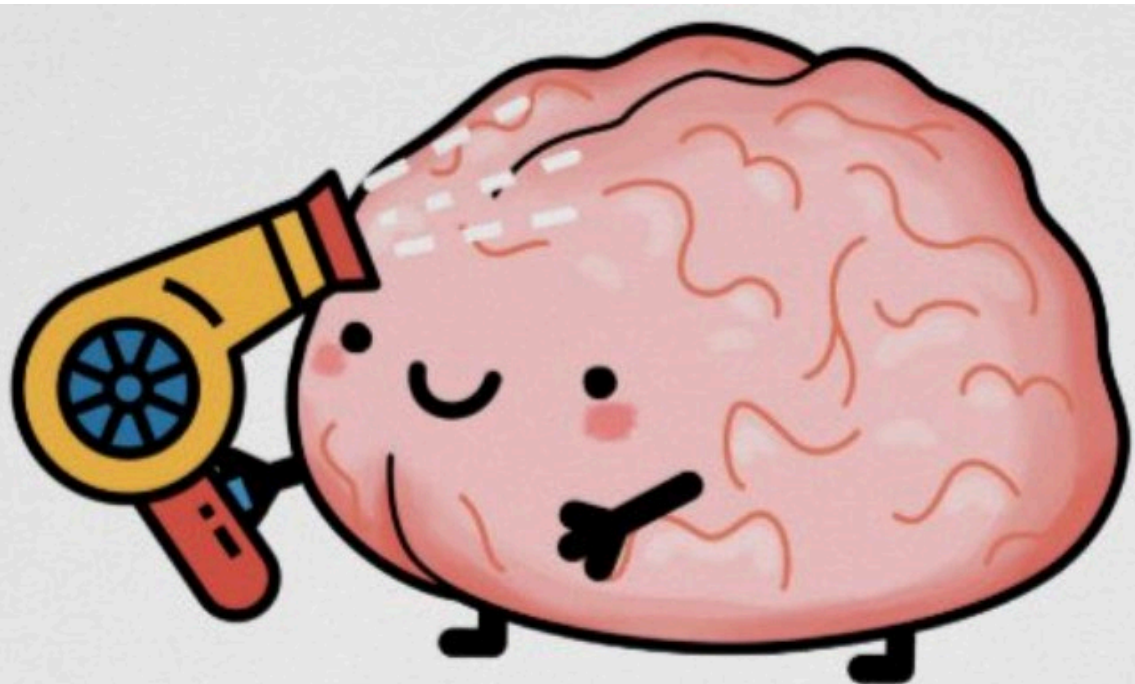


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Fracture Repair Surgery





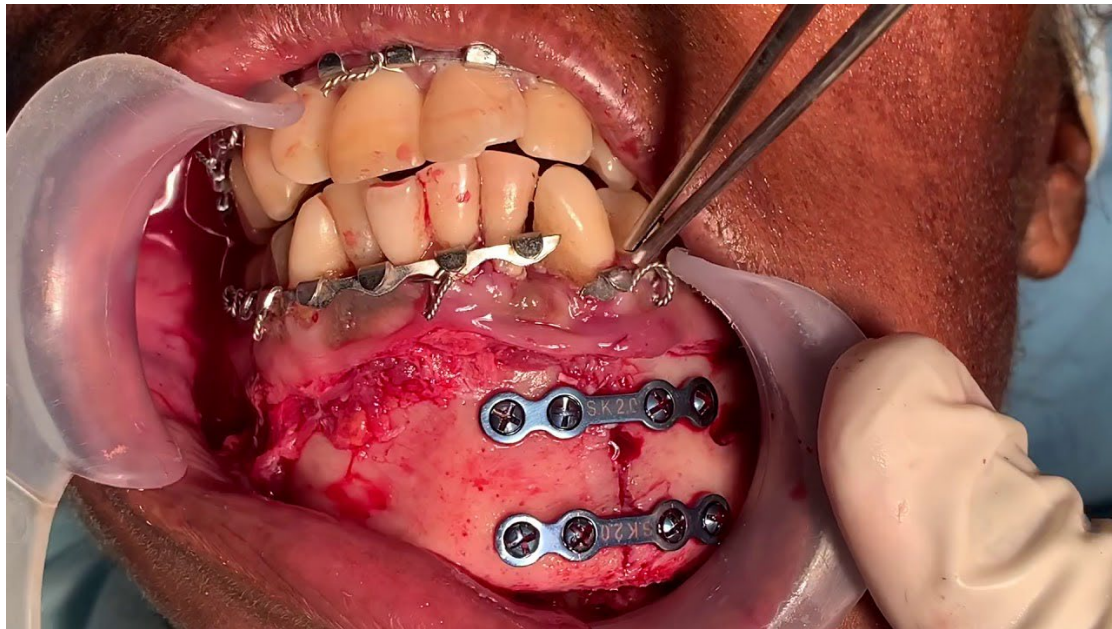
**BLOW YOUR
MIND!!**



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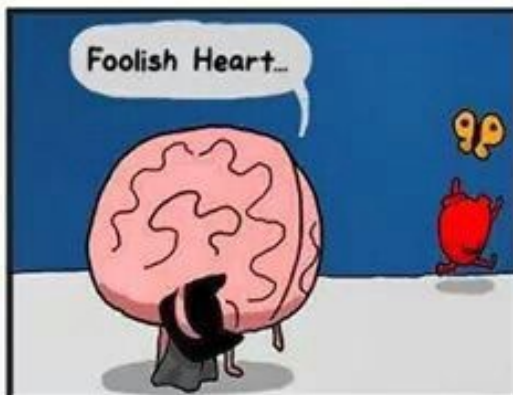
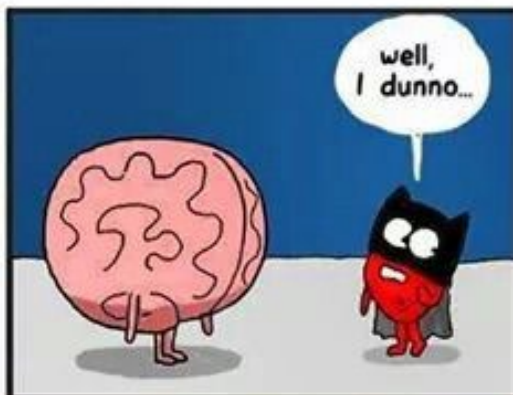
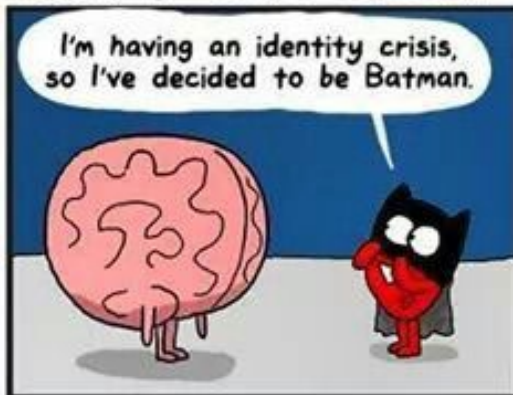
Fracture Repair Surgery



*Note these are from various other patients.

Heart and Brain

THE AWKWARD YETI



Any Questions?