



آسیب های نروماتیک سر و ستون فقرات

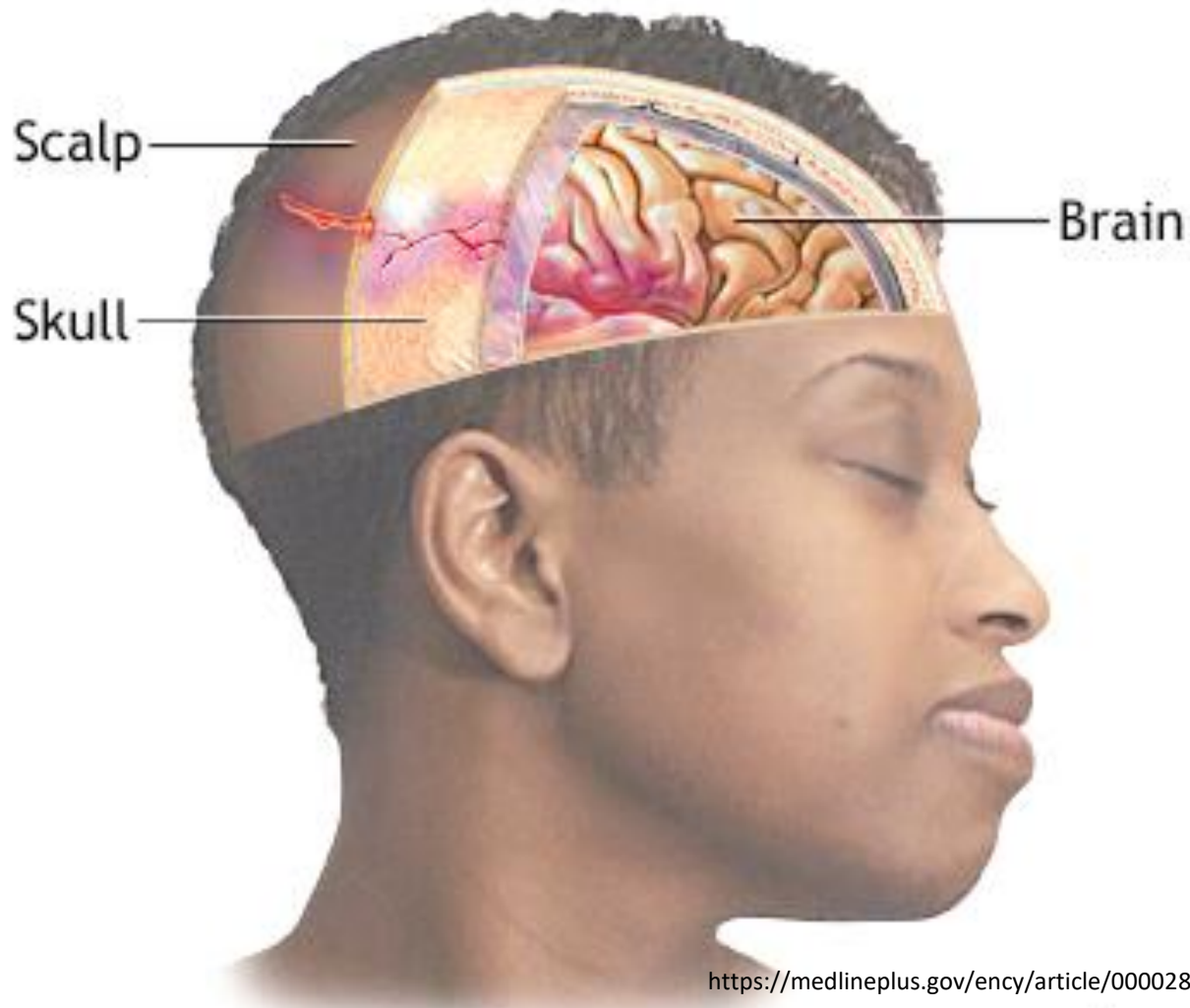
دکتر آرش فتاحی

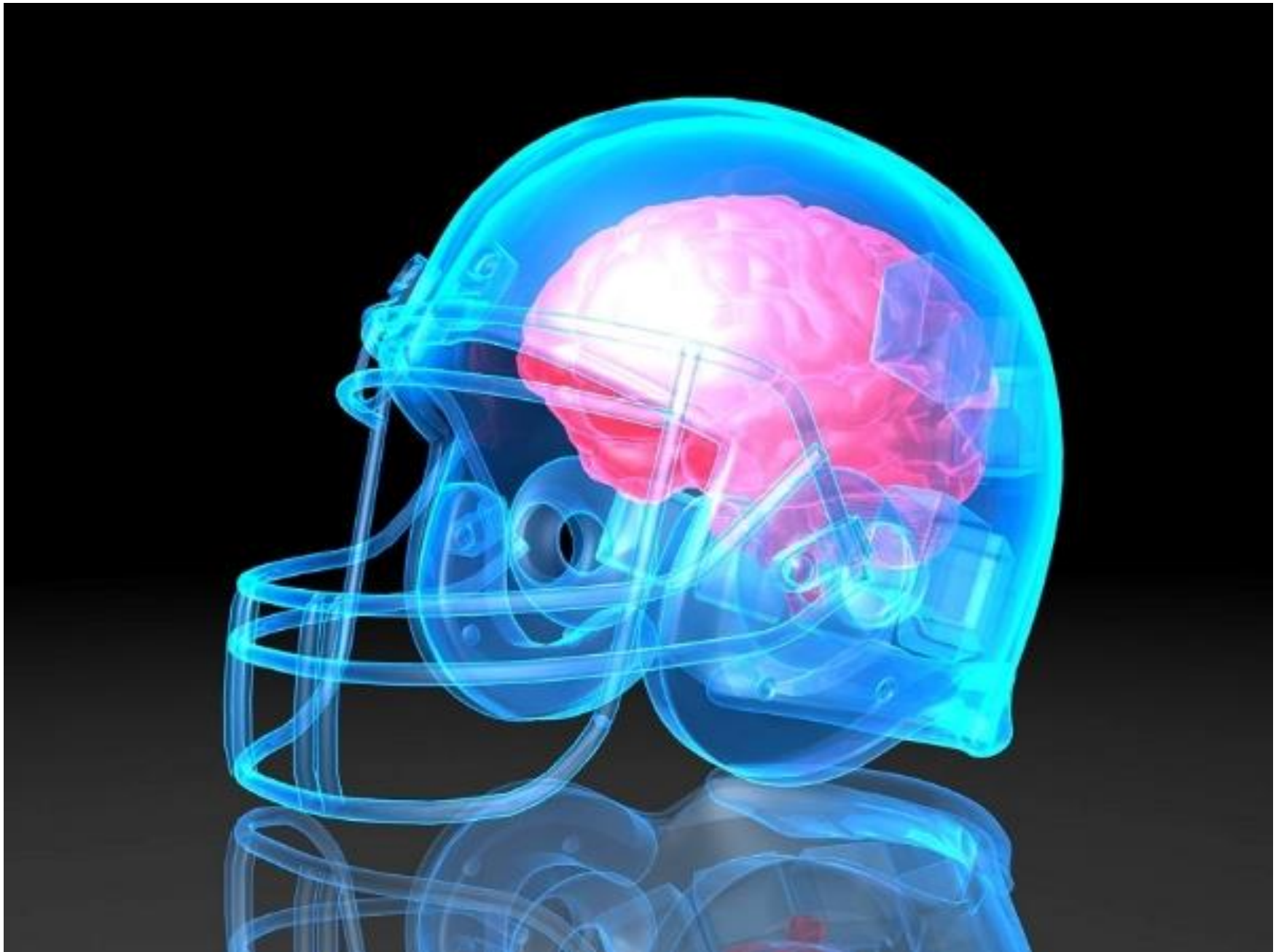
استادیار دانشگاه علوم پزشکی ایران

بیمارستان شهدای هفتم تیر

آسیب تروماتیک جمجمه

Head Trauma refers to any damage to the Scalp, Skull or Brain







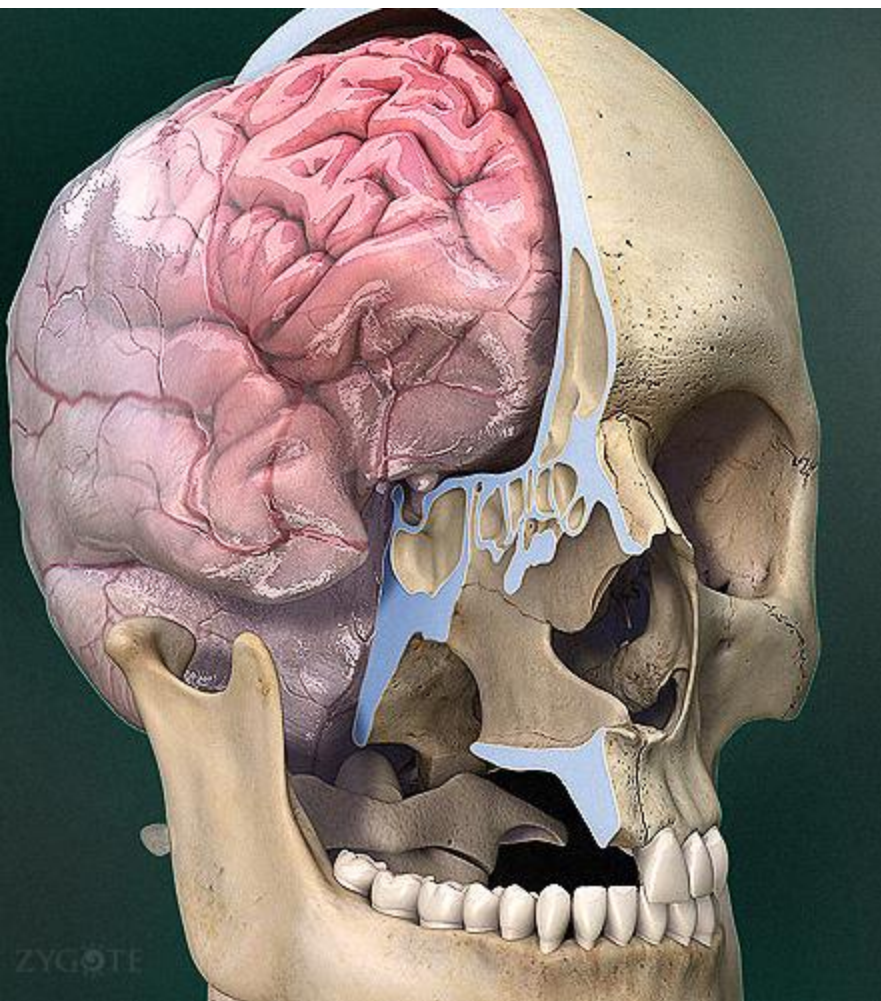
Cráneo de hombre adulto.
Trepación Corto-Cónica



First Brain Surgery:

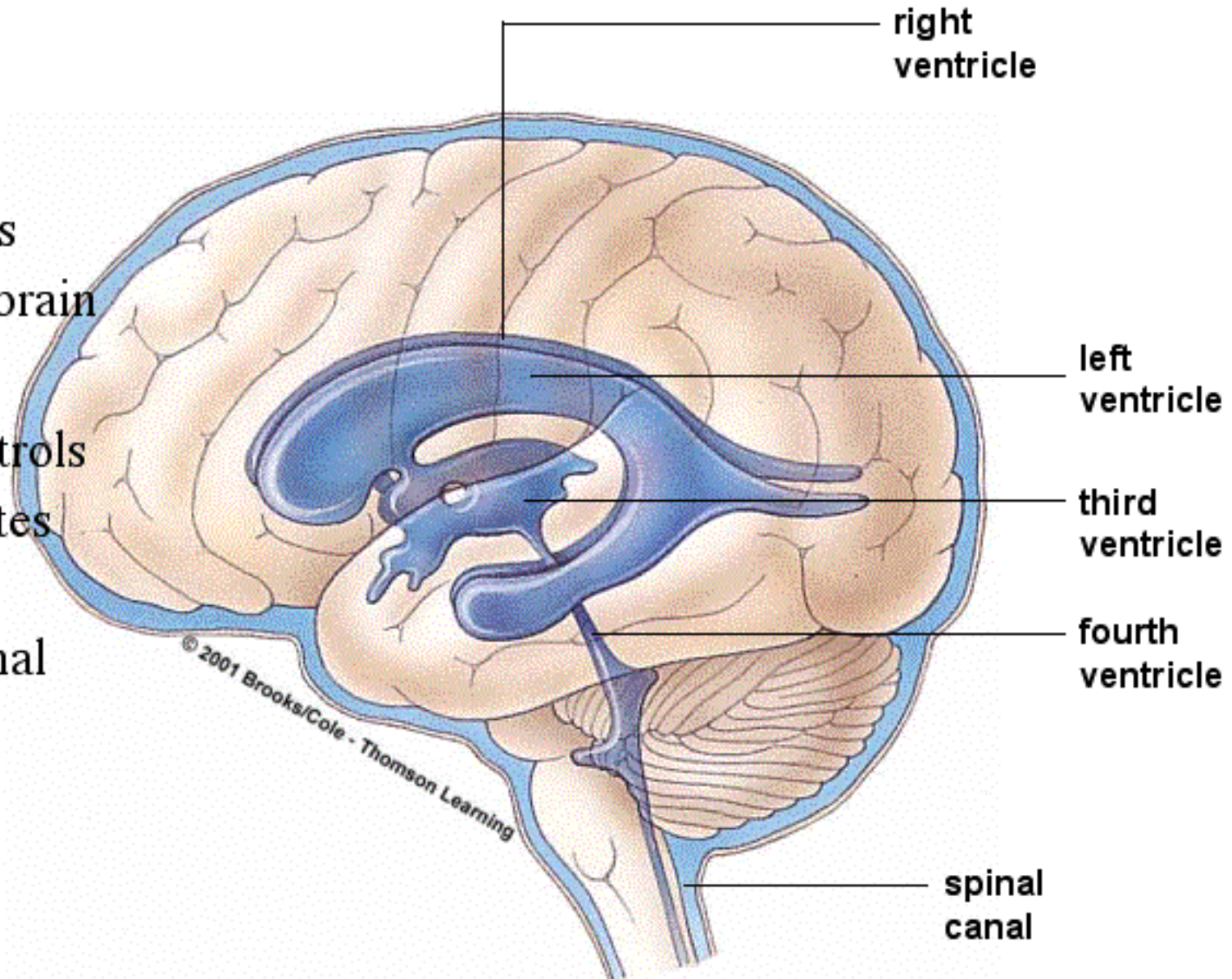
- ***Incas*** : trepanation since the late Stone age (between 8700 BCE and 2000 BCE)
- ***Abu al-Qasim al-Zahrawi*** (Latinized as ***Albucasis***) provides descriptions of the instruments used by Arab surgeons in the twelfth century.

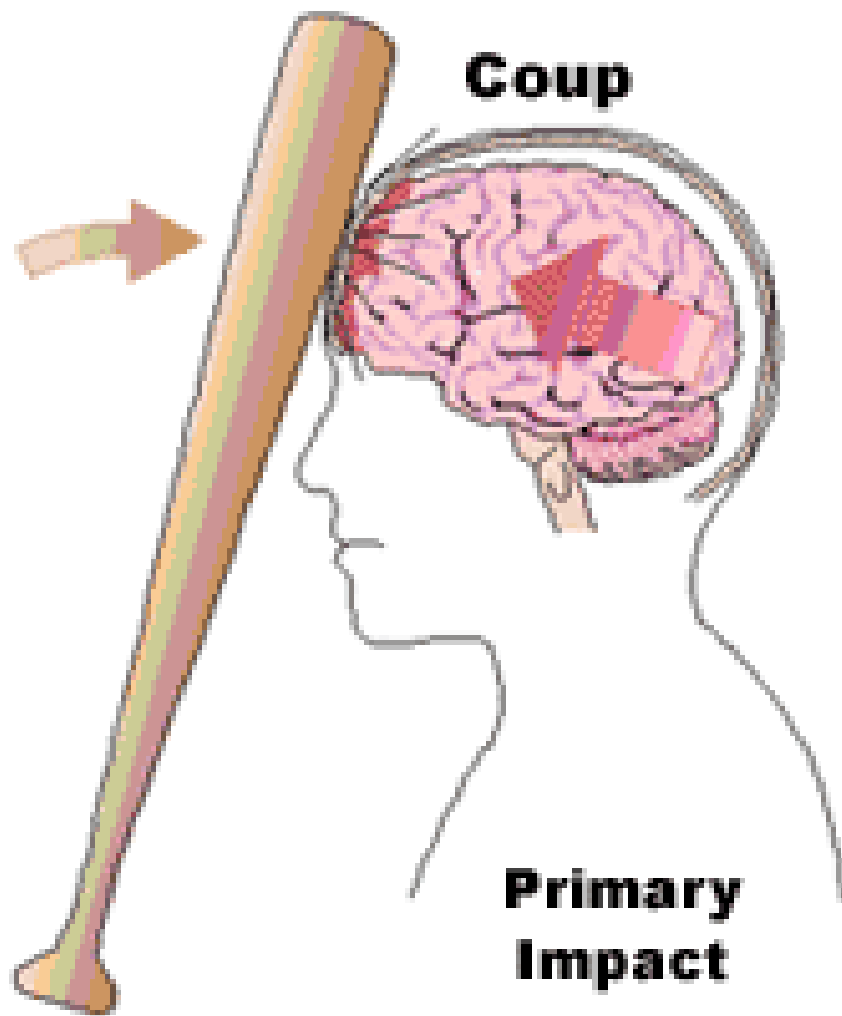




Cerebrospinal Fluid (CSF)

Surrounds the spinal cord
Fills ventricles within the brain
Blood-brain barrier controls which solutes enter the cerebrospinal fluid





تشخیص آسیب های مغزی

- Acanthiomeatal line (AML)

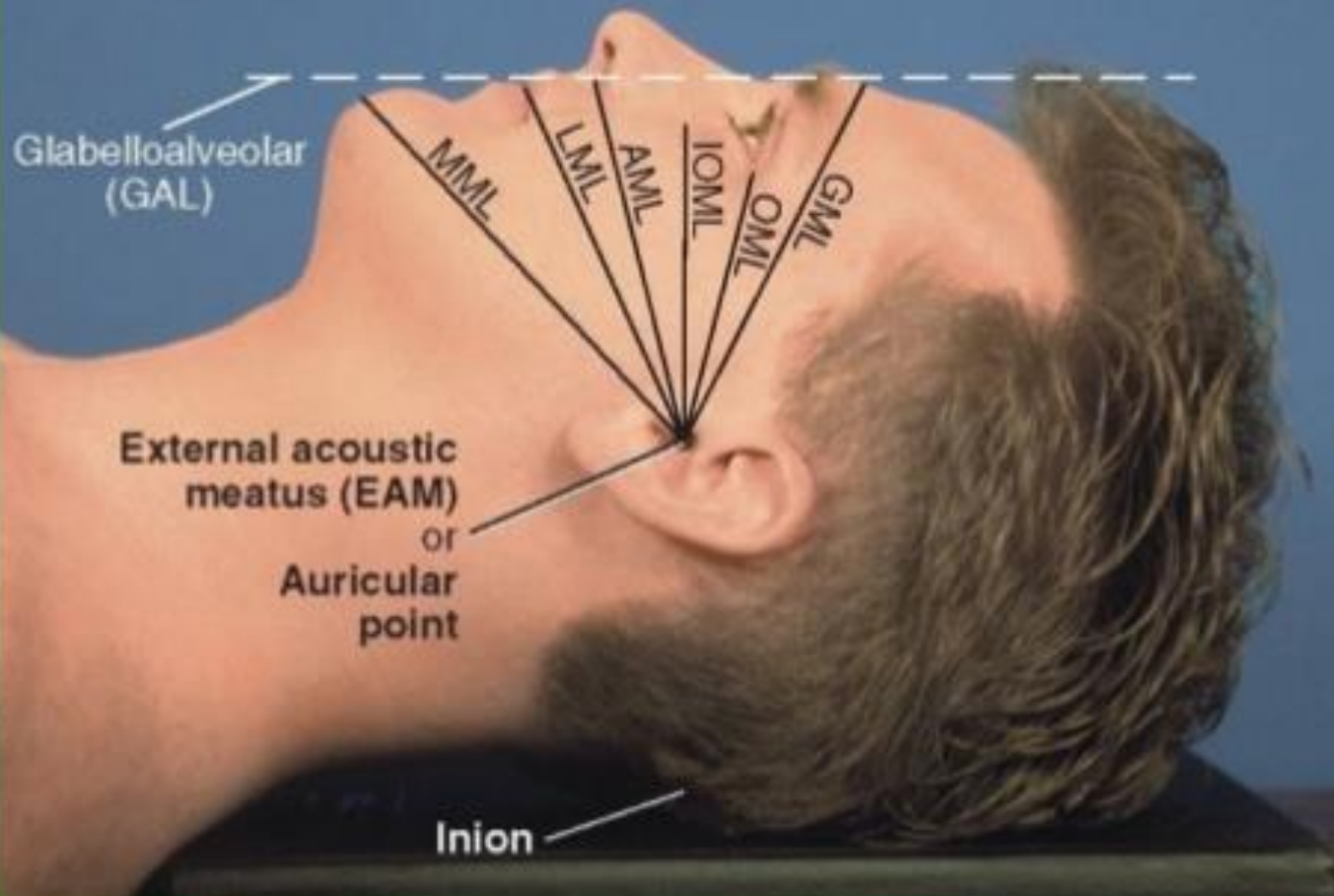
- Lips-meatal line (LML)

- Mentomeatal line (MML)

- Glabellomeatal line (GML)

- Orbitomeatal line (OML)

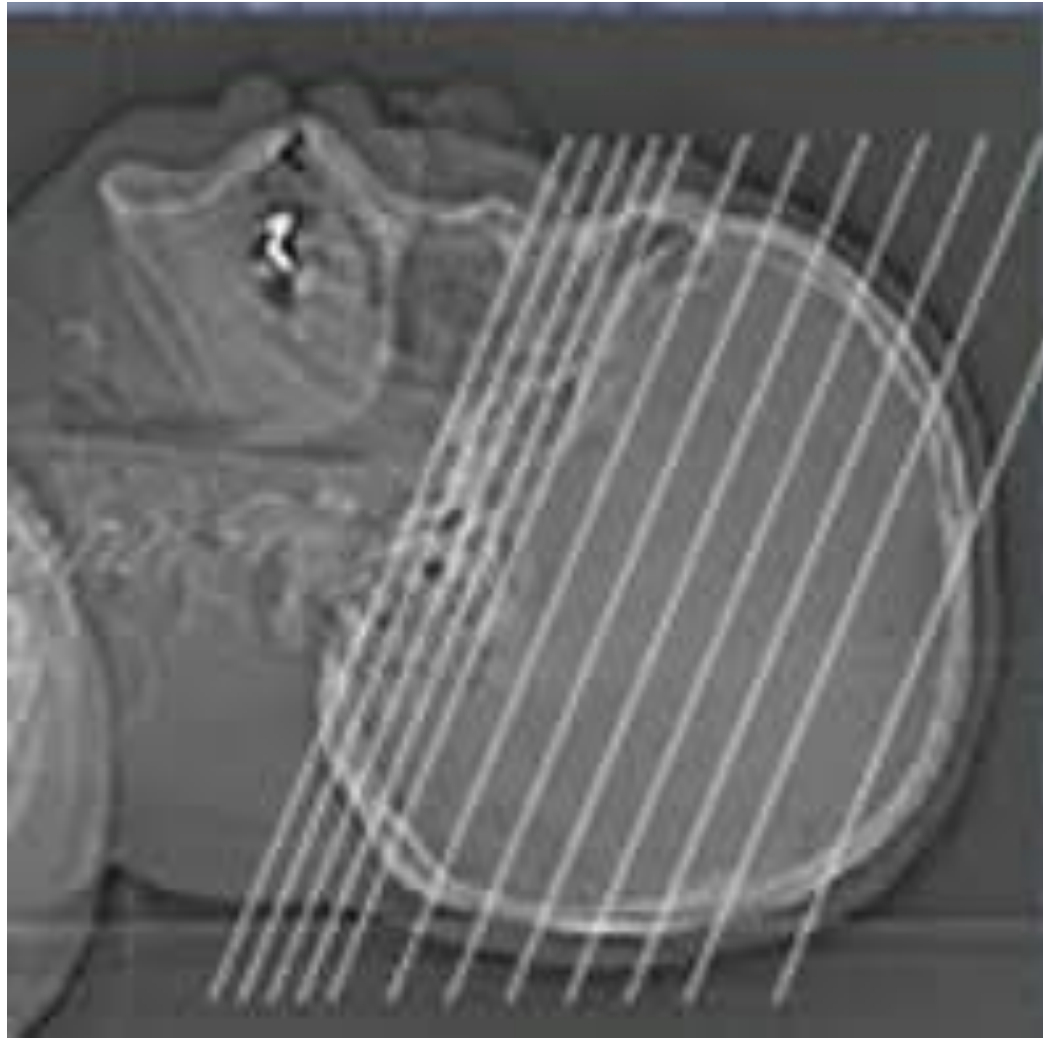
- Infraorbitomeatal line (IOML)
(Reid's base line)



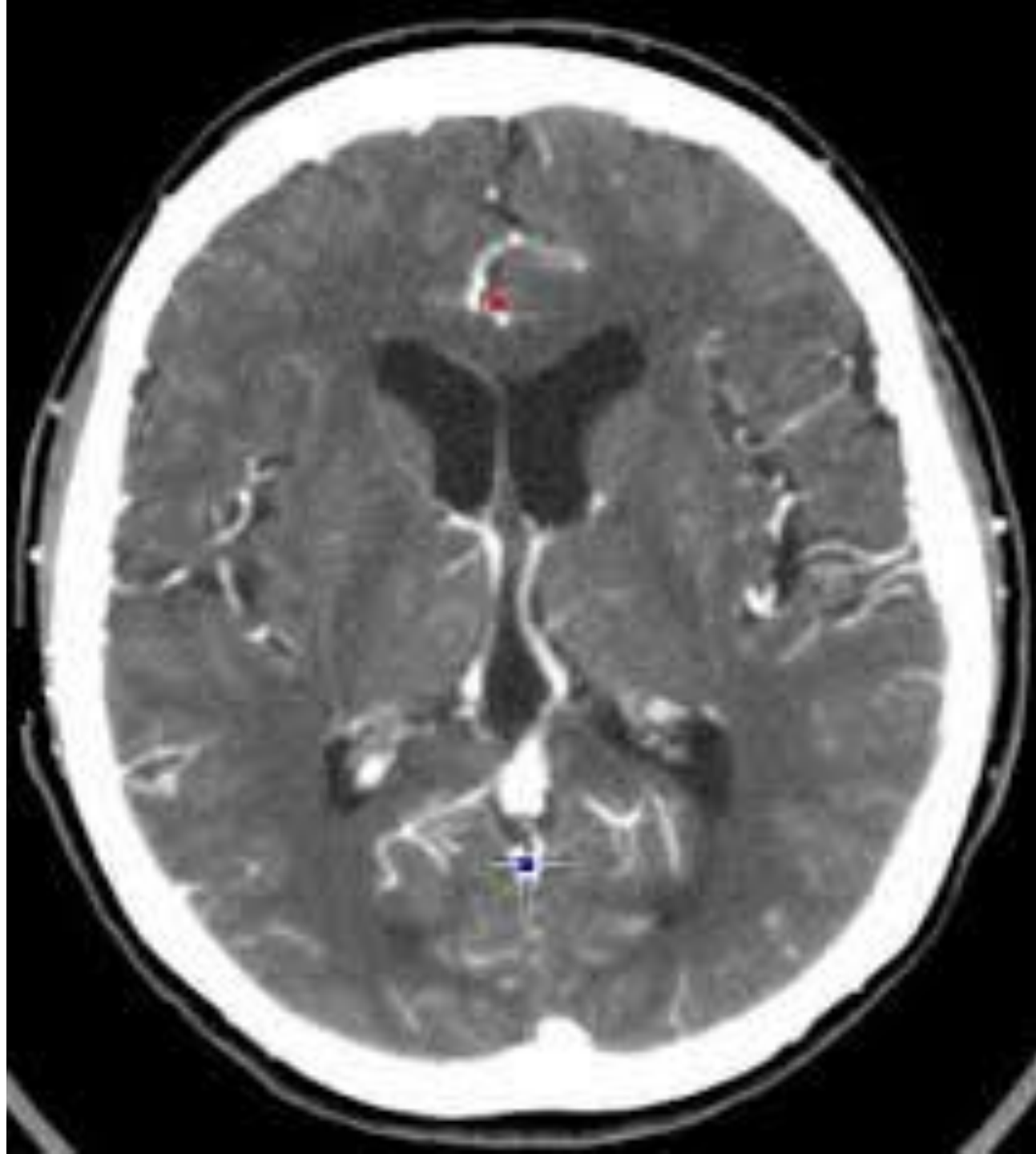
Glabelloalveolar (GAL)

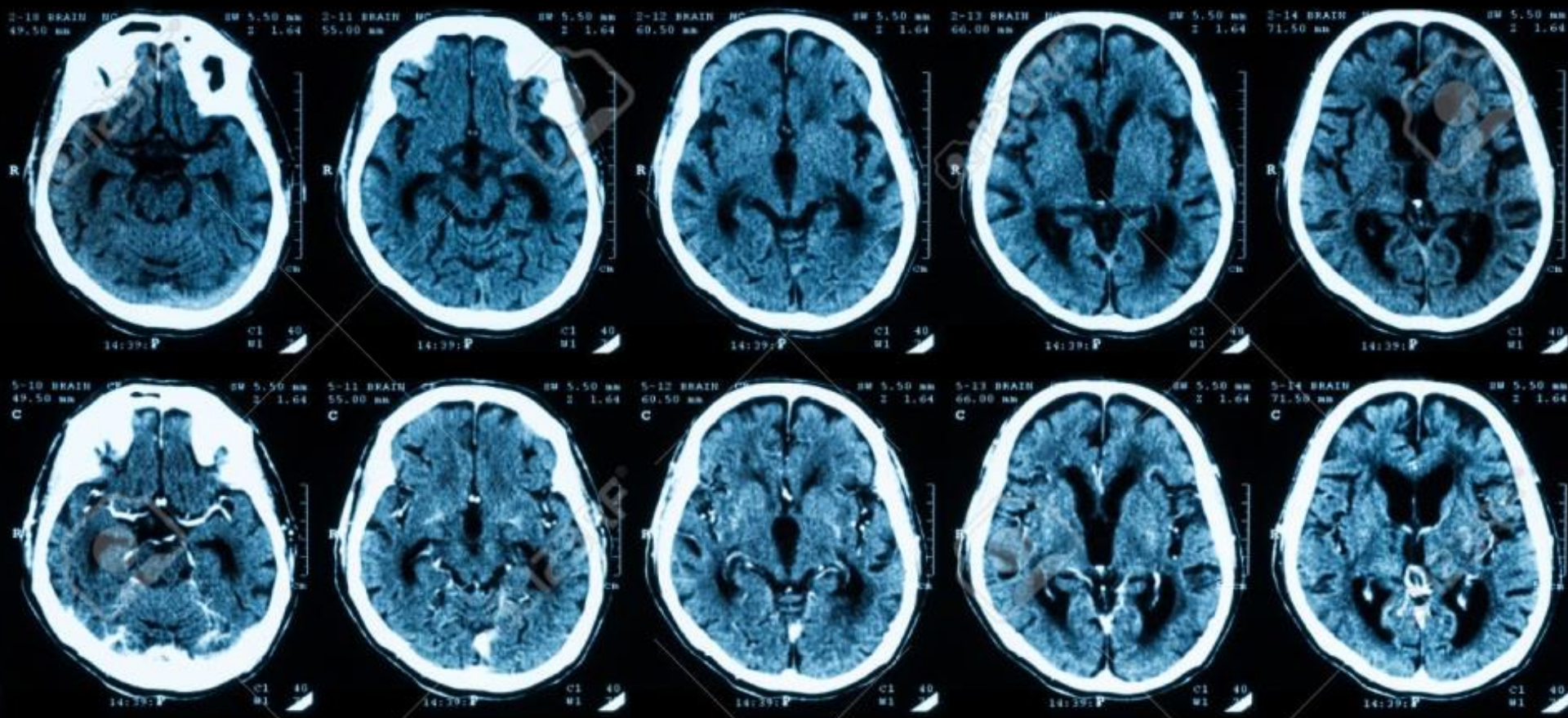
External acoustic meatus (EAM)
or
Auricular point

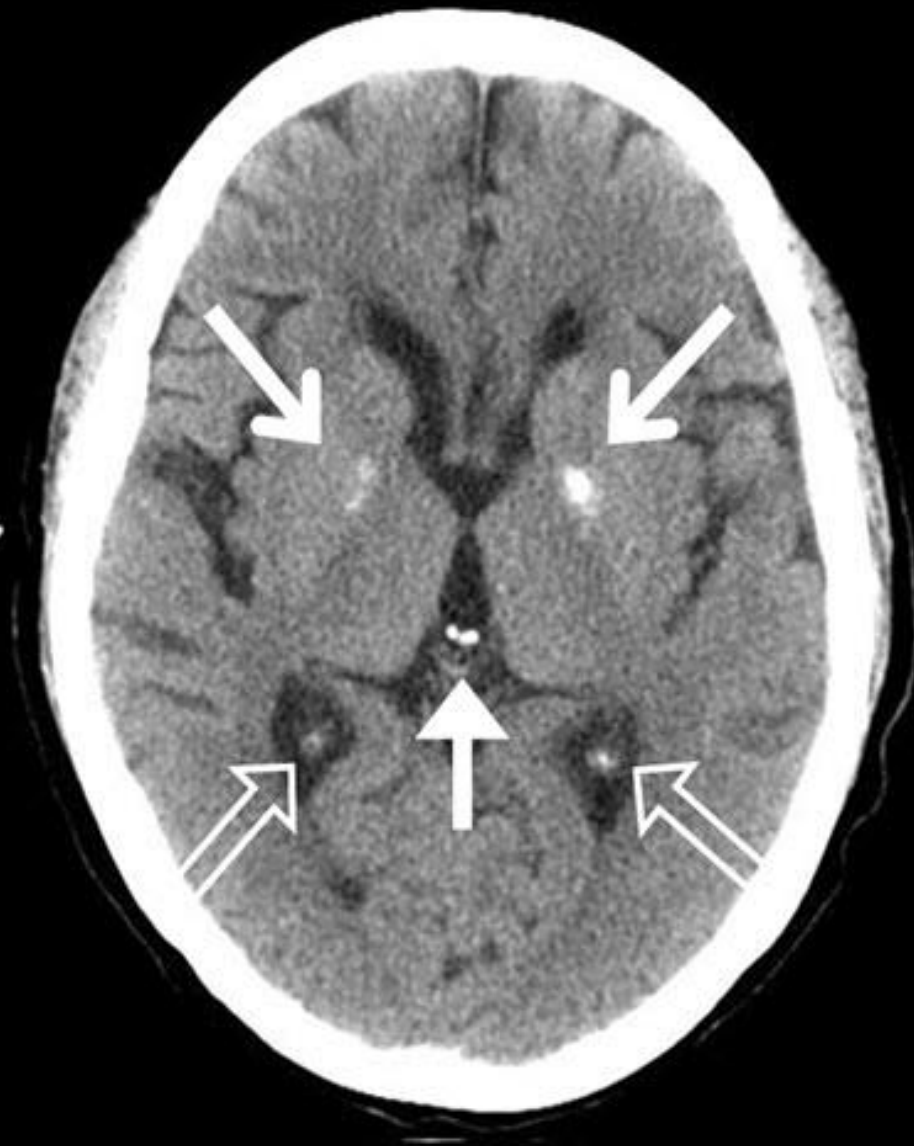
Inion







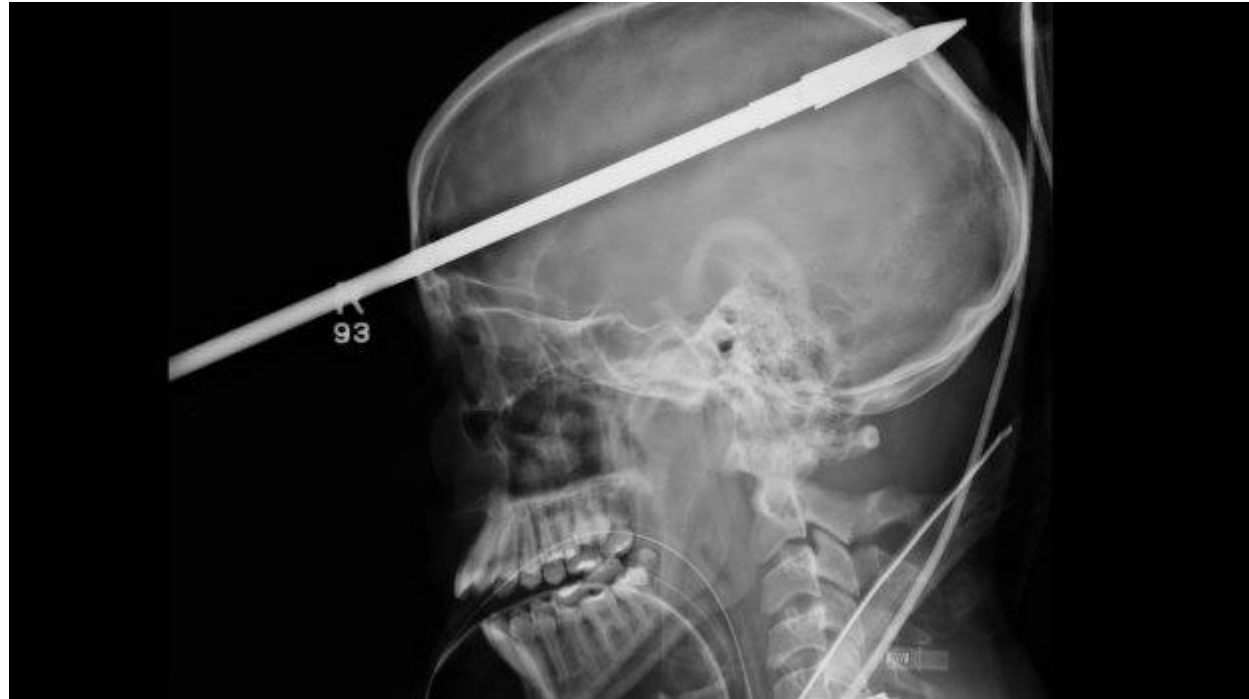




انواع آسیب های مغز

Penetrating (Open) or Non-penetrating (Closed)

- Penetrating objects to skull:
 - Have a small impact site (<2 Inch² : means less than 5×5 cm)
 - Have a high acceleration



Mechanisms of Head Injury

Static/ Quasi-static Loading

Penetrating

Non-penetrating

Dynamic Loading

Impact

Impulsive

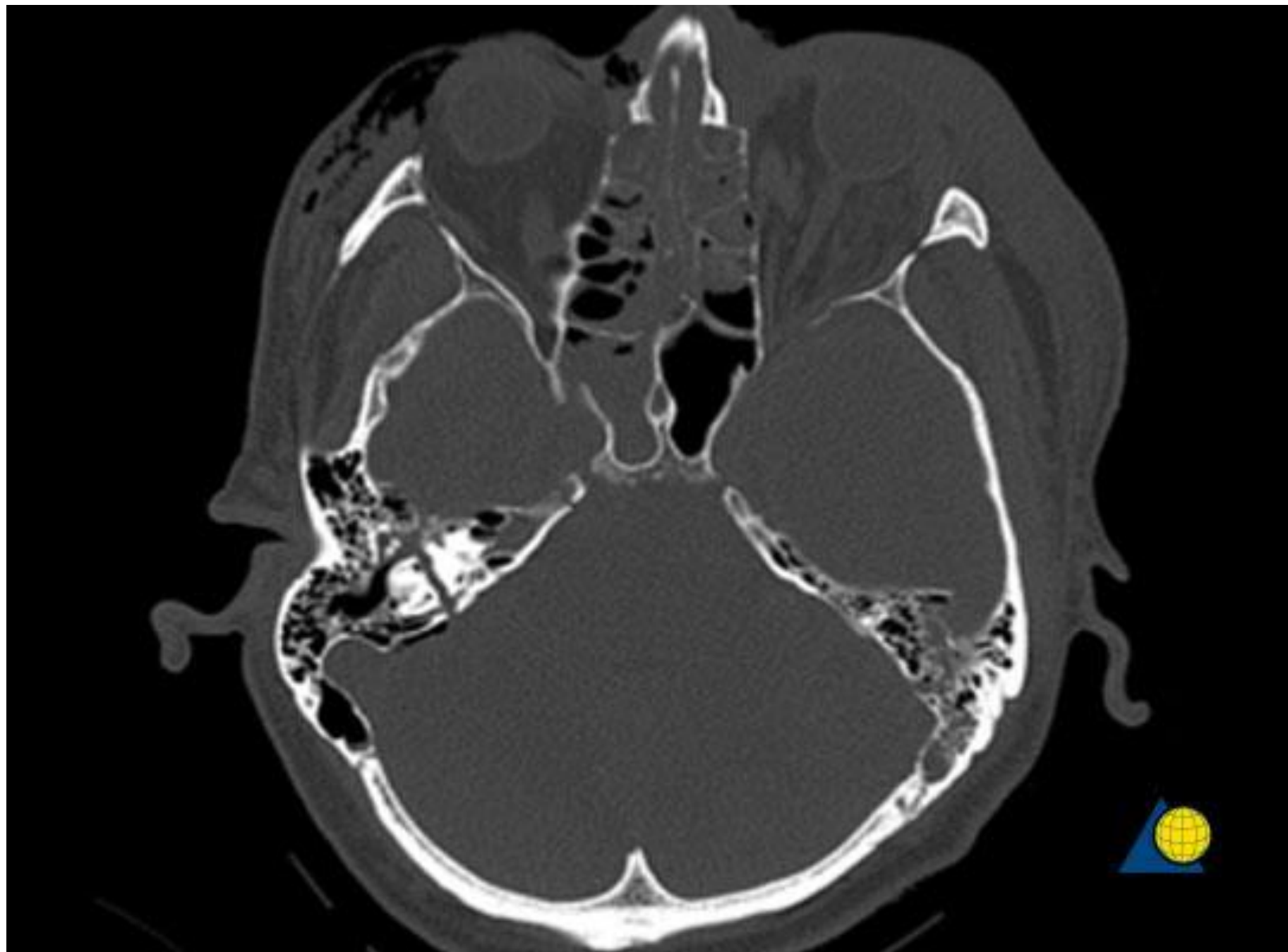
Penetrating

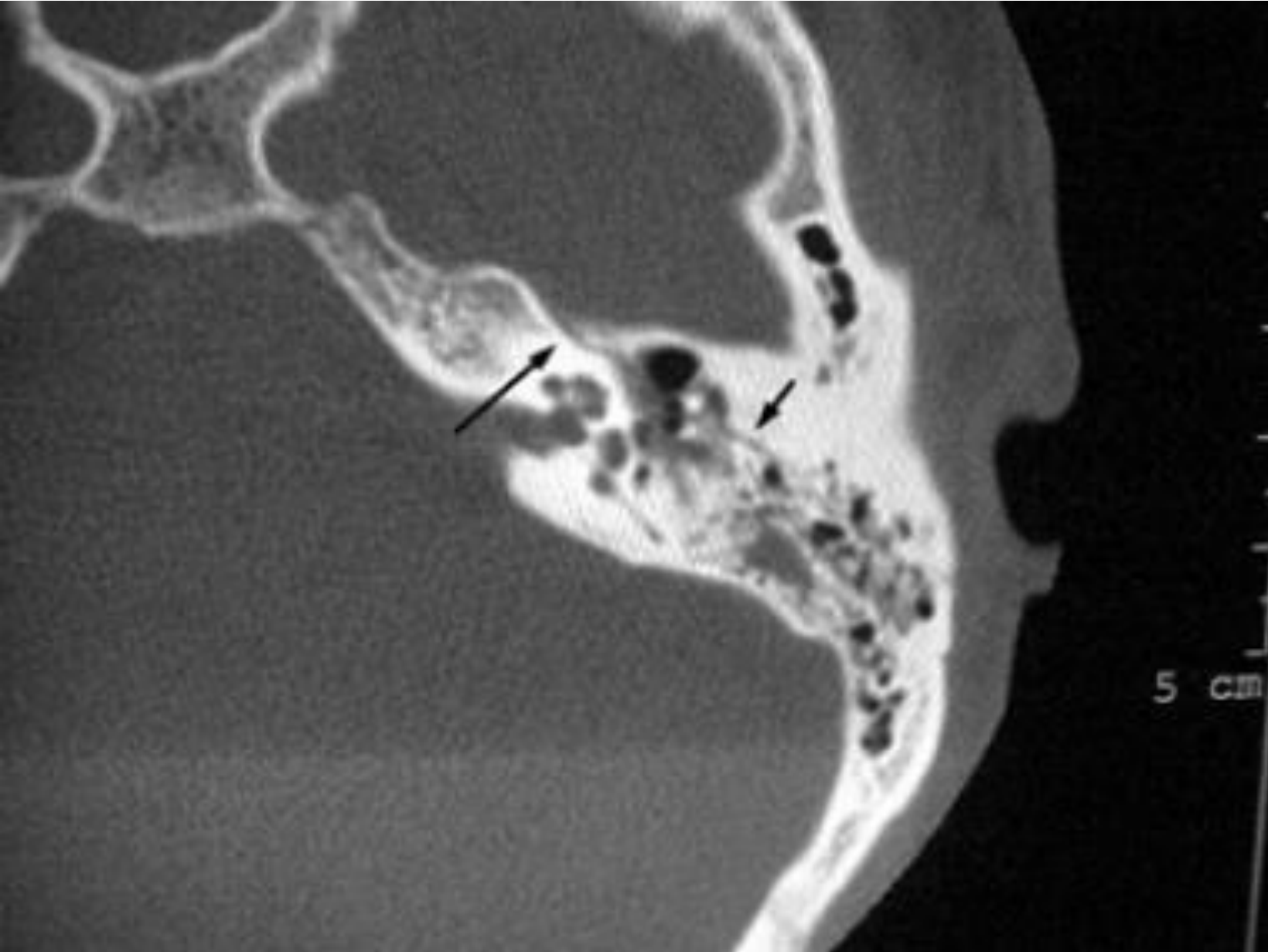
Non-penetrating

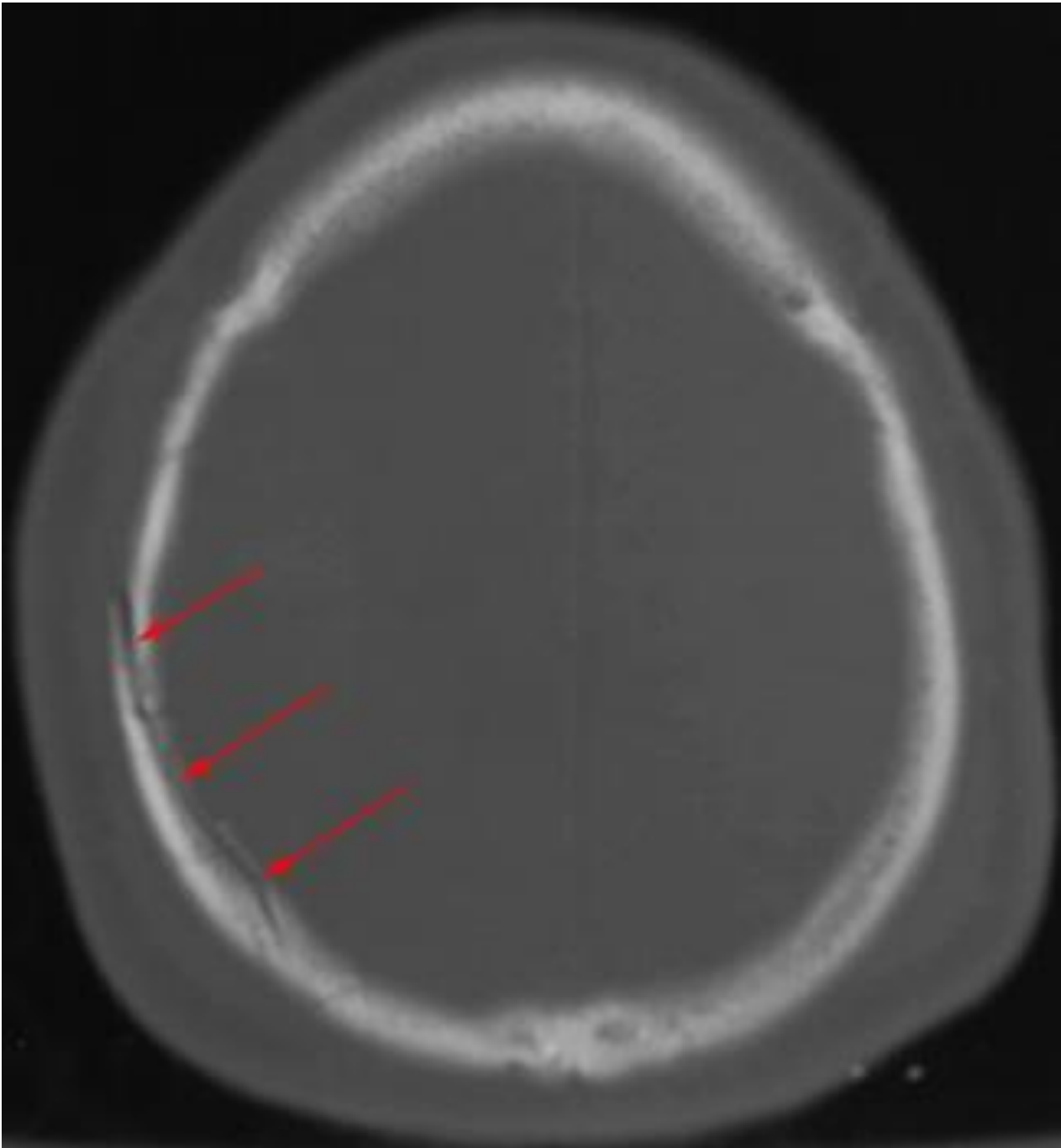
Static/ Quasi-static Loading

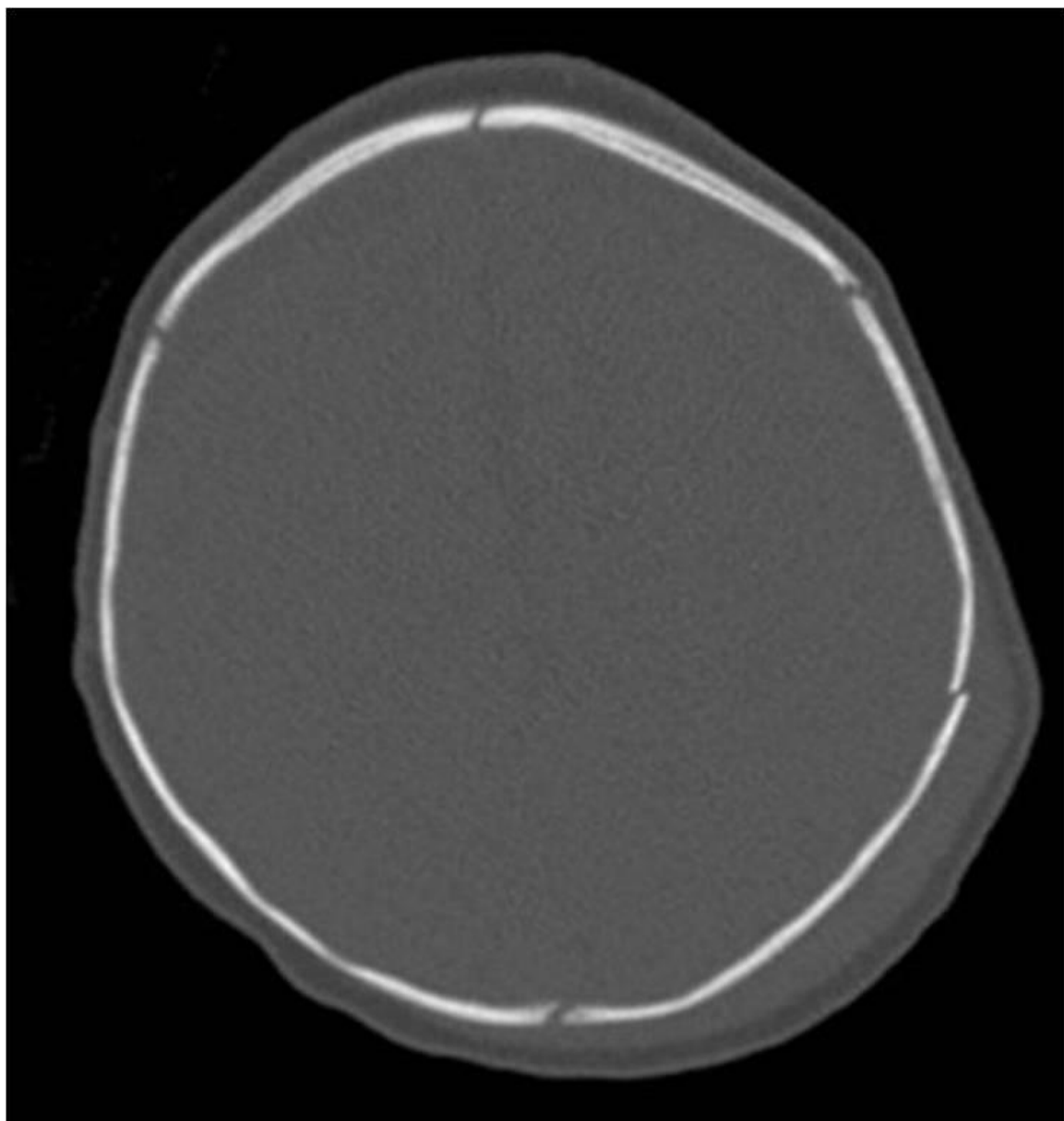
- Very Slow
- Uncommon
- Deformation

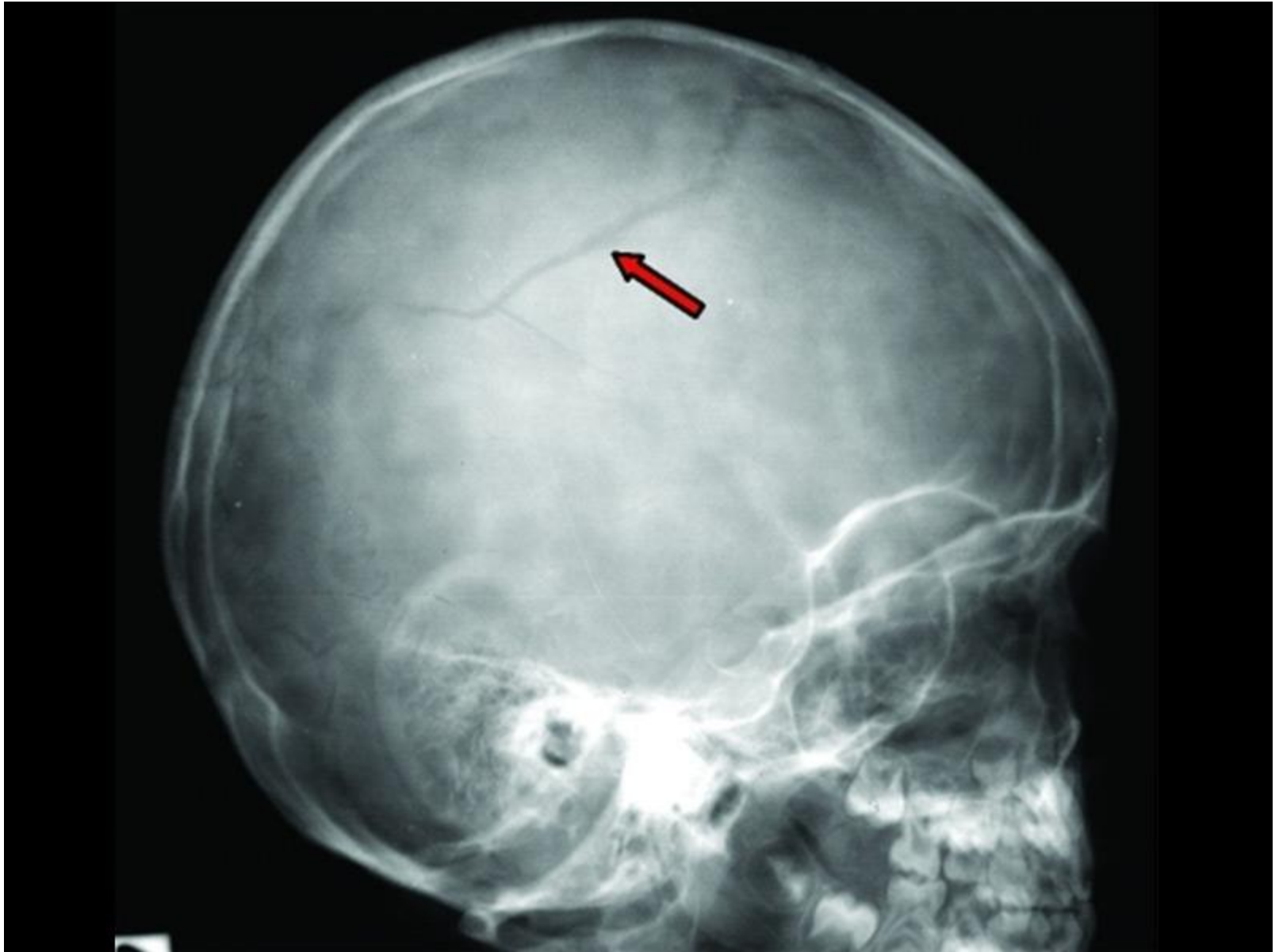


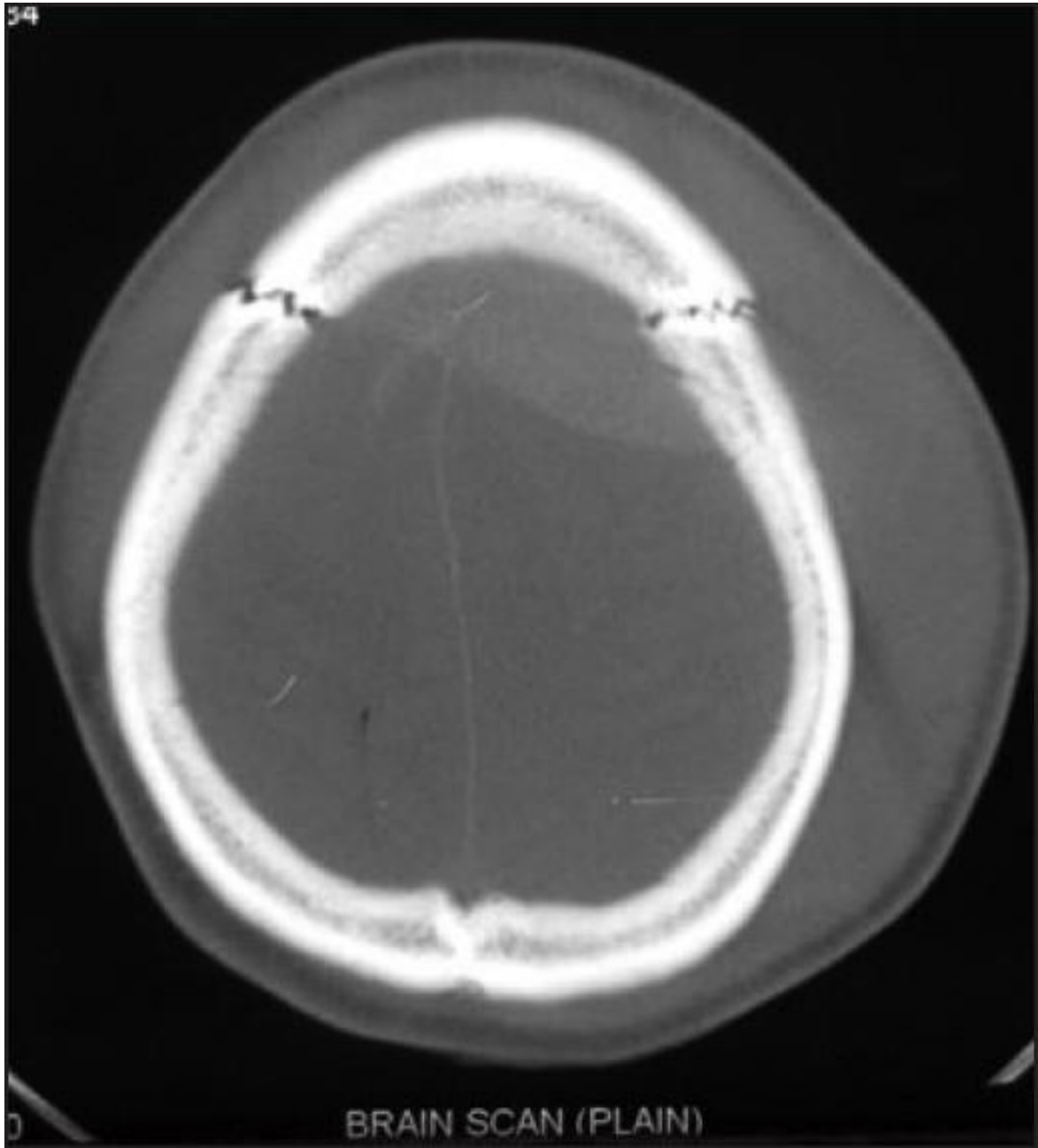






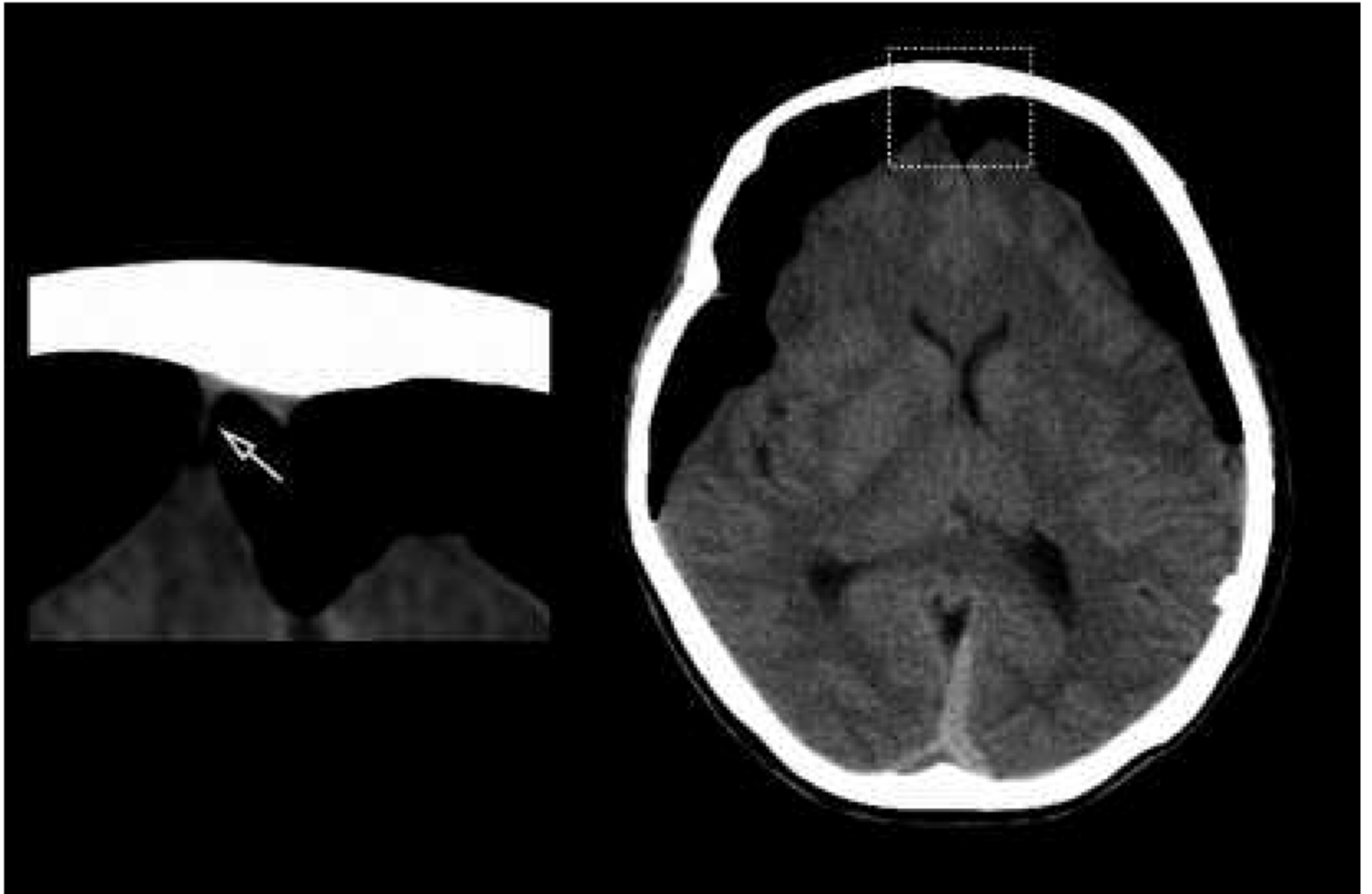


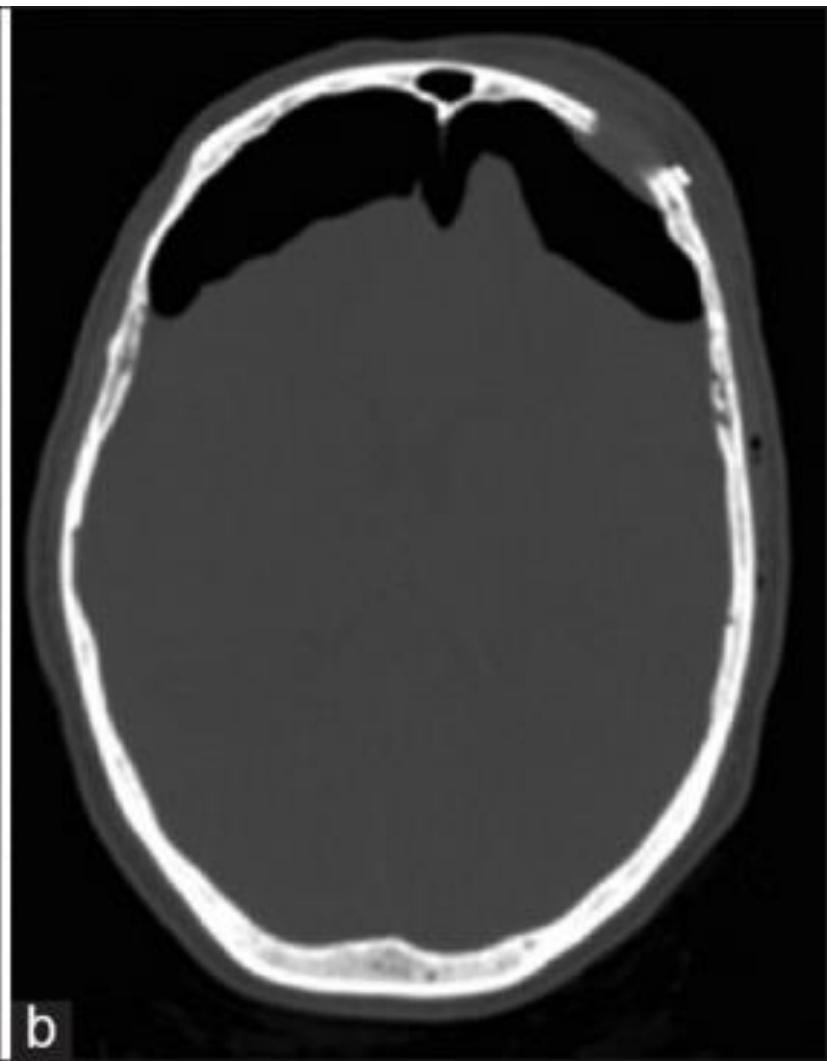
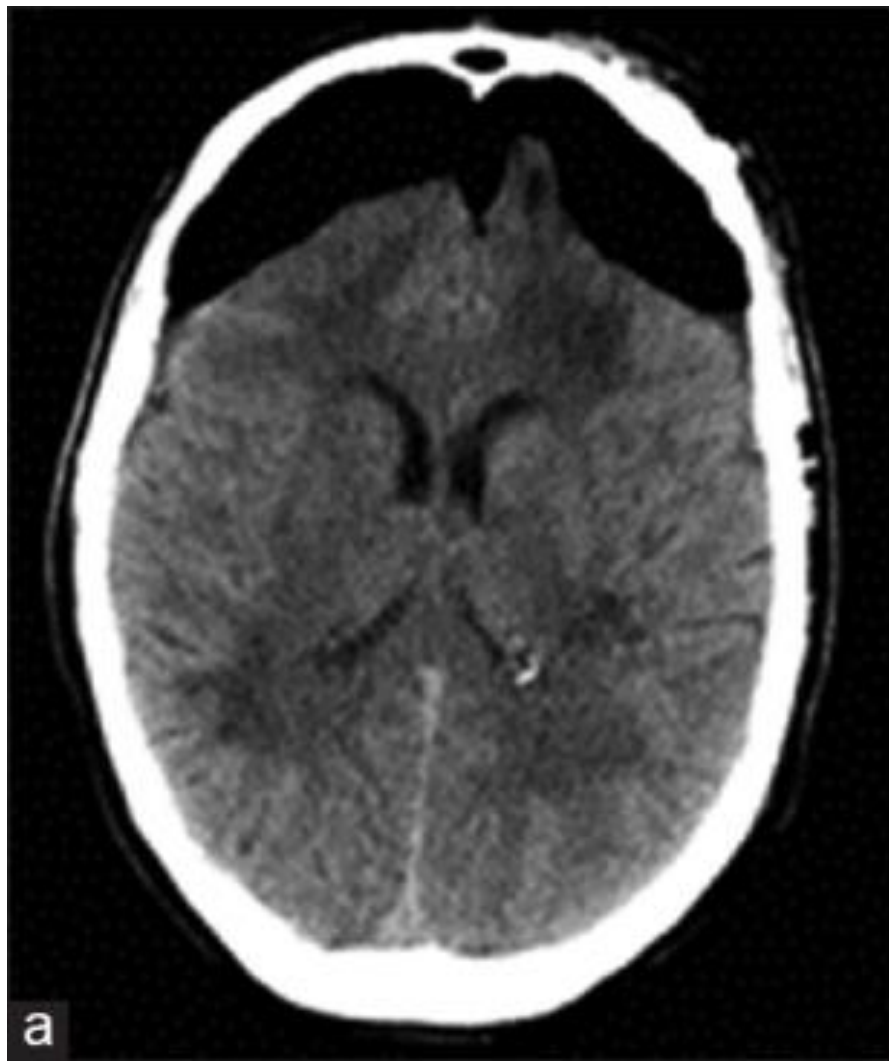


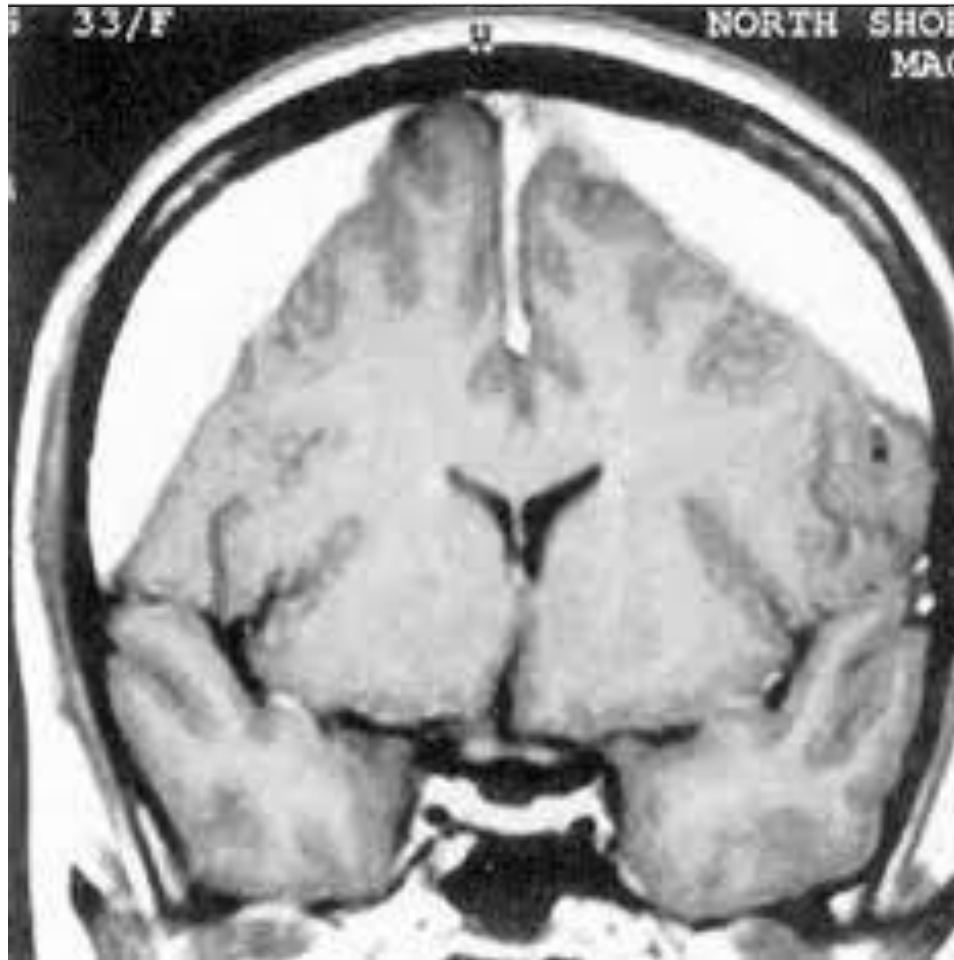


BRAIN SCAN (PLAIN)

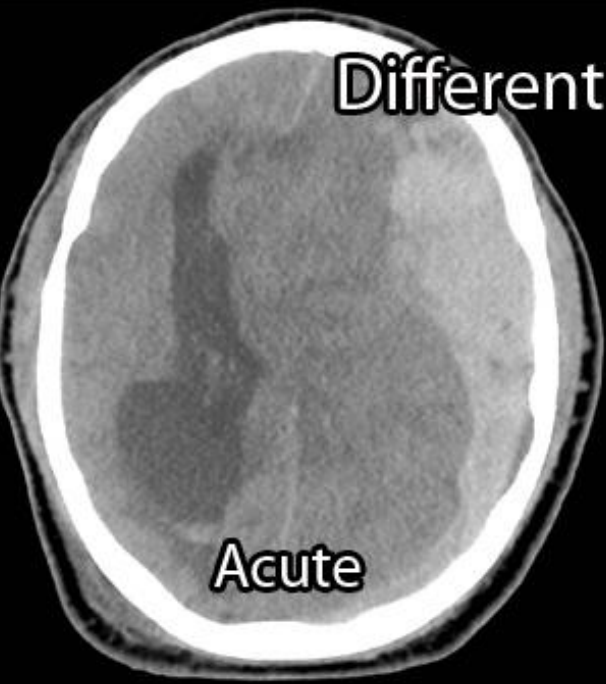




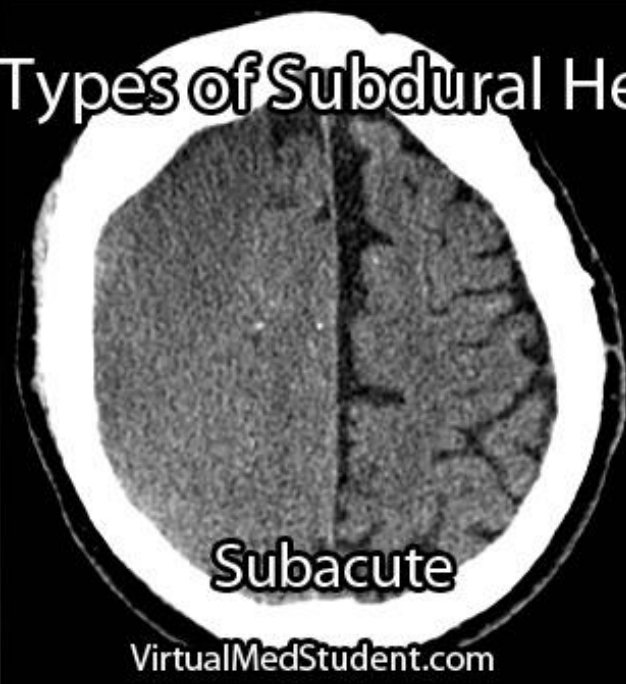




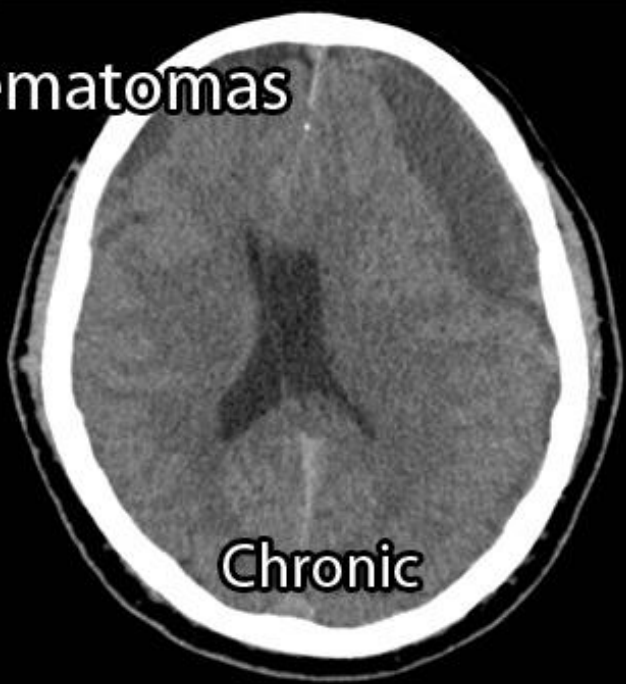
Different Types of Subdural Hematomas



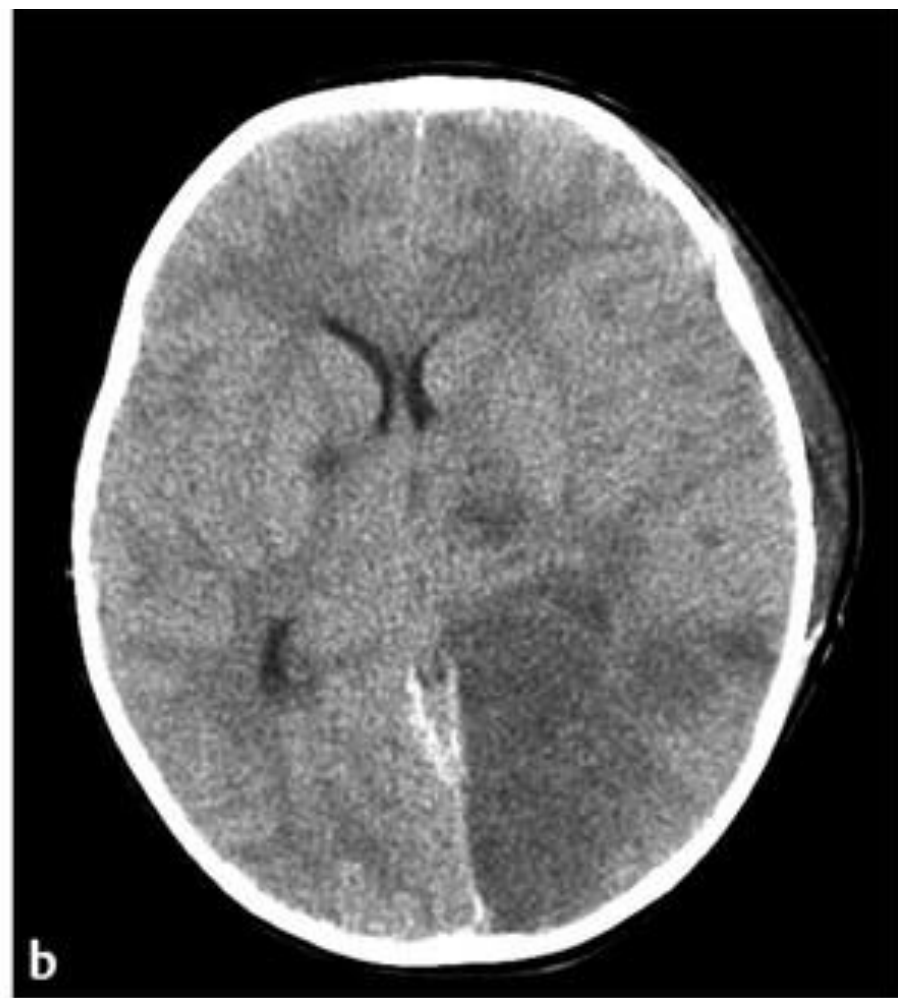
Acute

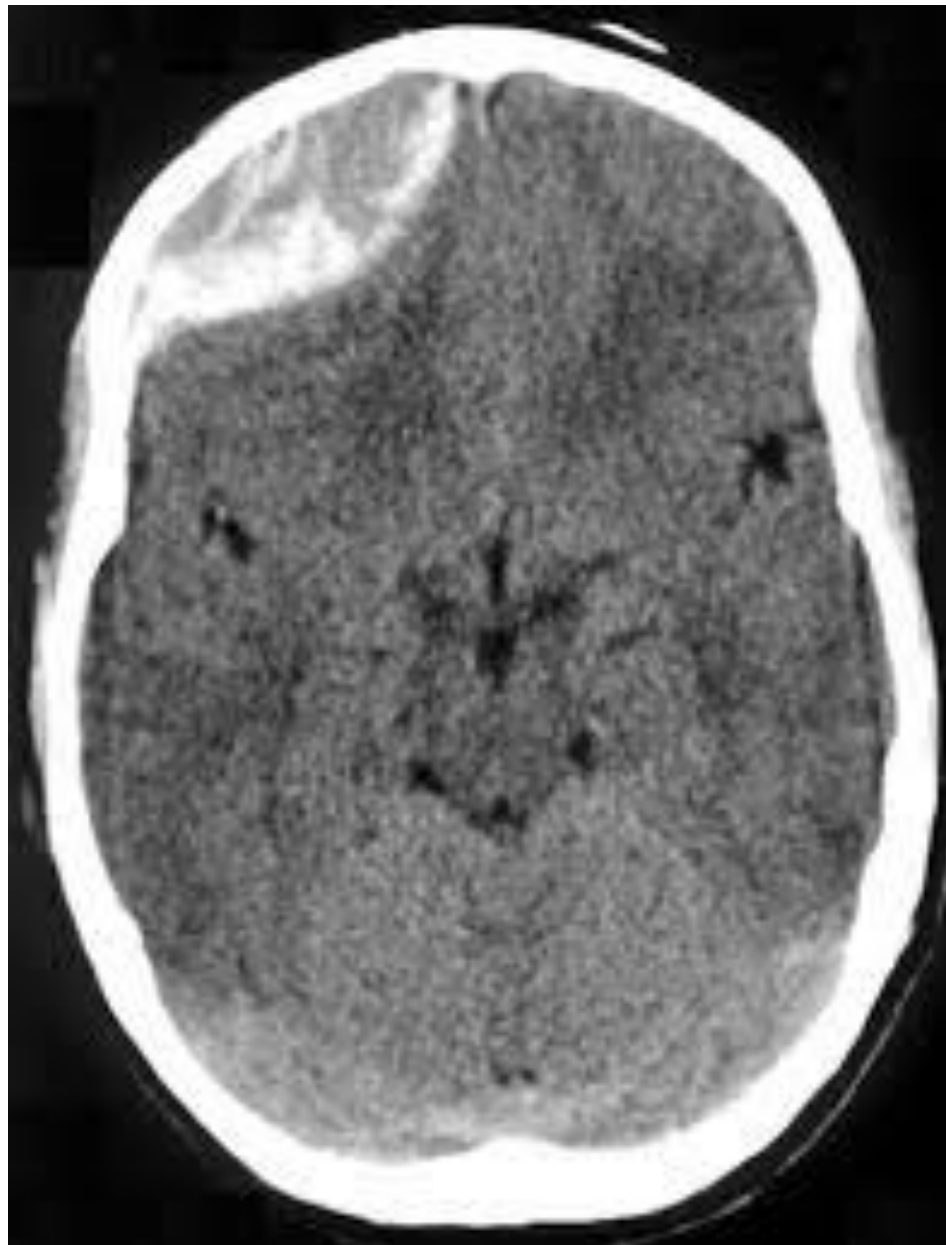


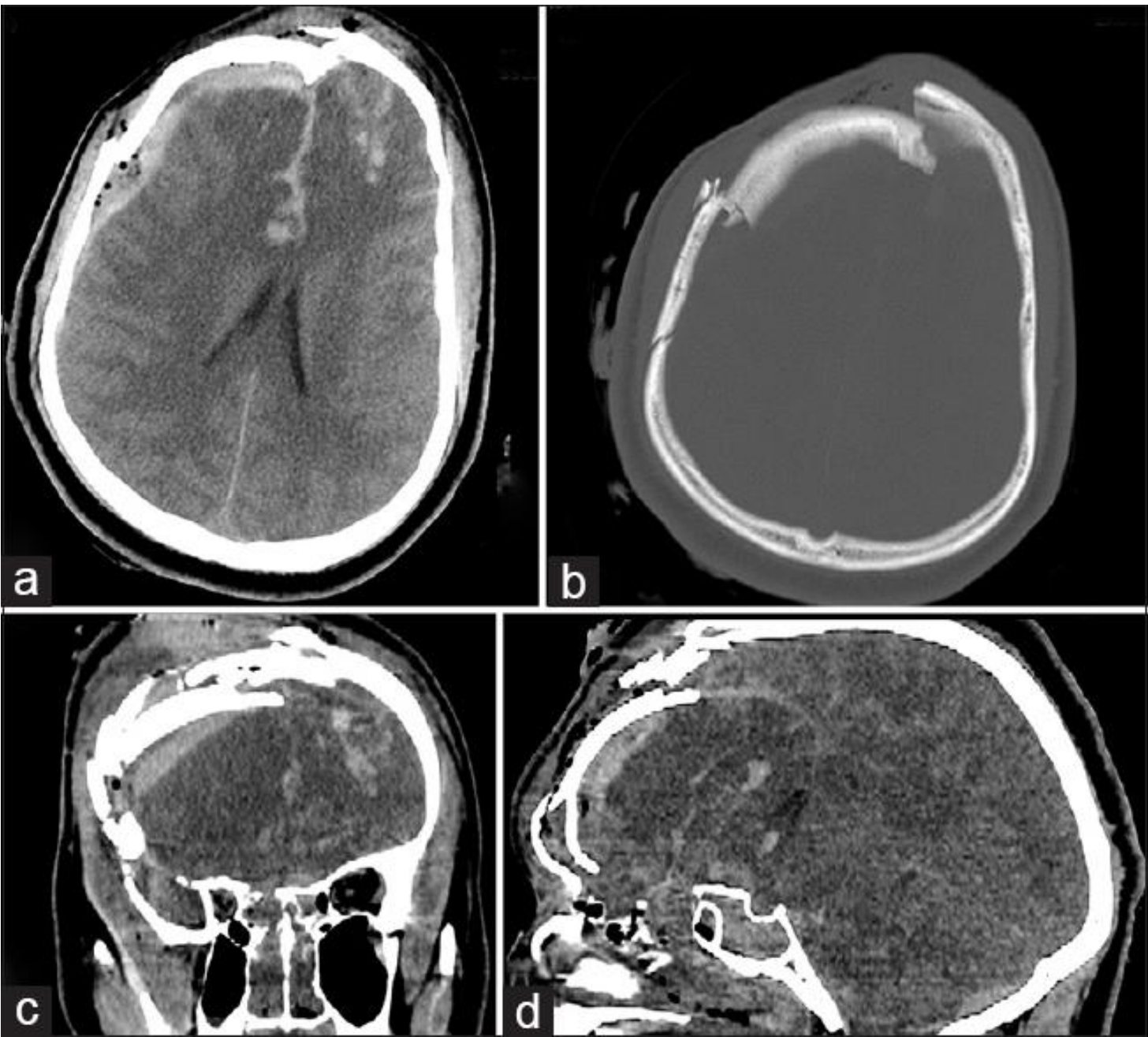
Subacute



Chronic



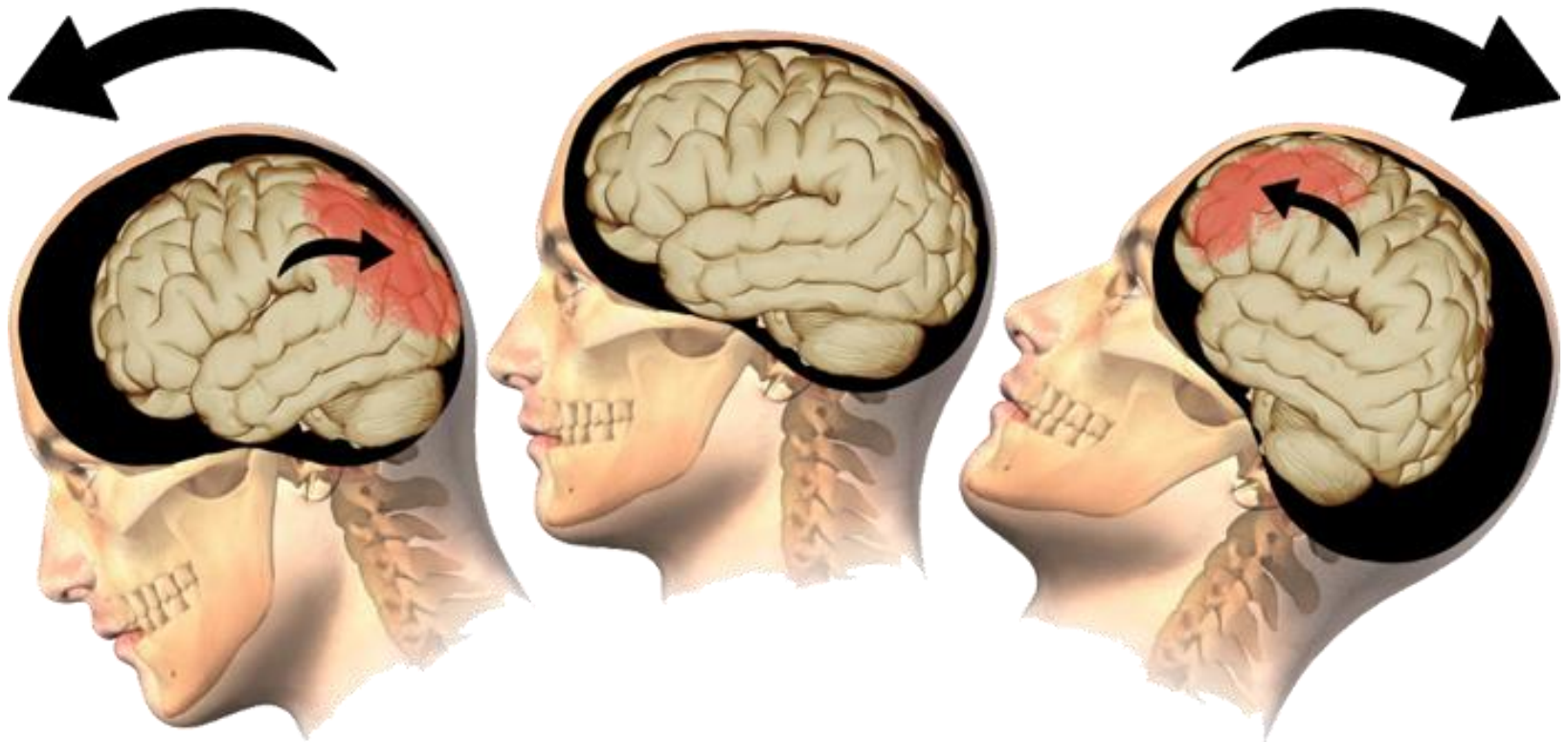




Agrawal, A., Kumar, S. S., Hegde, K. V., Reddy, V. U., & Sundeep, N. V. K. (2014). Massive bifrontal infarction following massive depressed fracture overlying the superior sagittal sinus. *African Journal of Trauma*, 3(2), 94.

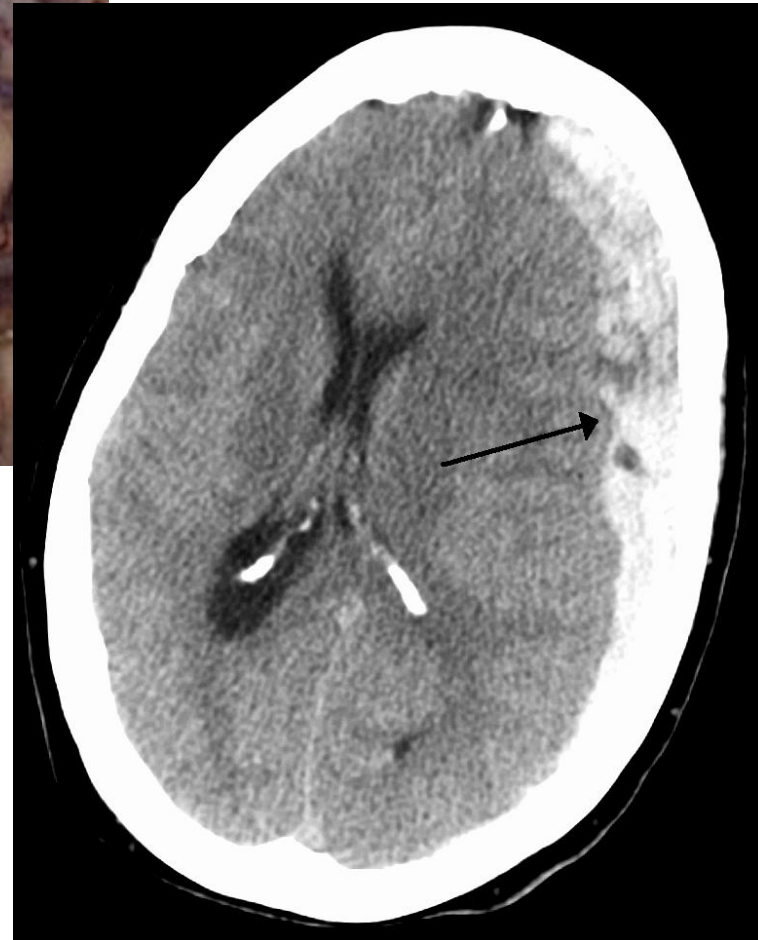
Impulsive type of Dynamic Loading

- Only Head Motion
- Acceleration- Deceleration

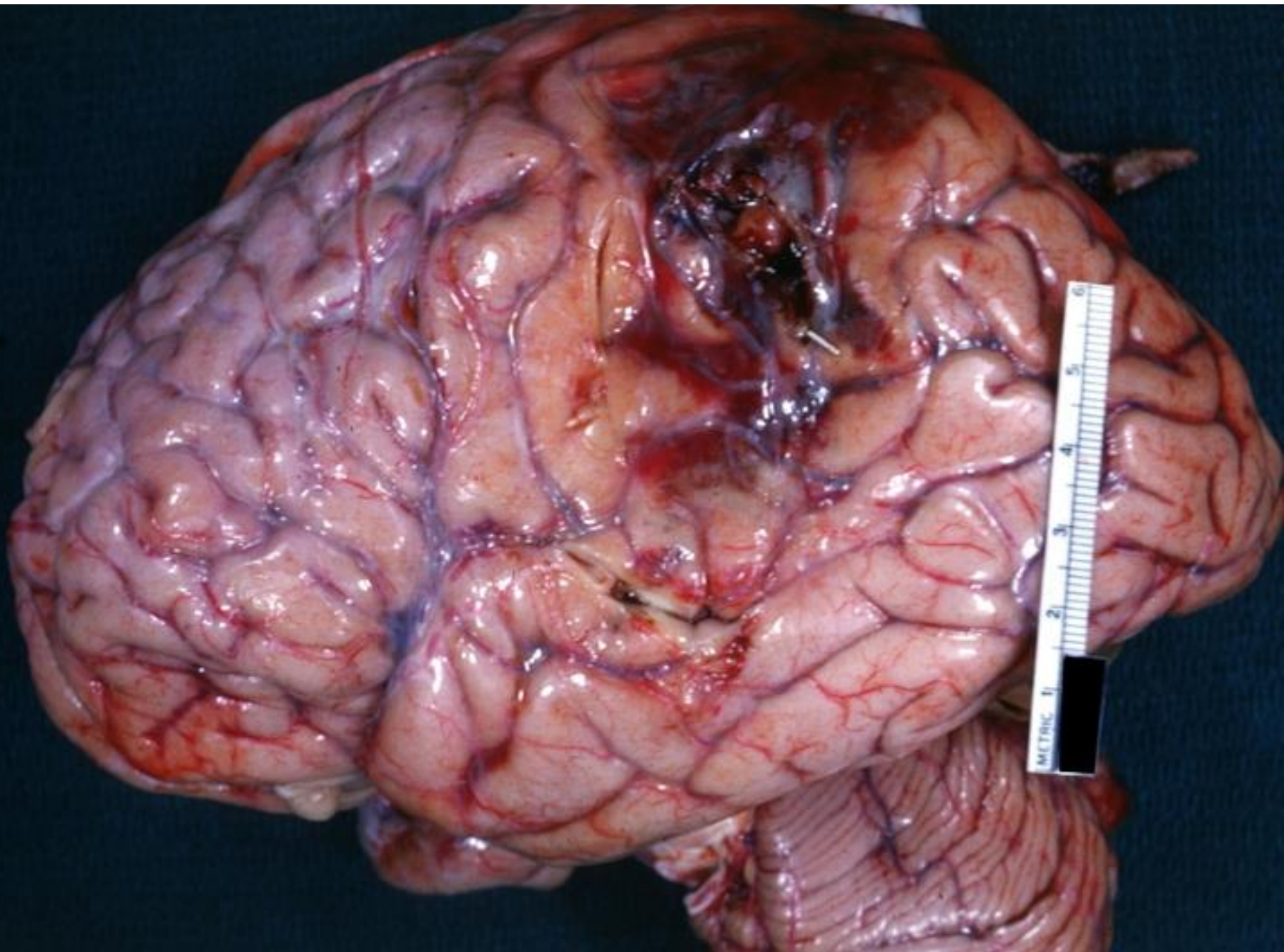


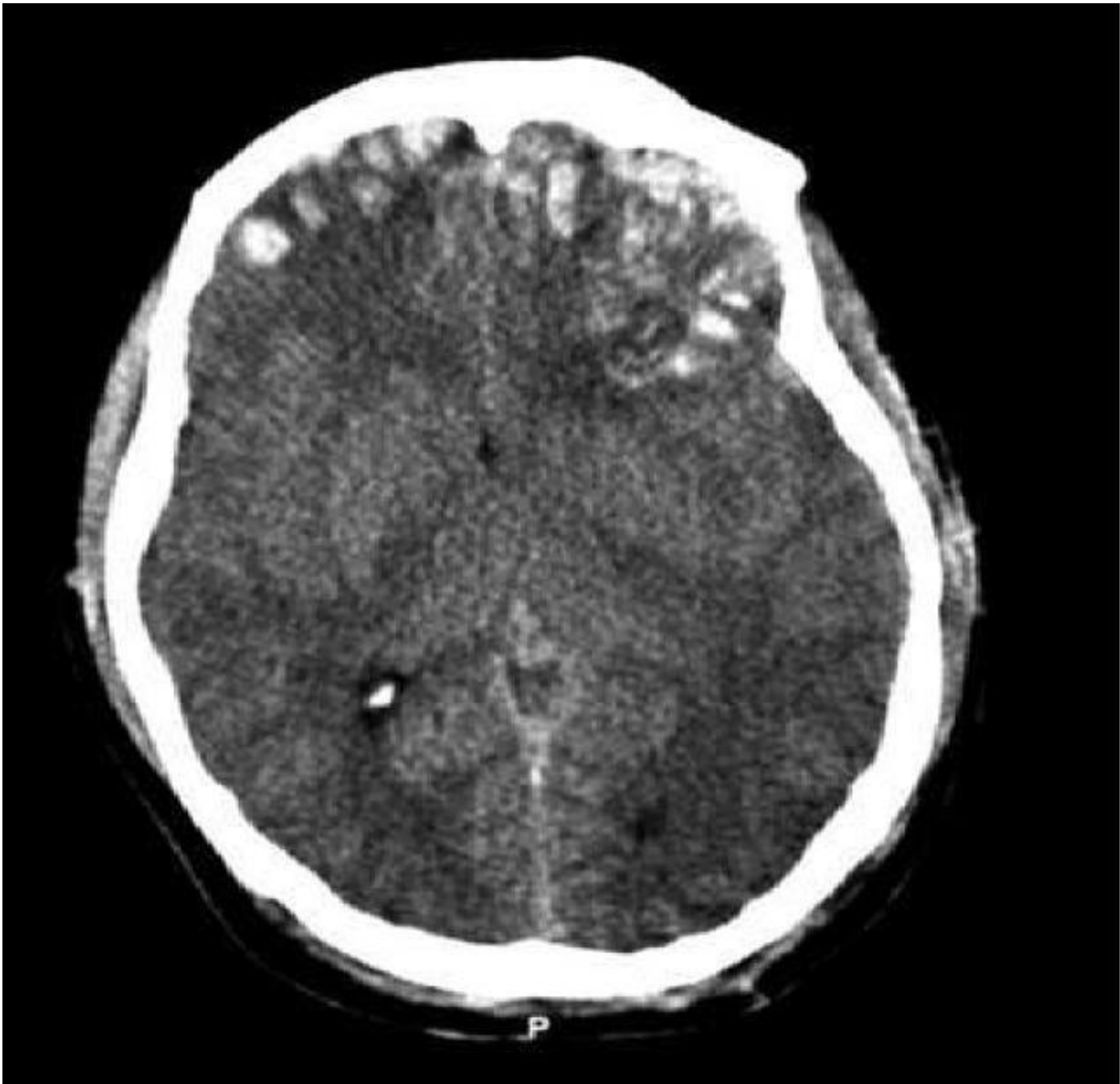


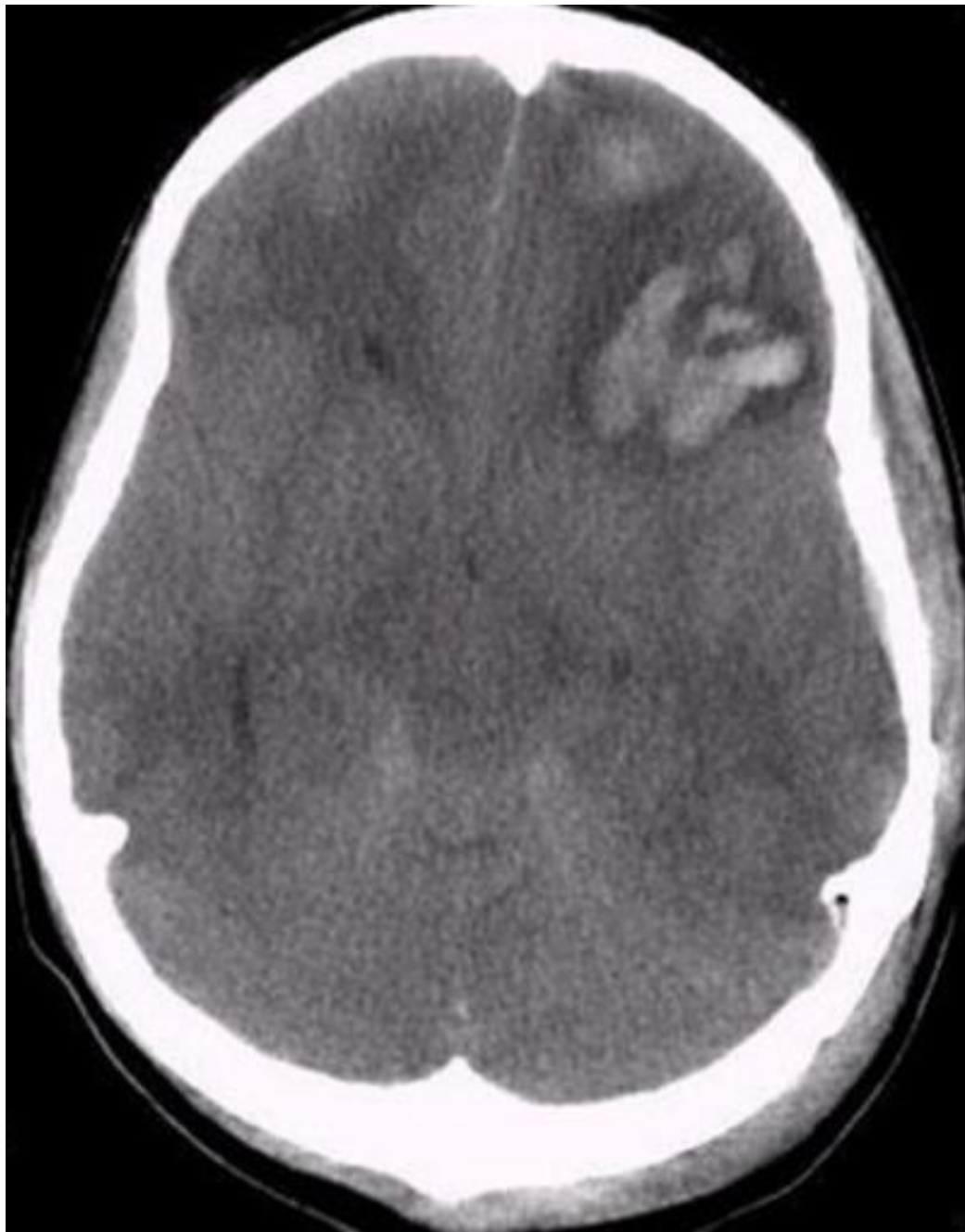
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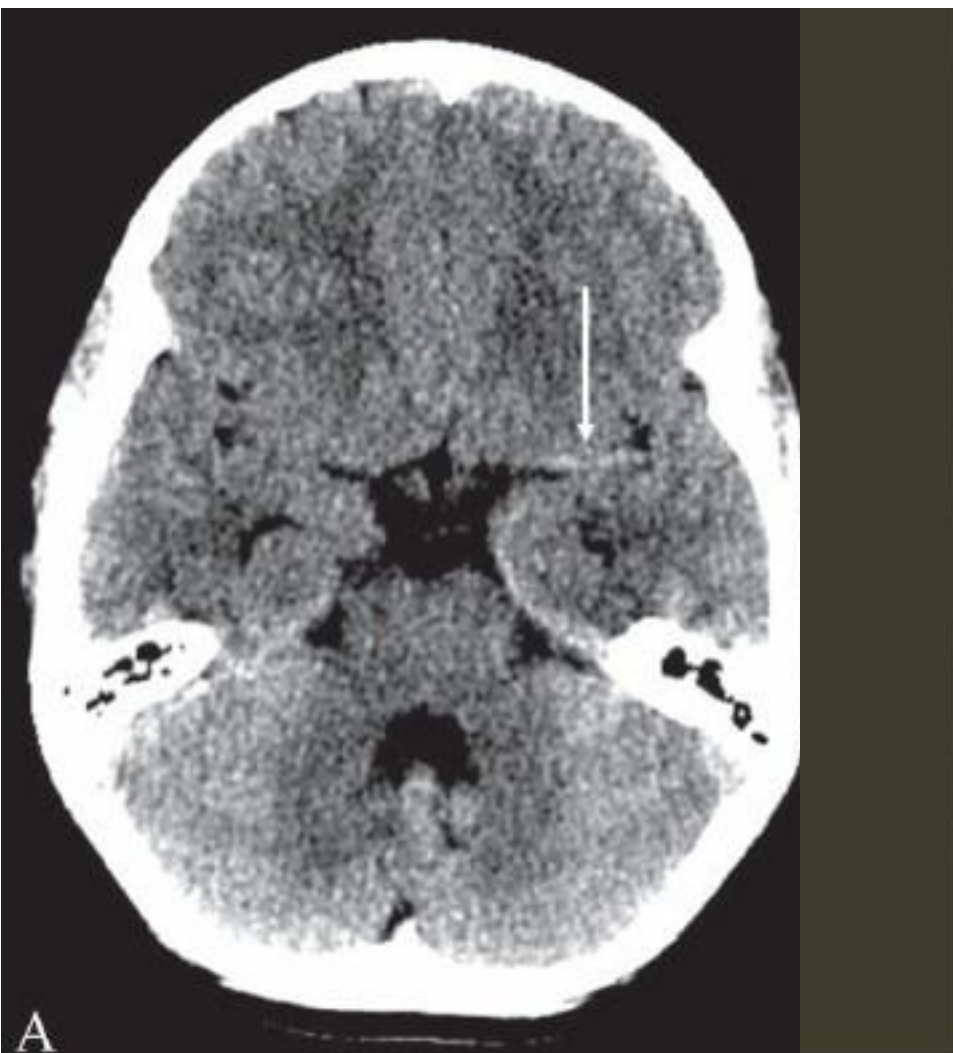


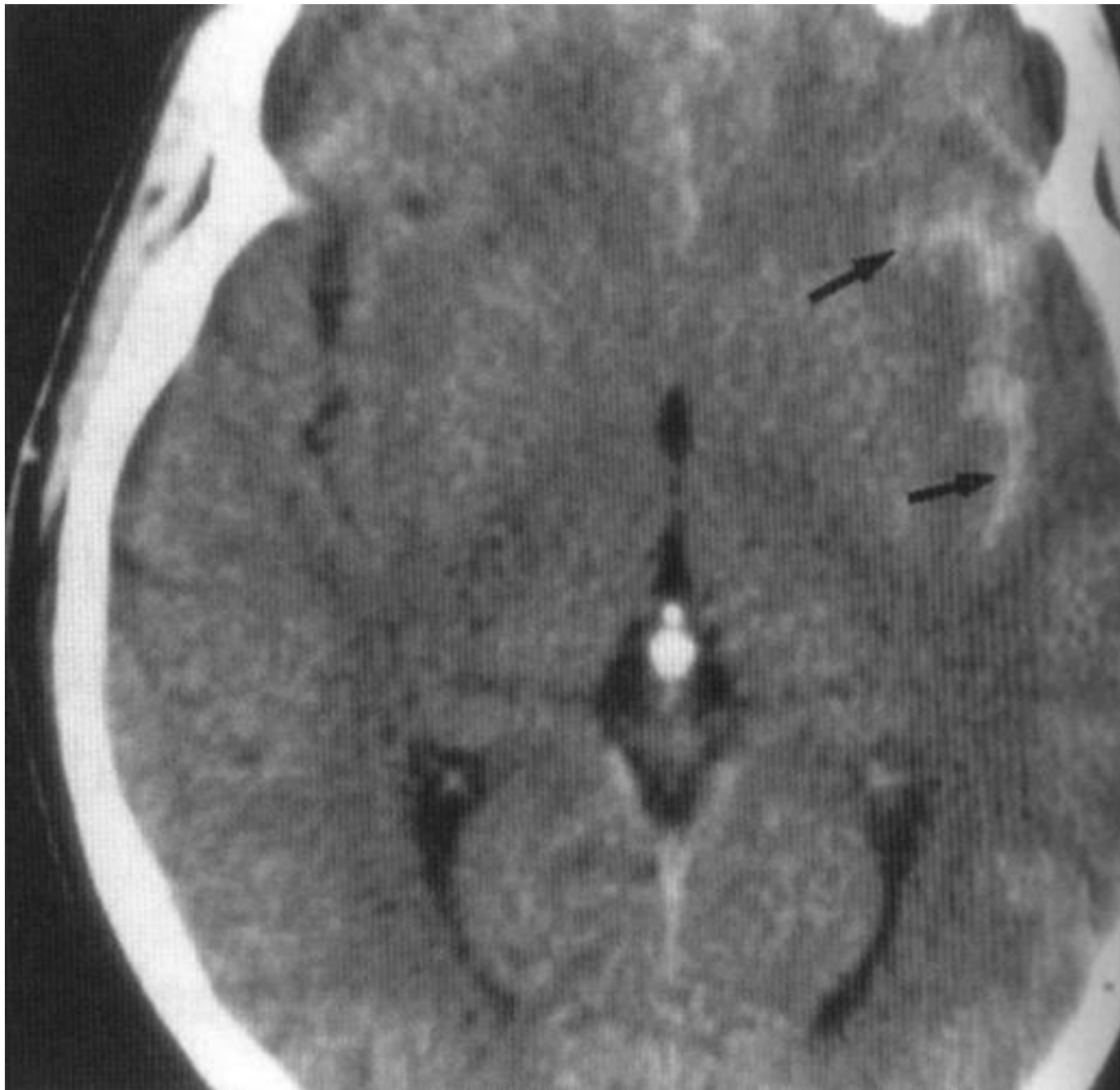
https://en.wikipedia.org/wiki/Subdural_hematoma

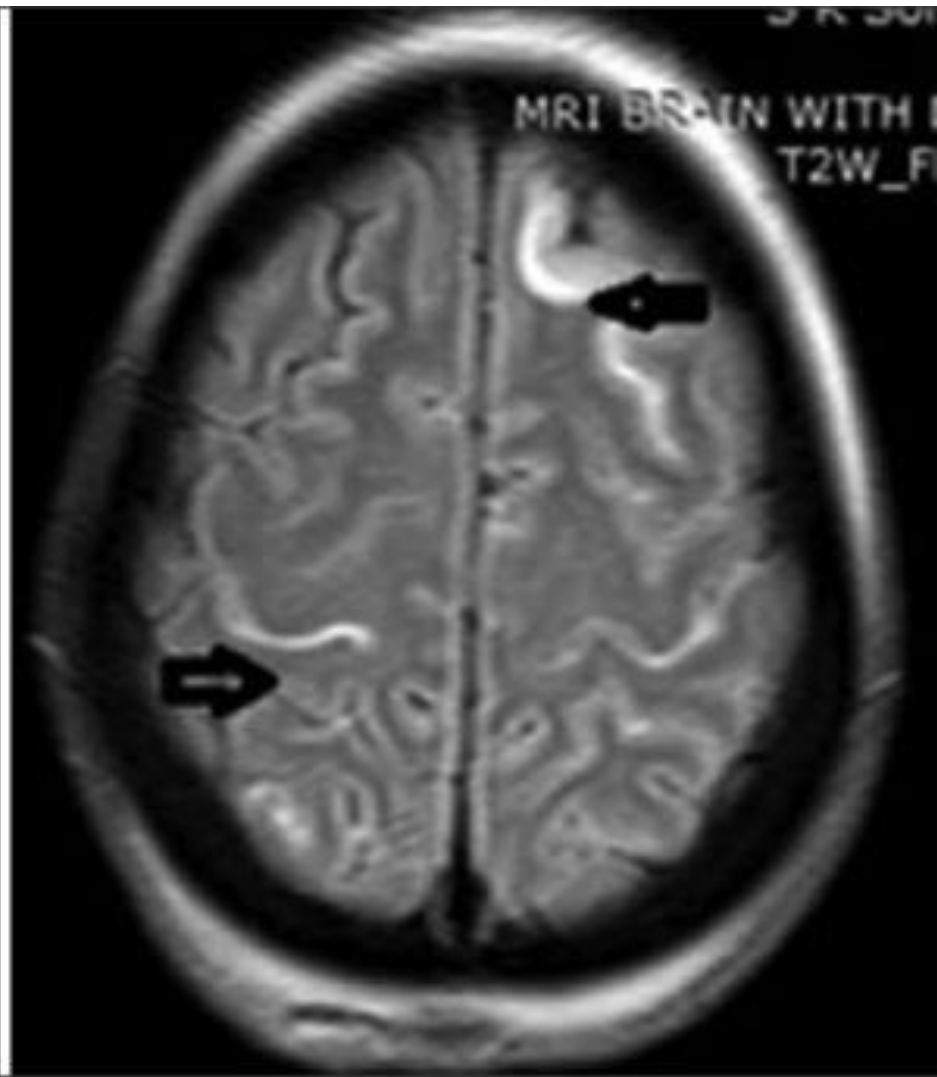




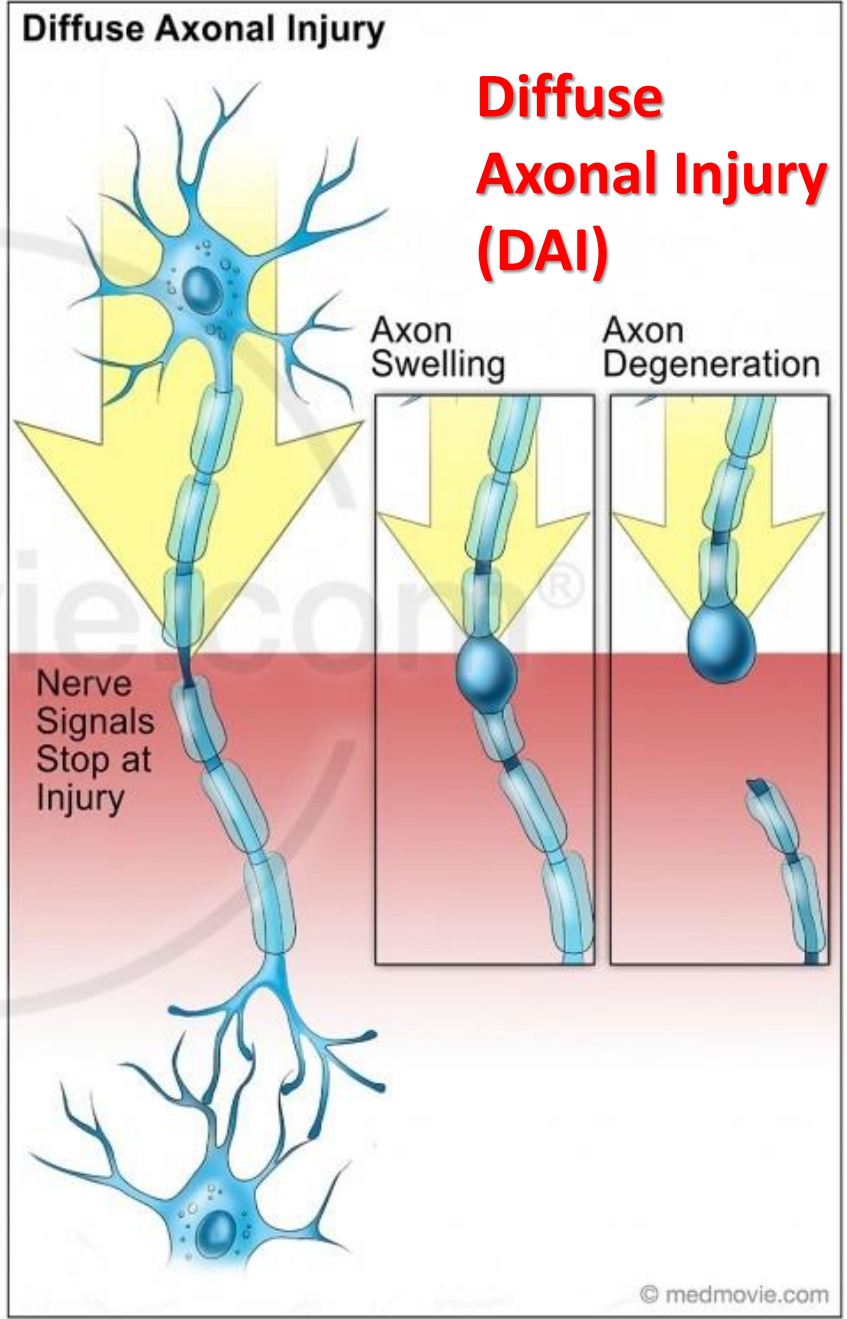
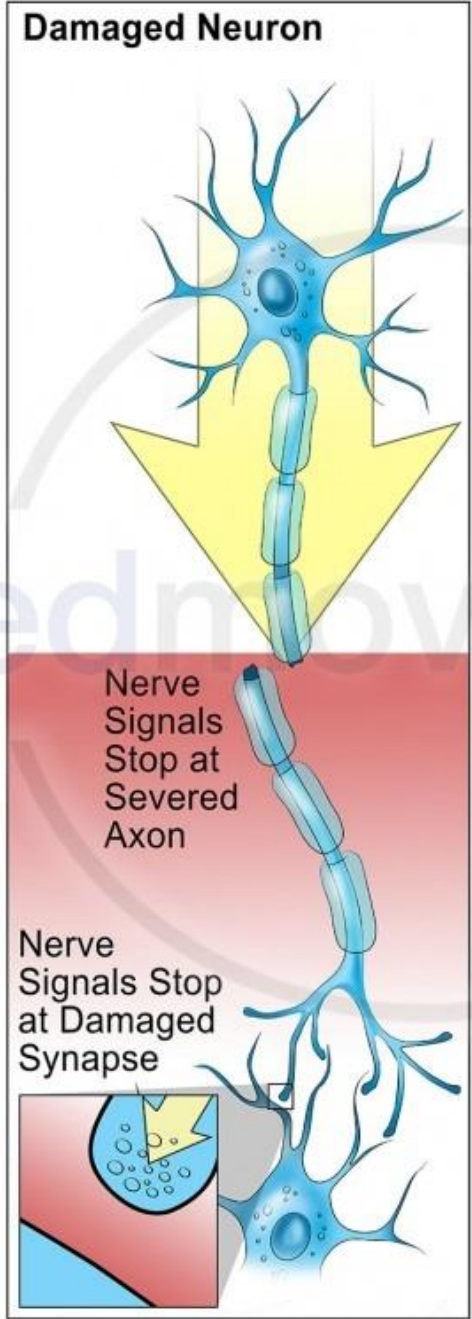
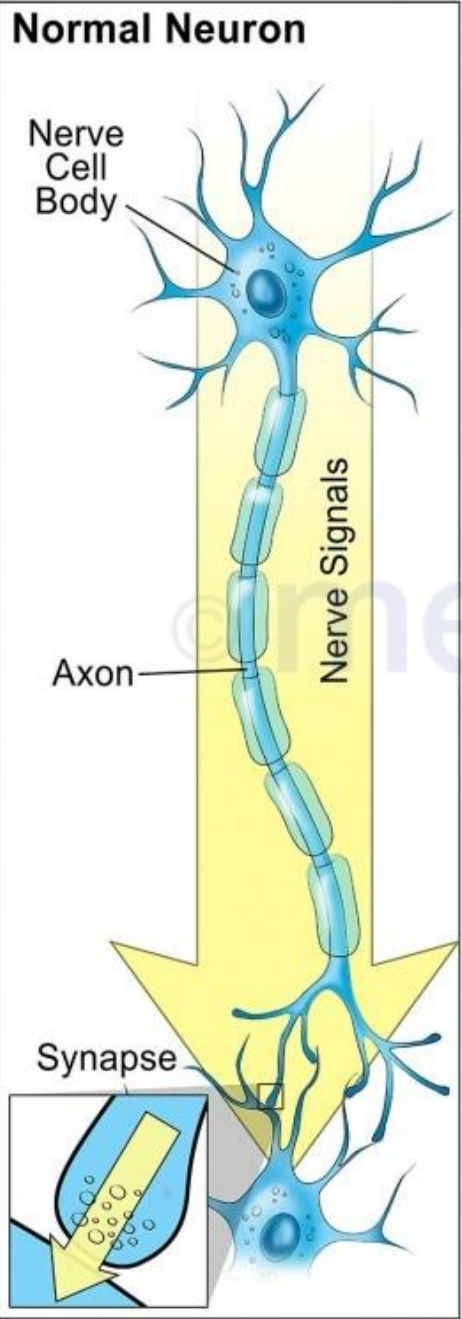


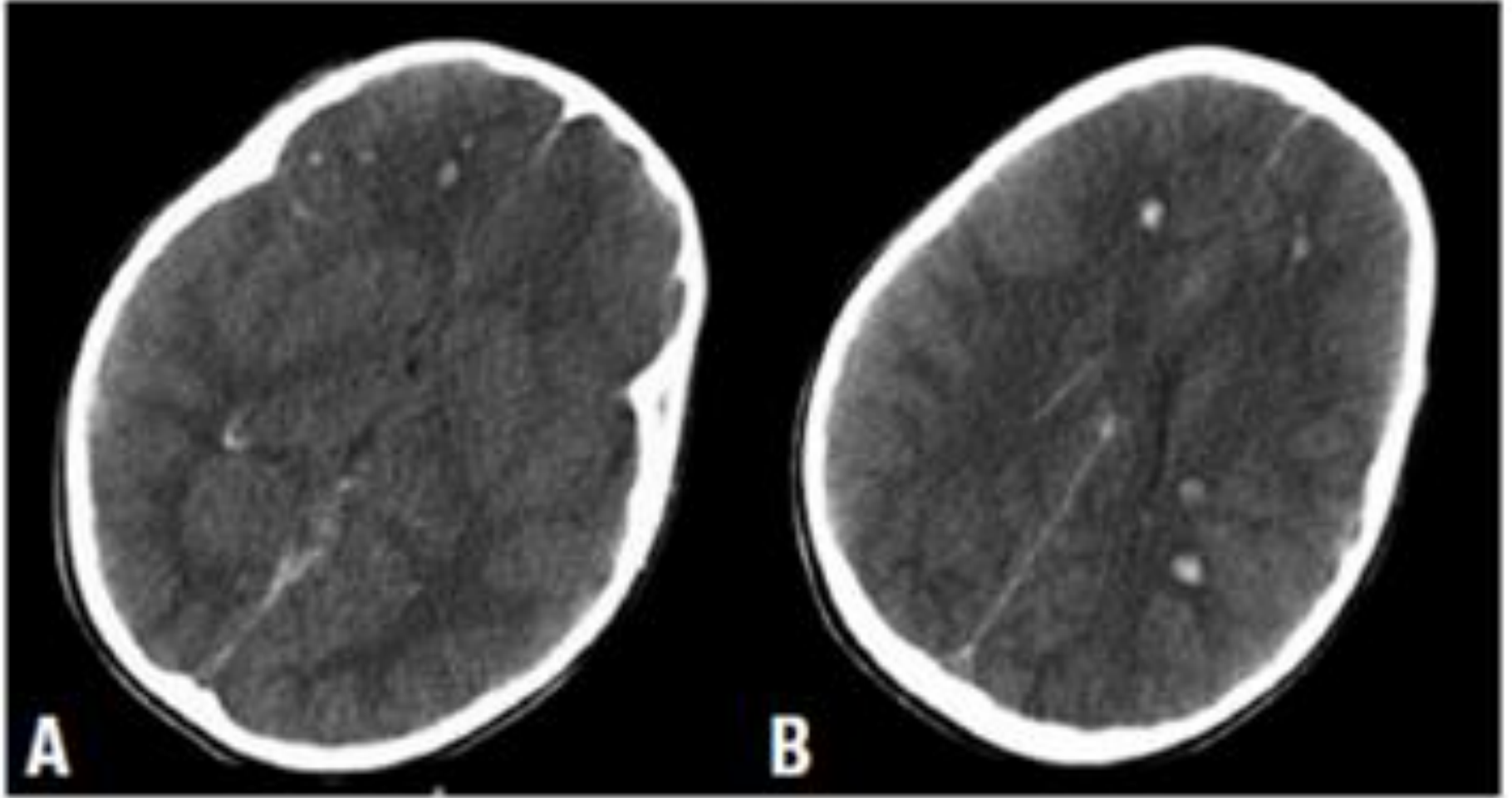


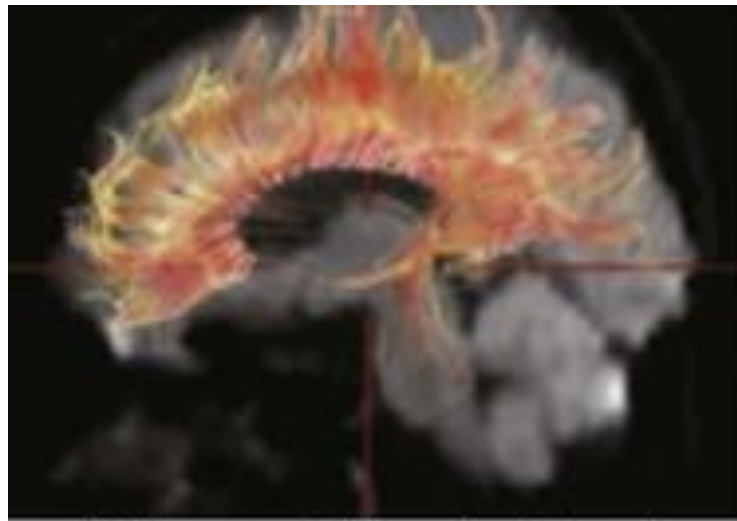




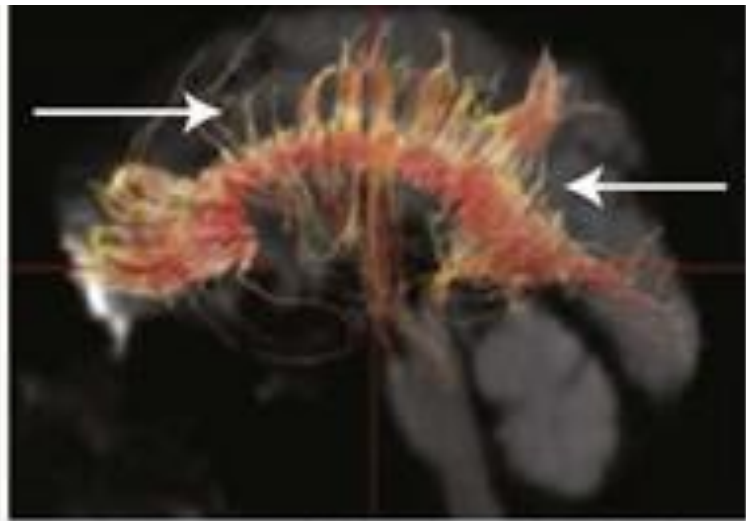




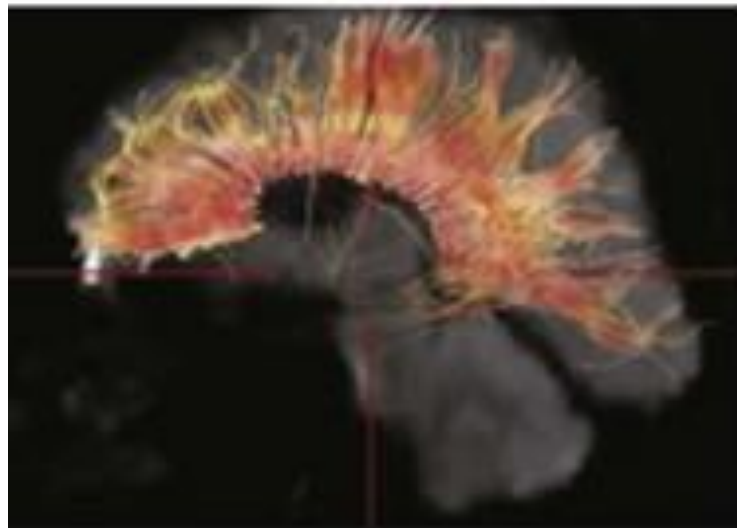




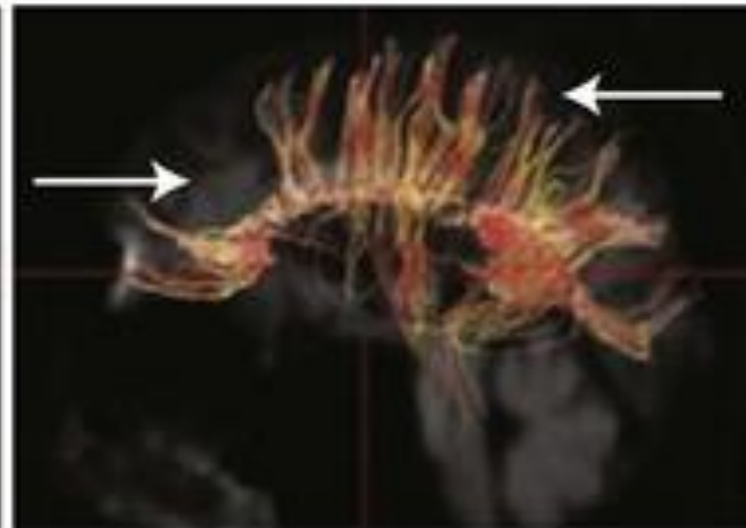
A 27-year old healthy female
volunteer



A 26-year old male with DAI



A 36-year old healthy male
volunteer



A 34-year old male with DAI

Impact type of Dynamic Loading

- More Frequent
- Combination of Contact force (Hit) and Inertial force (Head motion)

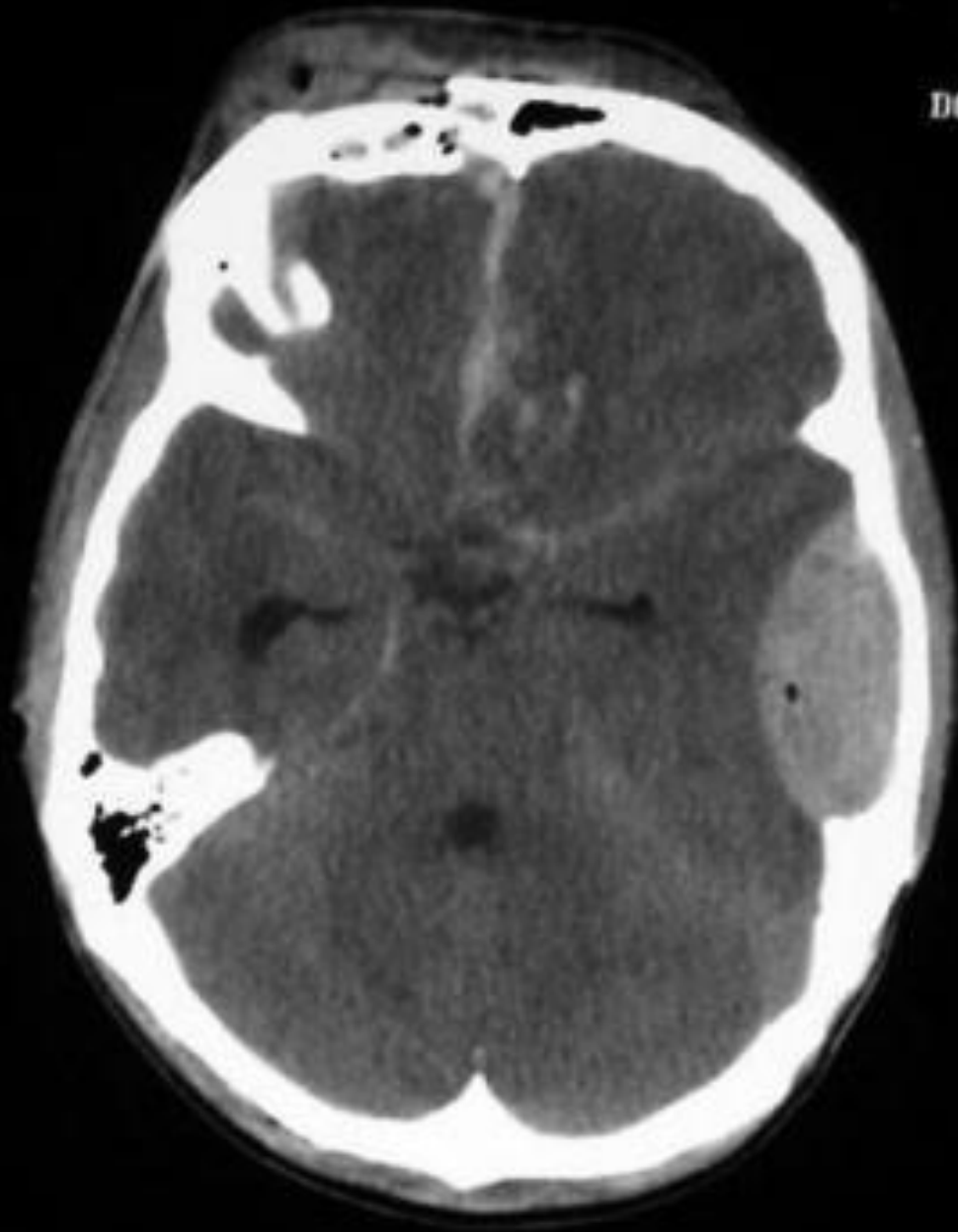


22

33

0cm

M 17
DOB: 25
27



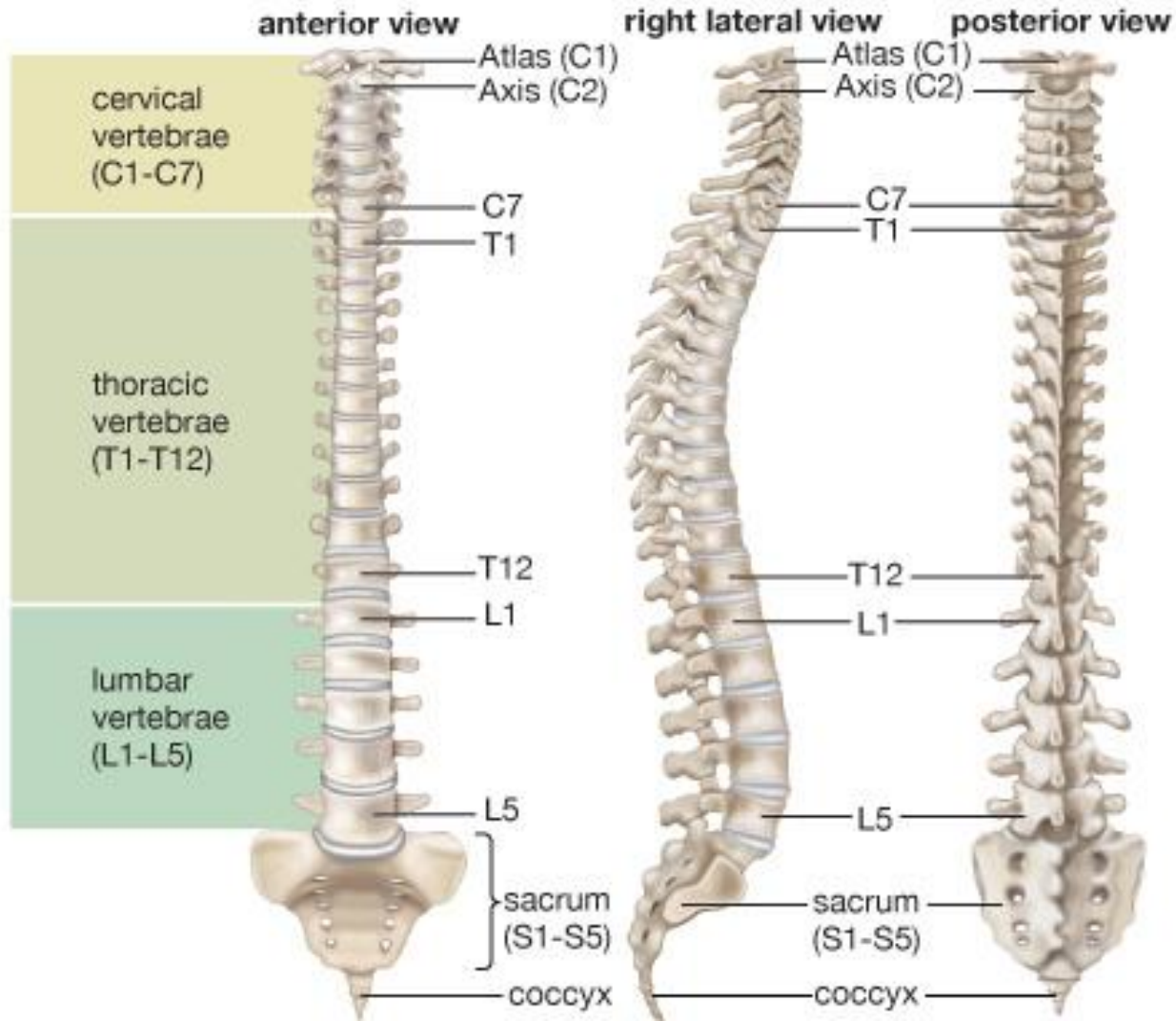
11 4 row



آسیب تروماتیک ستون فقرات

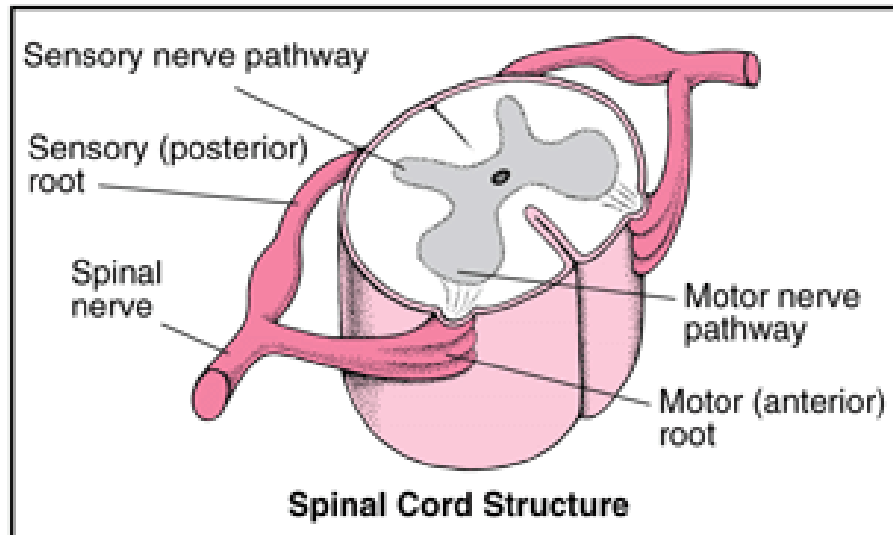
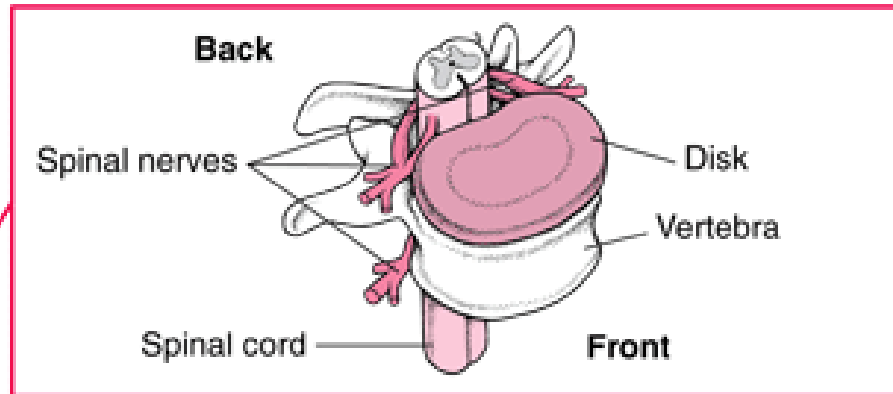
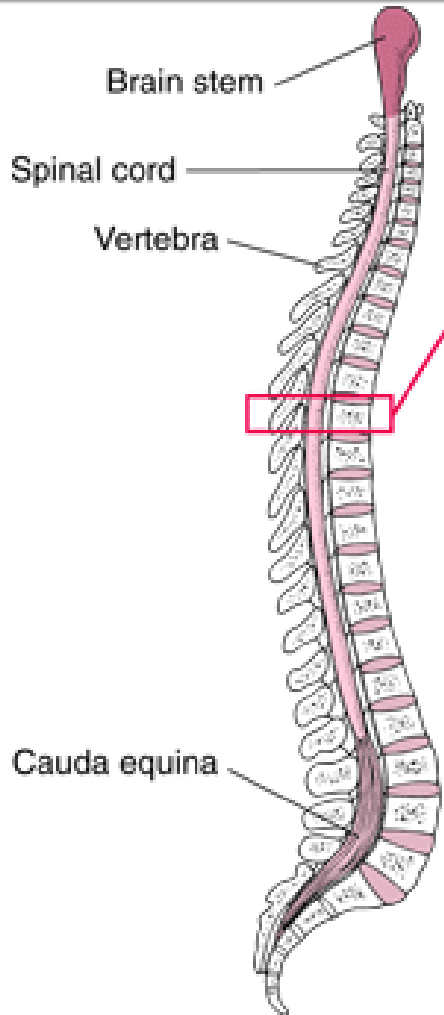
Definitions

Spinal Column

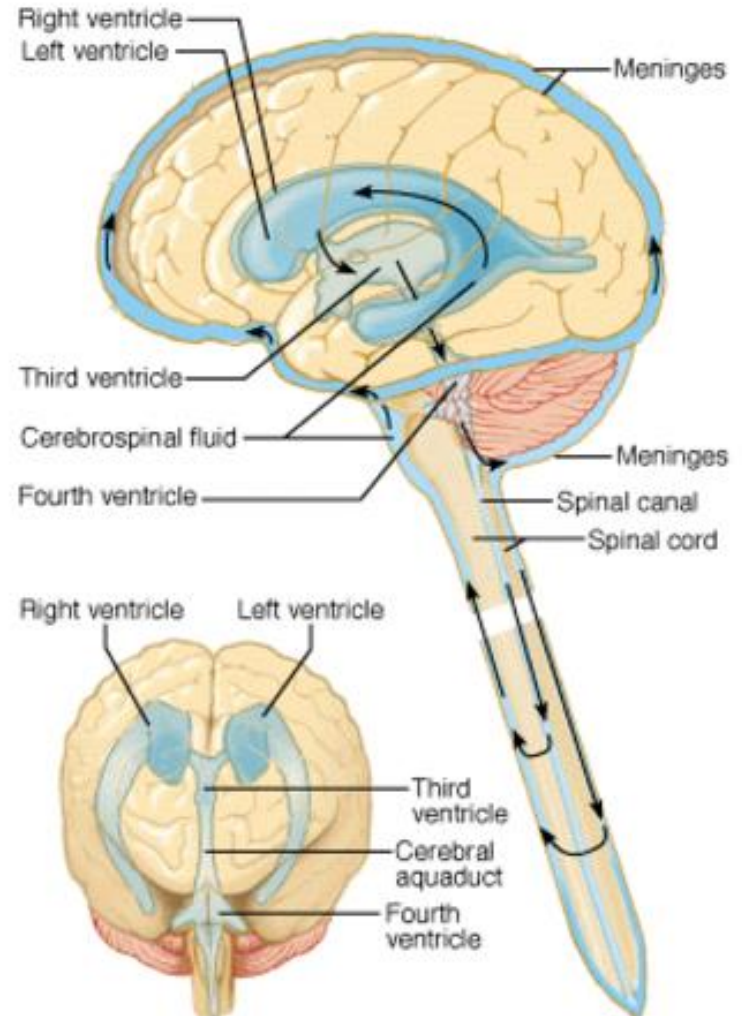
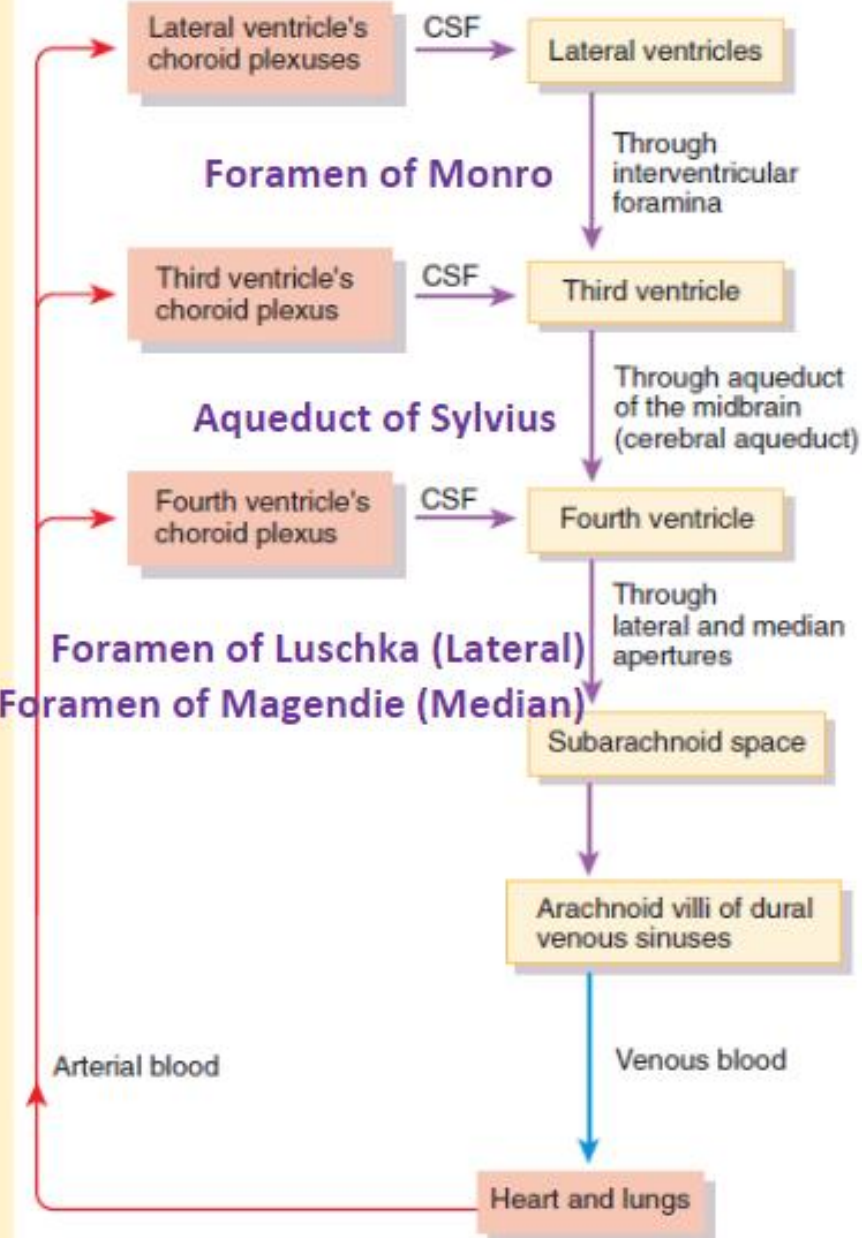


Definitions

Spinal Cord association with Spinal Column



Circulation of CSF

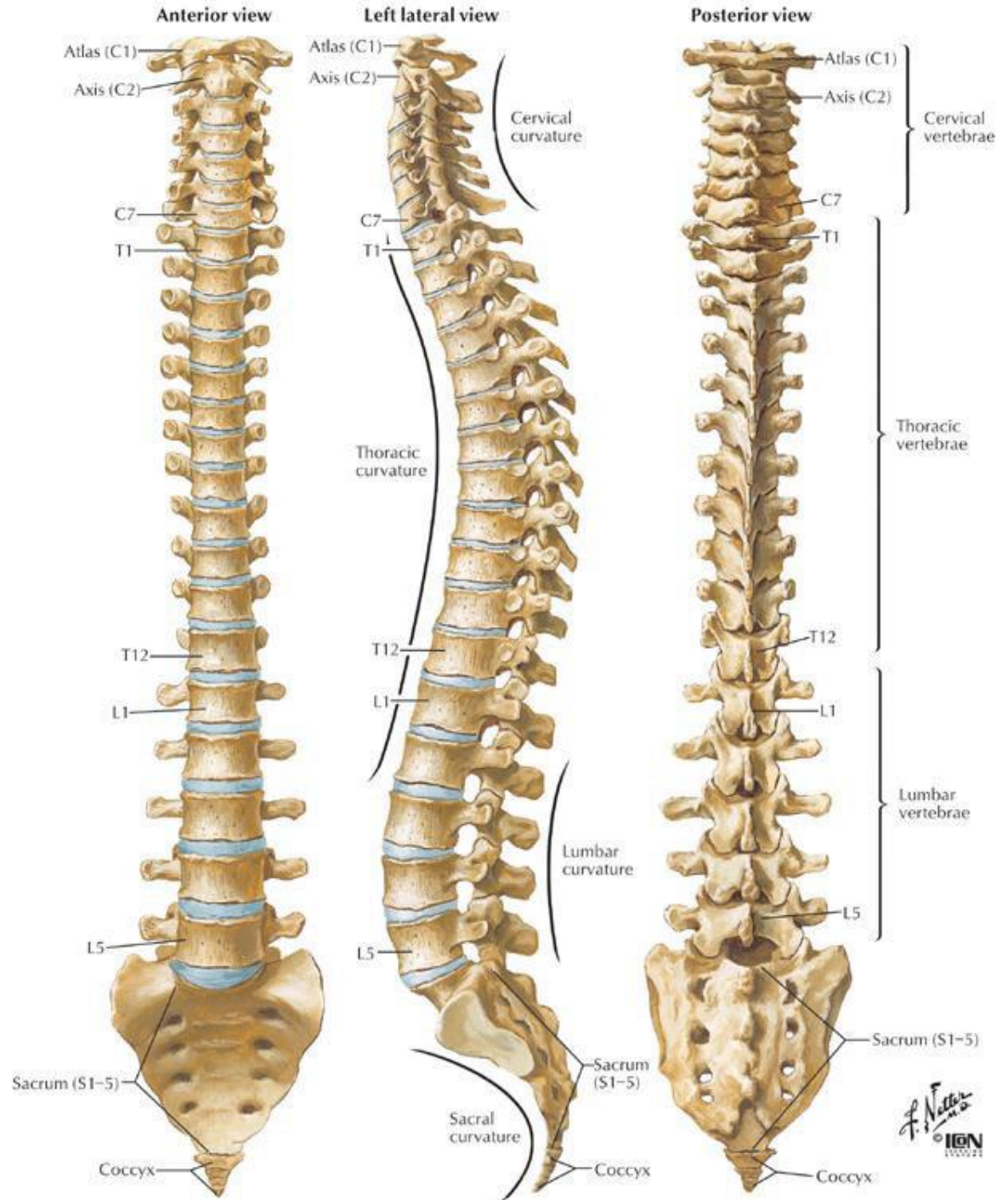
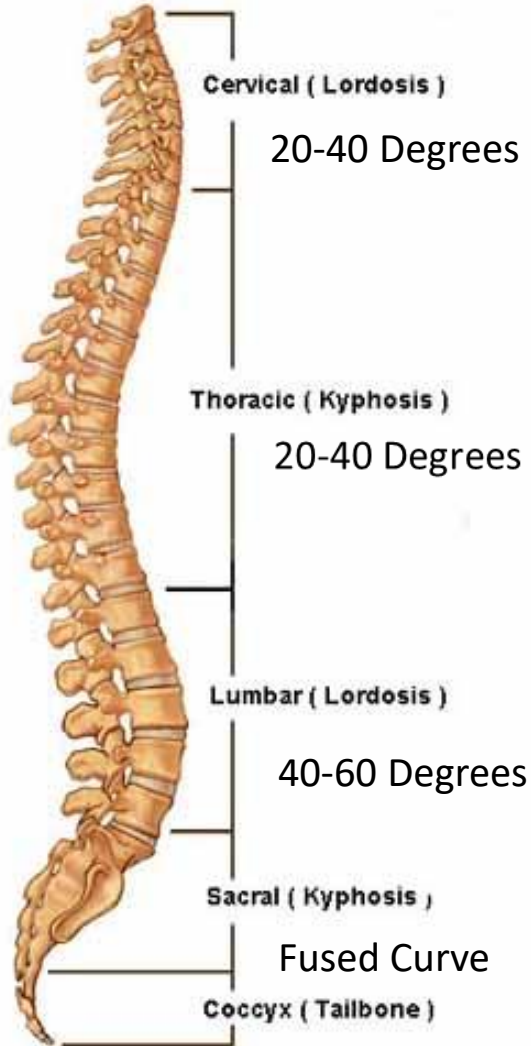


(a) Anterior view

(b) Sagittal view

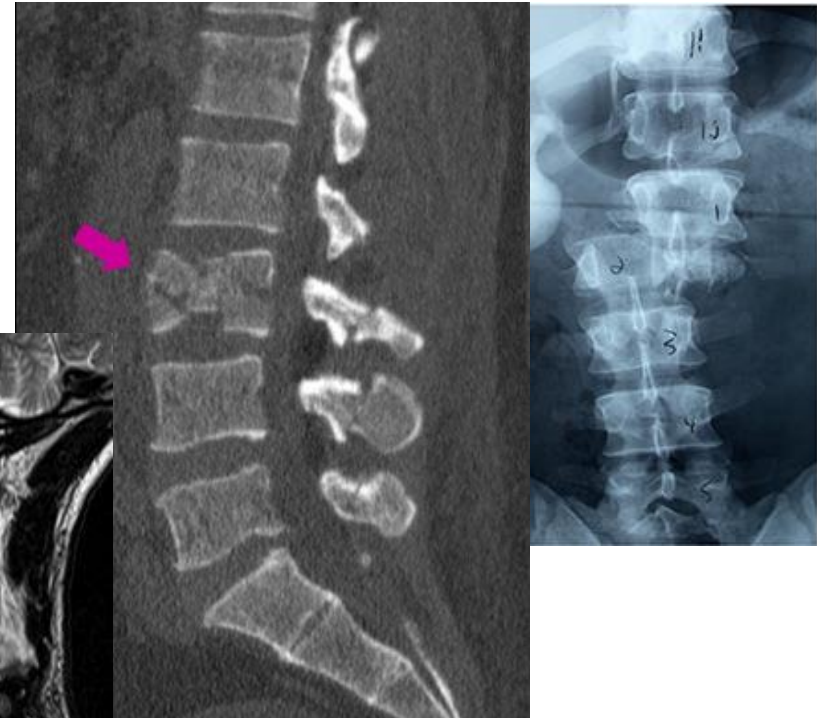
Spinal Normal Curvatures:

Lateral (Side) Spinal Column



Definitions

- Spinal Trauma can cause:
 - I. Spinal column fracture or dislocation



- II. Cauda or Root injury

- III. Cord injury



Spinal column fracture or dislocation

I. Pure uni-column fractures



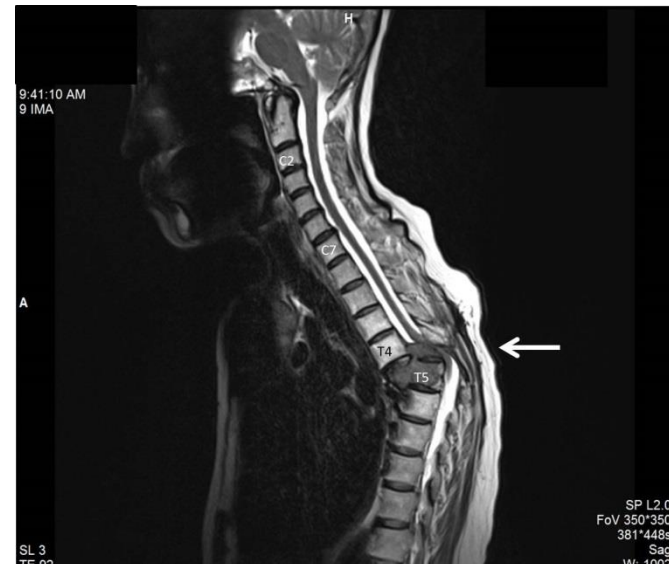
II. Two column fractures (Burst Fracture)



III. Dislocation with only ligamentous injury



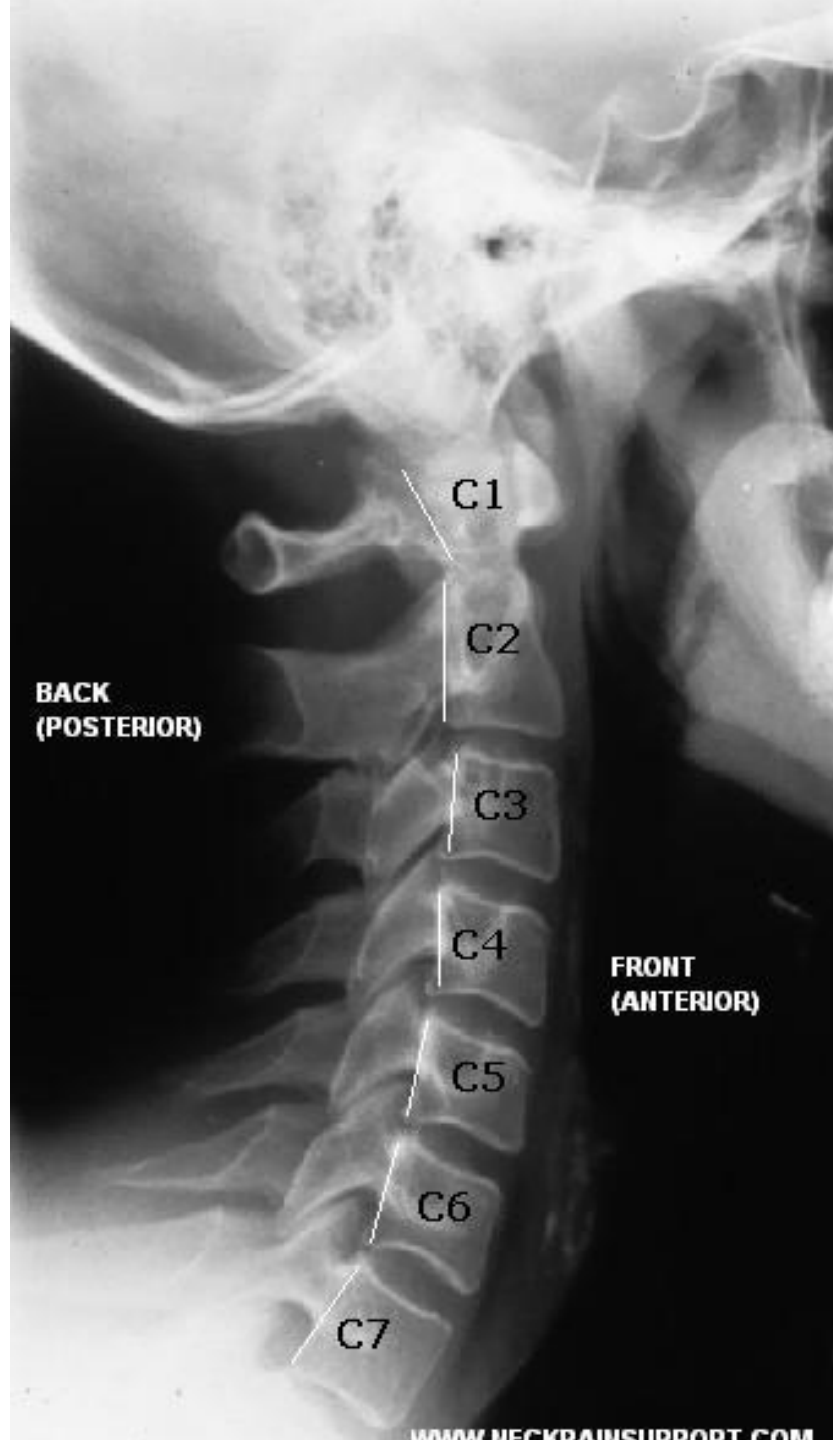
IV. Fracture- Dislocation



تشخیص آسیب تروماتیک ستون فقرات







**BACK
(POSTERIOR)**

C1

C2

C3

C4

C5

C6

C7

**FRONT
(ANTERIOR)**



Figure 1

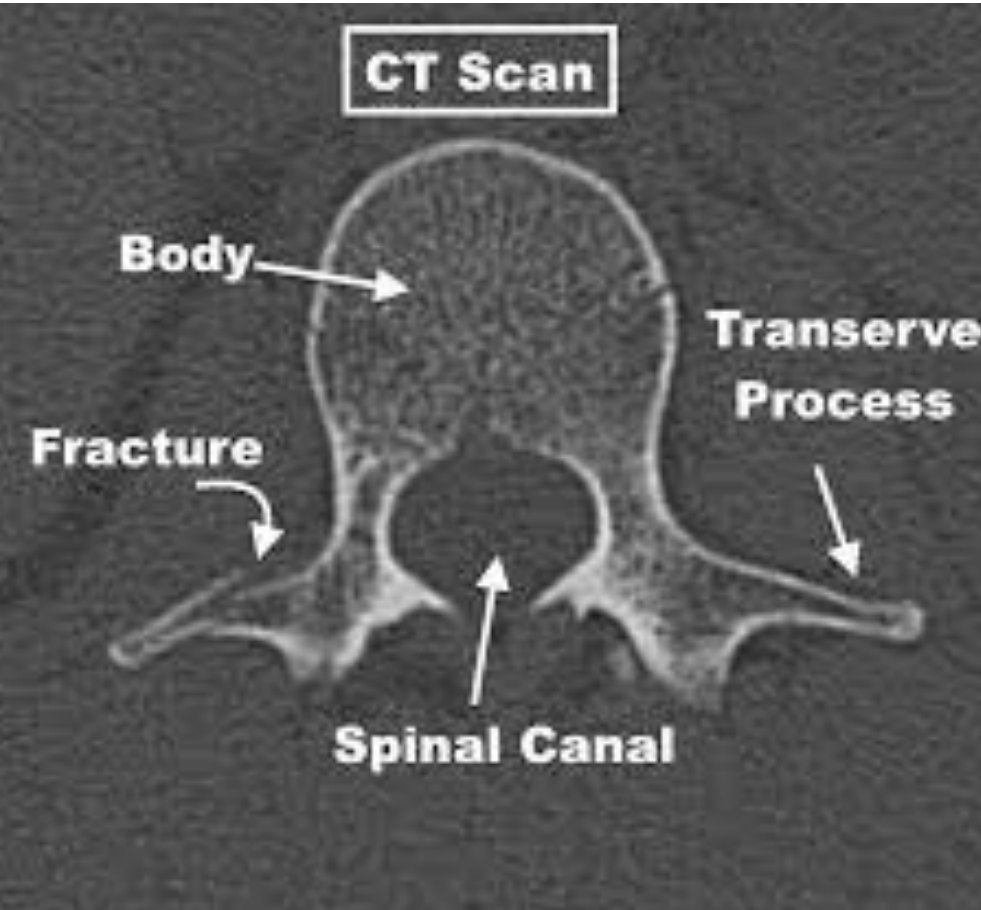


Figure 2

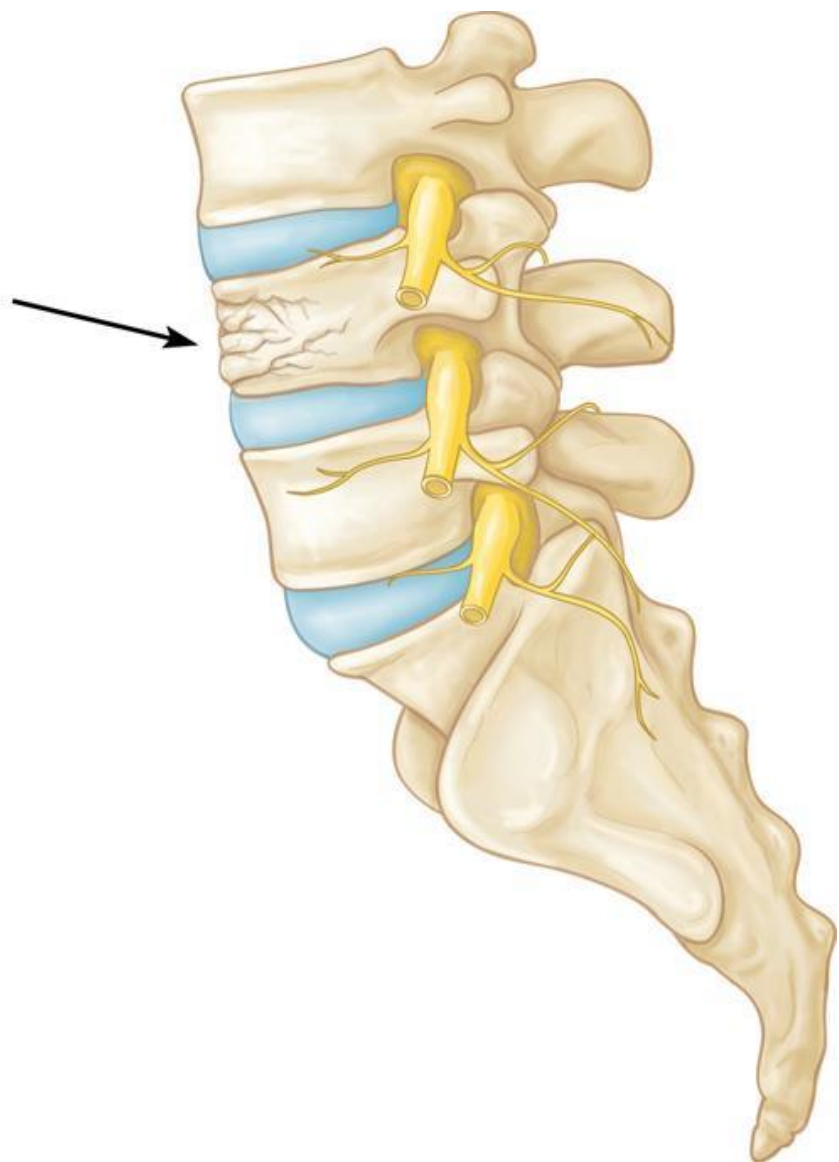
clay shoveler fracture



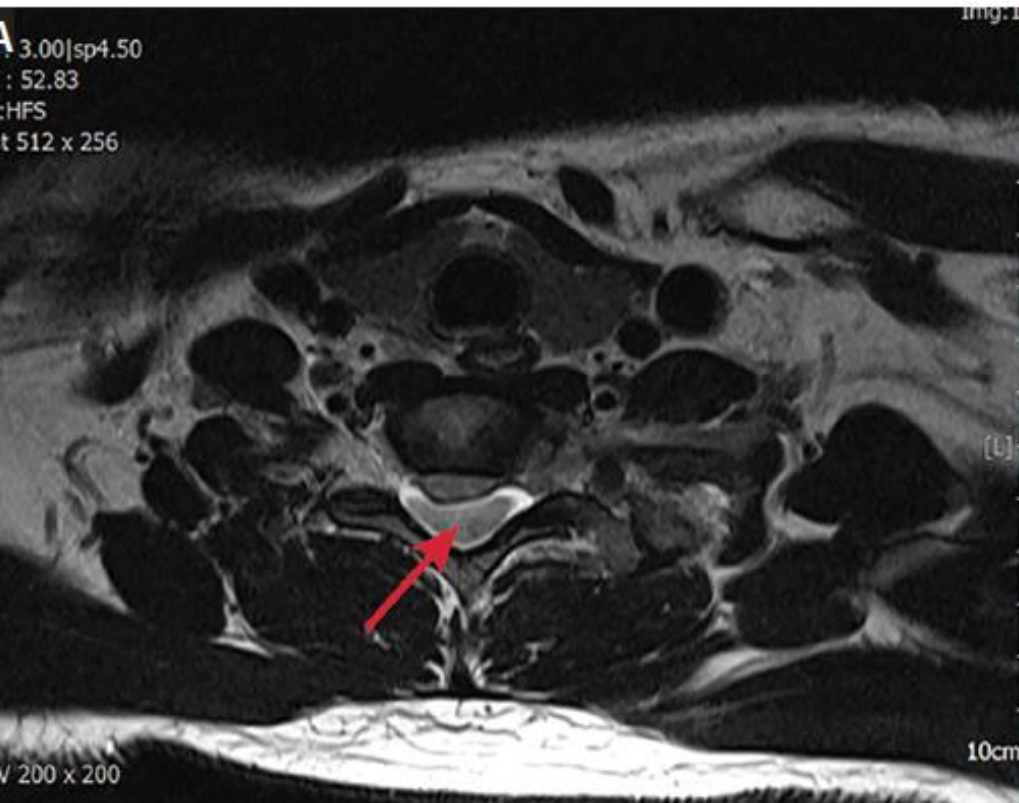
Transverse Process Fracture











Hyperflexion Sprain: MRI





Signs and Symptoms

- Spinal Trauma can cause:
 - I. Pain
 - II. Deformity
 - III. Plegia
 - IV. Paresis
 - V. Sensory level
 - VI. Sphincter disturbance
 - VII. Sexual dysfunction
 - VIII. Respiratory dysfunction
 - IX. Cardiac dysfunction



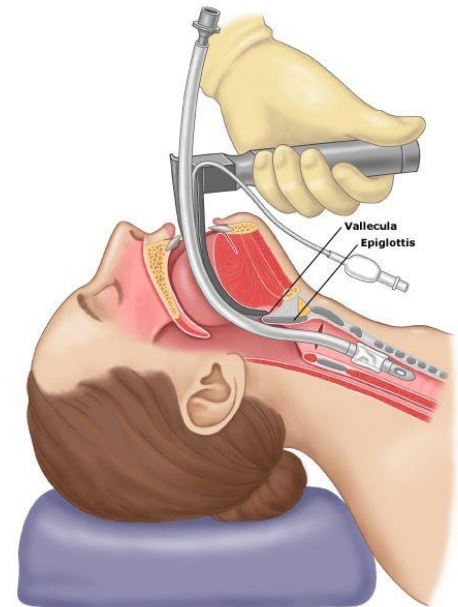
Effects of Spinal Injury

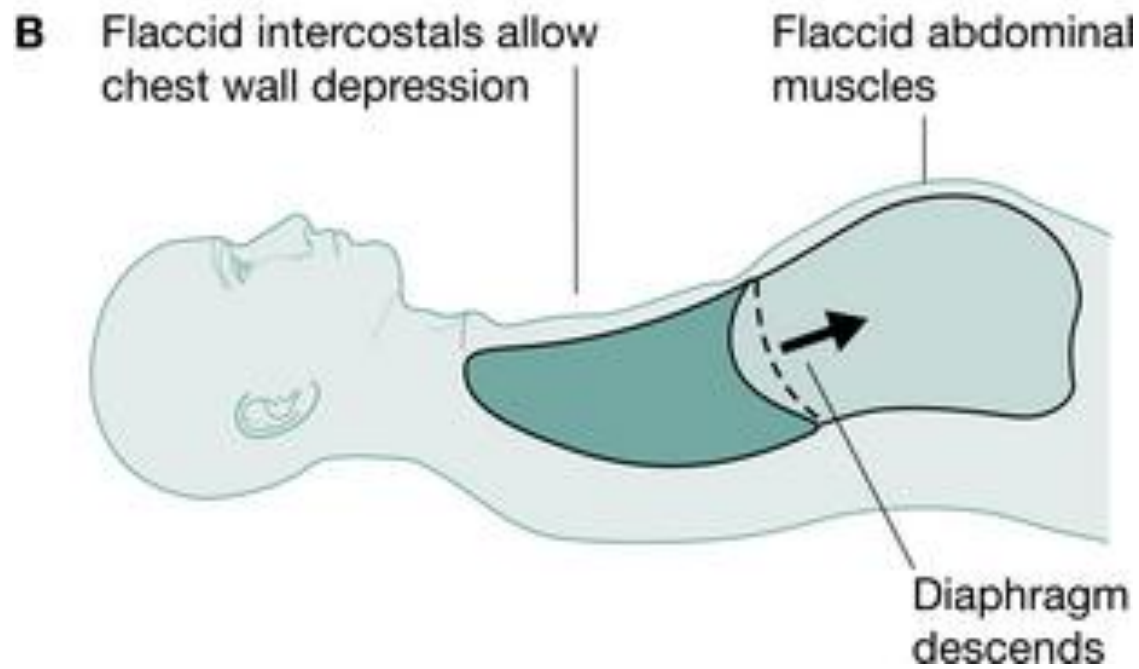
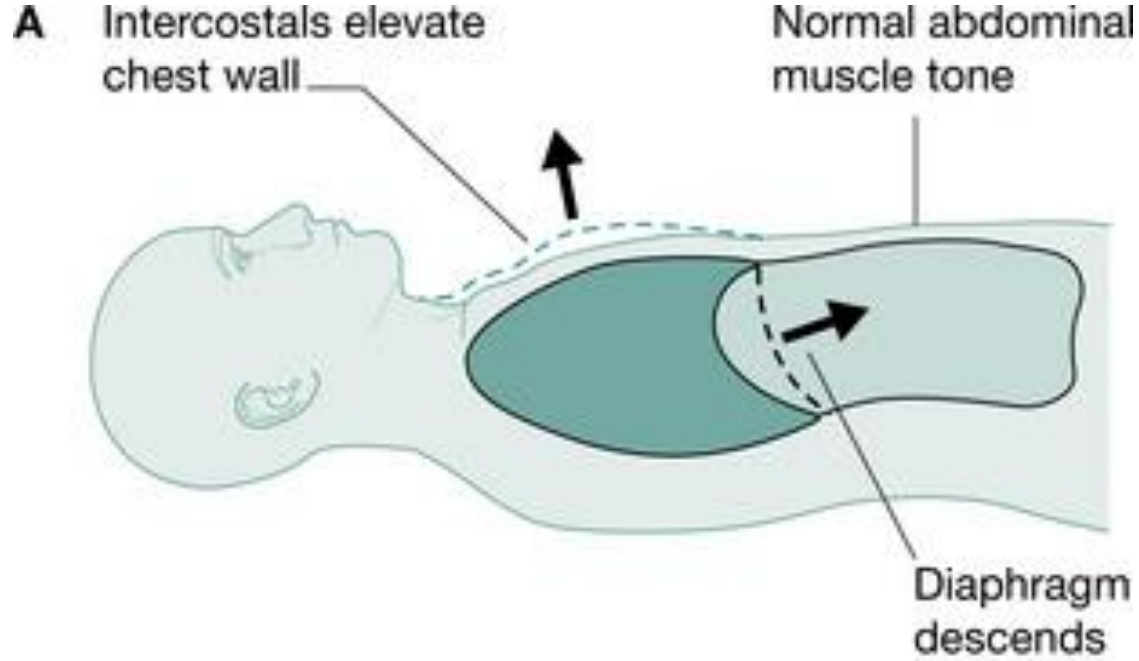
Level of Injury	Effect*
C E R V I C A L	
Between C2 and C5	Paralysis of some or all muscles used for breathing and all arm and leg muscles Typically, fatal unless a ventilator is used
Between C5 and C8	Paralysis of the legs, trunk, hand, and wrist Weakness of the muscles that move the shoulder and elbow
T H O R A C I C	
Between C8 and C7	Paralysis of the legs, trunk, and part of the wrists and hands Normal movement of the shoulders and elbows
Between C7 and C8	Paralysis of the legs, trunk, and hands
C8 to T1	Paralysis of the legs and trunk Weakness of the muscles that move fingers and hands Horner syndrome (with a drooping eyelid, a constricted pupil, and reduced sweating on one side of the face) Possibly normal movement of the shoulders and elbows
T2 to T4	Paralysis of the legs and trunk Loss of sensation below the nipples Normal movement of the shoulders and elbows
L U M B A R	
T5 to T8	Paralysis of the legs and lower trunk Loss of sensation below the rib cage
T9 to T11	Paralysis of the legs Loss of sensation below the navel
T11 to L1	Paralysis of and loss of sensation in the hips and legs
S A C R A L	
L2 to S2	Various patterns of leg weakness and numbness, depending on the precise level of injury
S3 to S5	Numbness in the area between the anus and the opening of the vagina (perineum)

* At any level of the spinal cord, severe injury can cause loss of bladder and bowel control.

Signs and Symptoms

- Cervical spine trauma can cause:
 - I. Respiratory Failure due to intercostal muscle palsy (cord injury below C4) → Abdominal respiration
 - II. Respiratory Arrest due to phrenic nerve palsy concomitant with intercostal muscle palsy (cord injury at C4 level and above it)
 - III. Both above conditions need Intubation, urgently or as soon as possible





Precautions

- In cases of Spinal Trauma, we must do:
 - I. Use external fixator (Brace or collar)
 - II. Minimal displacement (Intubation) and only transferring with Backboard.
 - III. Multiple intermittent exam of vital signs and limbs forces



IV. Deep Vein Thrombosis Prophylaxis (Drug or Devices)



V. Bladder training in cases of Cord injury and in the postoperative period (Foley clamped-off)



VI. Physical Therapy in Cases of cord injury and in the postoperative period



VII. Bedsore prevention (change of position)



VIII. Nutritional support



IX. Out of bed, as soon as possible

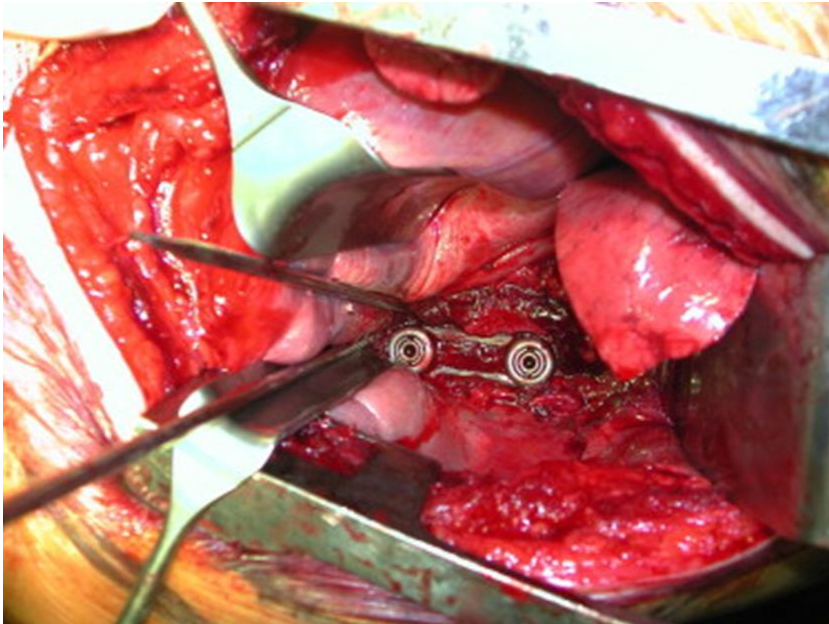


Treatment

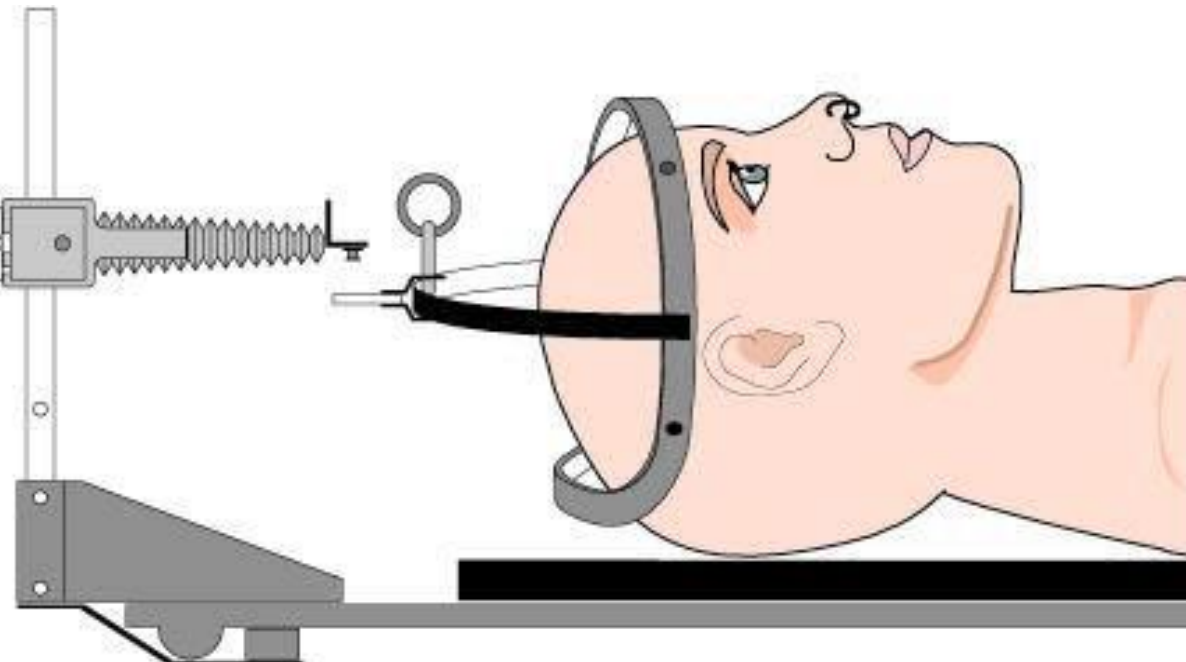
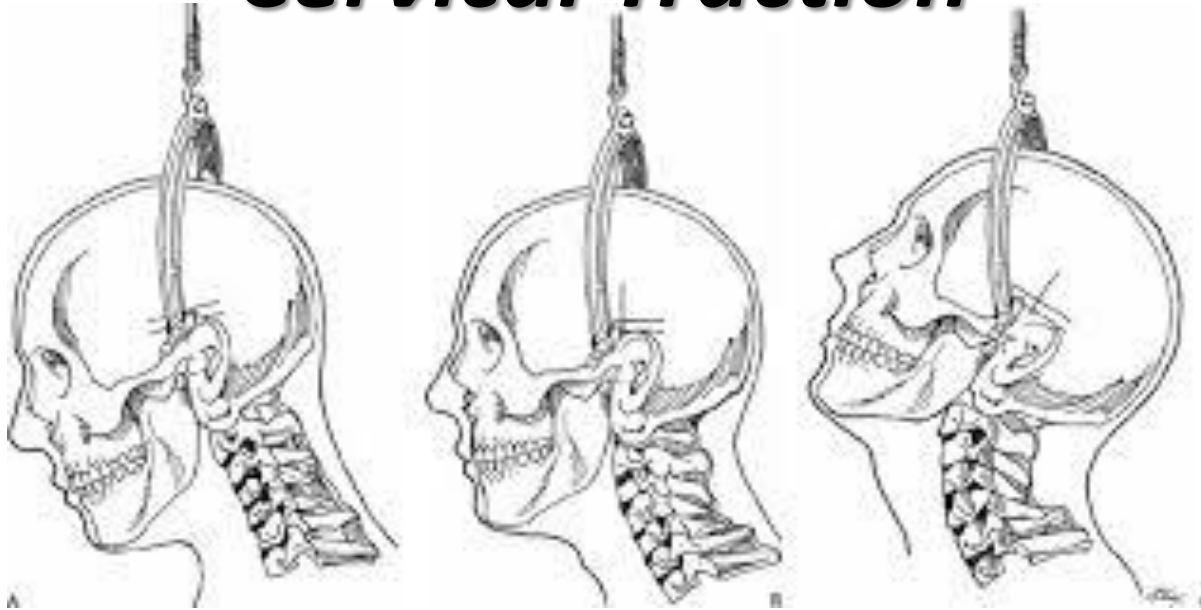
- Treatment options are:

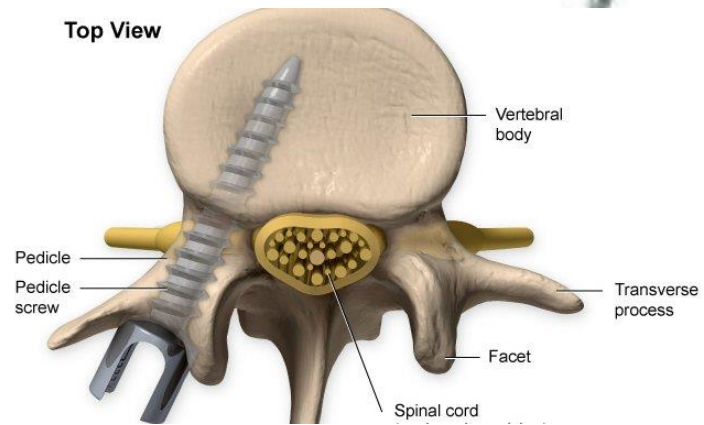
I. Conservative

II. Surgical



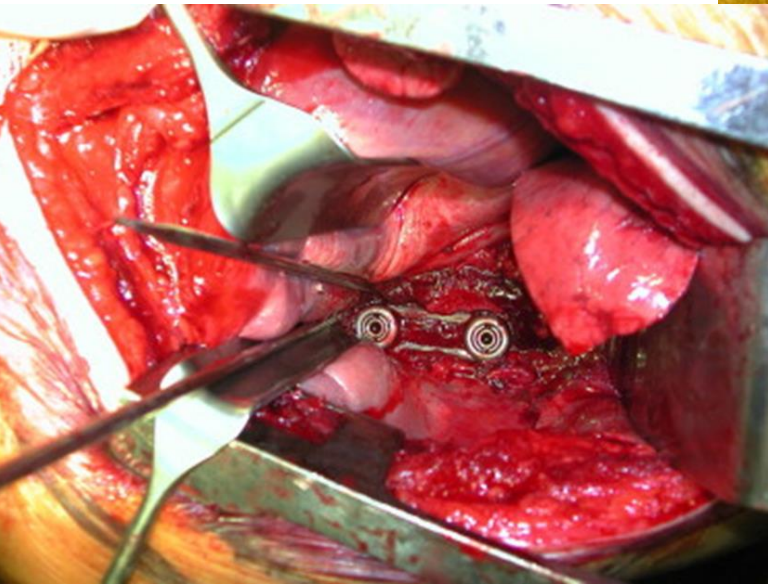
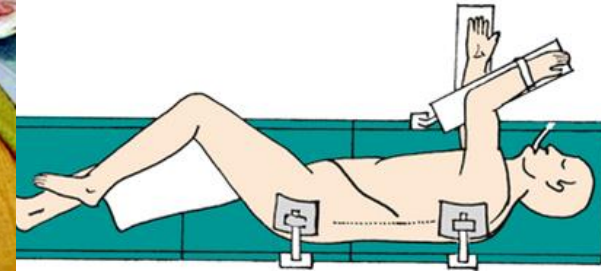
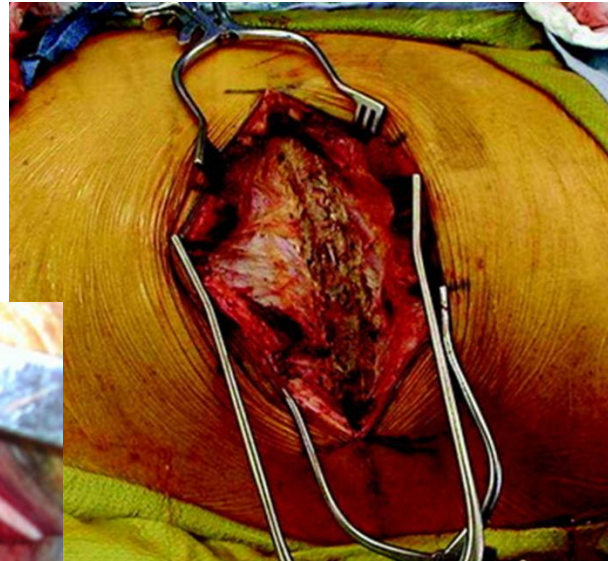
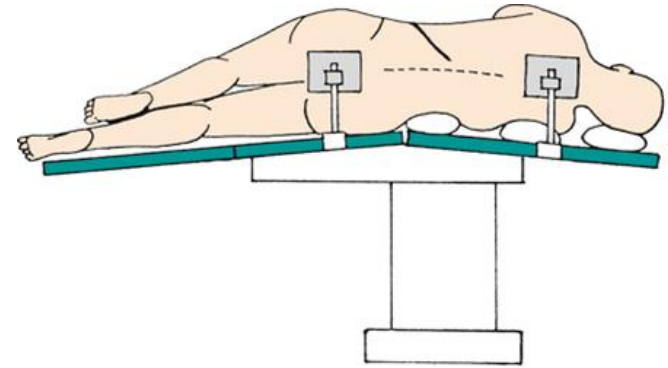
Cervical Traction

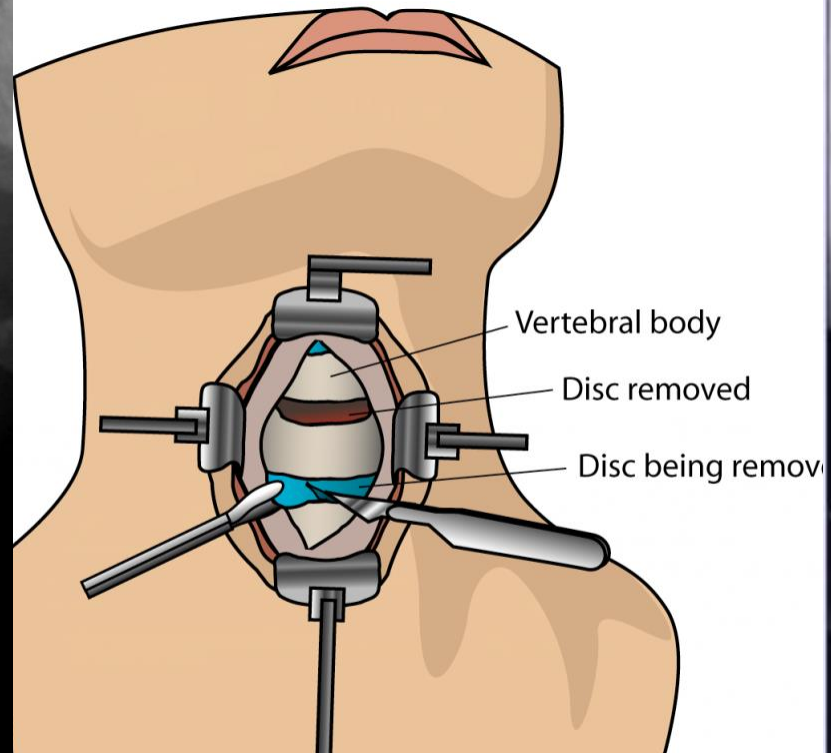




Treatment

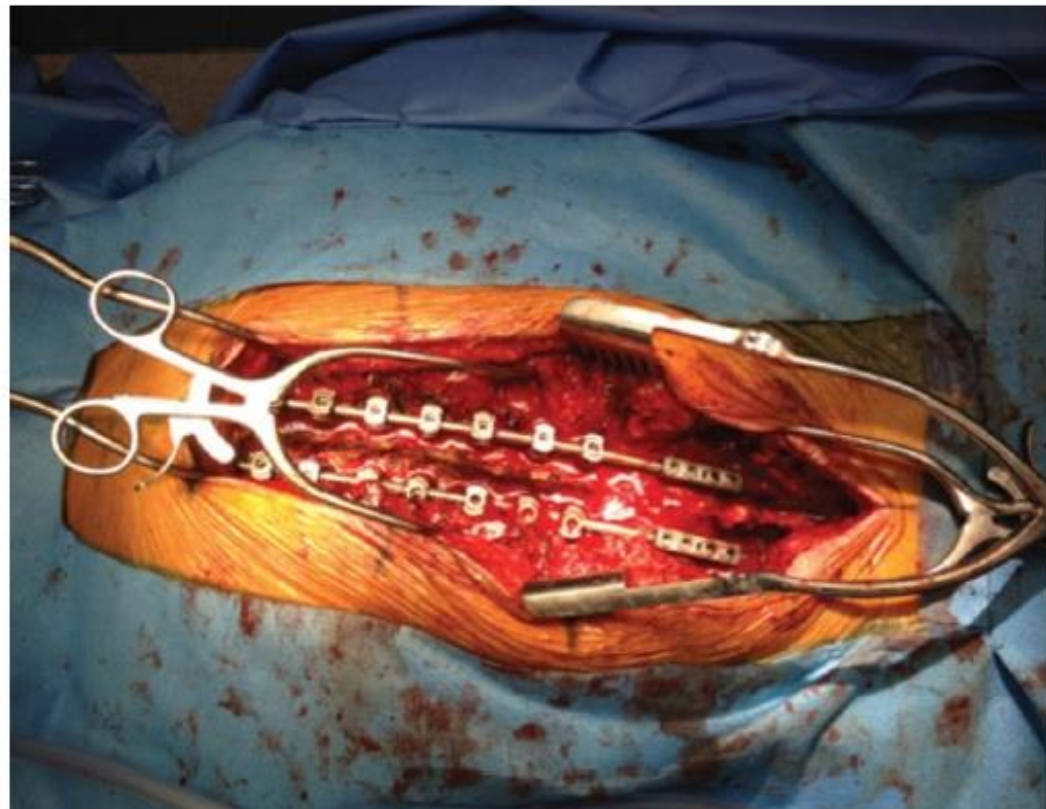
- Surgical treatment:
 - 1) Anterior Approach:



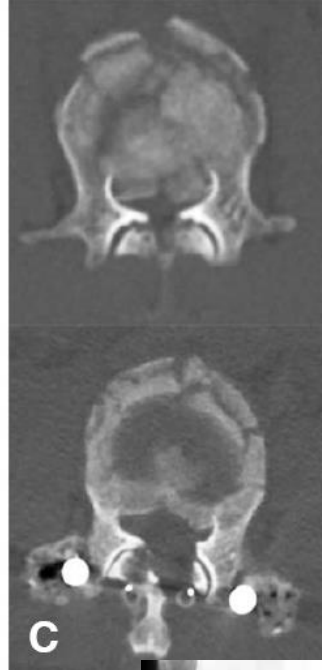
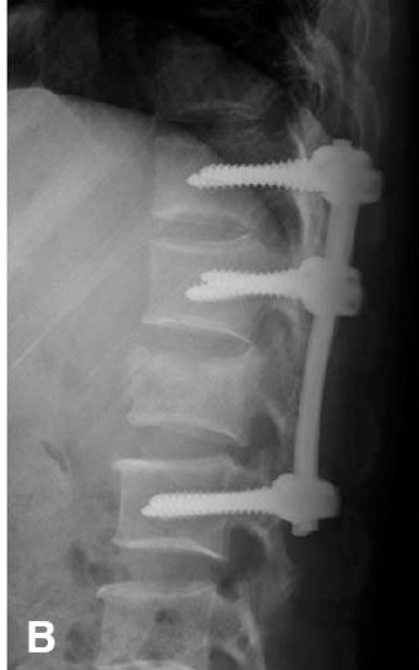


Treatment

- Surgical treatment:
 - 2) Posterior Approach: Posterior Segmental Fixation (PSF)







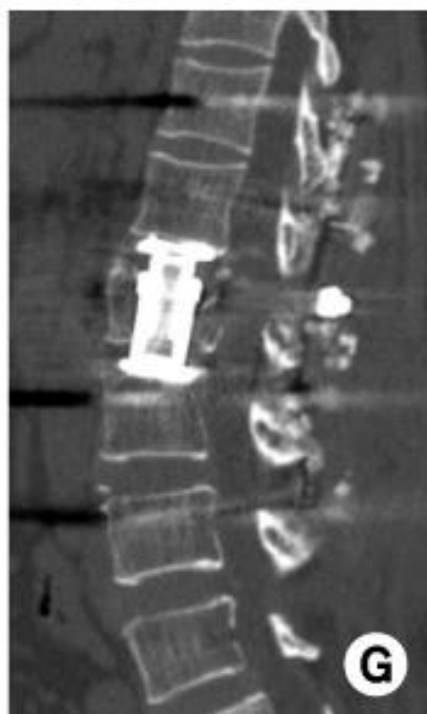
A

B

C



L



***Both
Approaches:
Anterior
+
Posterior***



Good Luck