



**Manajemen Penderita
Cedera Kepala**

Endro Basuki S.



- **Jakarta, 8 Januari, 1953**
- **Dokter Umum – FK UGM, 1979**
- **Spesialis Bedah Saraf – FK UNPAD, 1989**
- **Vrije Universiteit Amsterdam, 1987 – 1988**
- **Magister Kesehatan – FK UGM, 2000**
- **Puskesmas Kec. Lamuru, Bone, 1979 – 1982**
- **Staf SMF Bedah Saraf RS Dr Sardjito**
- **Bendahara CE&BU RS Dr Sardjito/FK UGM**
- **Ka. Instalasi Bedah Sentral RS Dr Sardjito**
- **Pengurus Harian Komite Medik RS Dr Sardjito**
- **Presiden PERSPEBSI, 2005 – 2009**
- **Medical Advisory Board PT. ASKES**





**TERJADI TIAP 15 DETIK
MATI TIAP 12 MENIT**



CEDERA KEPALA



**50 % KEMATIAN PADA TRAUMA
60 % KEMATIAN AKIBAT KLL**

TATALAKSANA

P
R
I
M
A
R
Y

S
U
R
V
E
Y

AIRWAY & C-SPINE CONTROL

BBREATHING

CCIRCULATION

KONSEPNYA
RESPONSIBILITAS TERPENTING

**MANAJEMEN ABC : CEGAH
HIPOVENTILASI DAN HIPOVOLEMIA**



***POTENSIAL TERJADINYA
SECONDARY BRAIN DAMAGE***

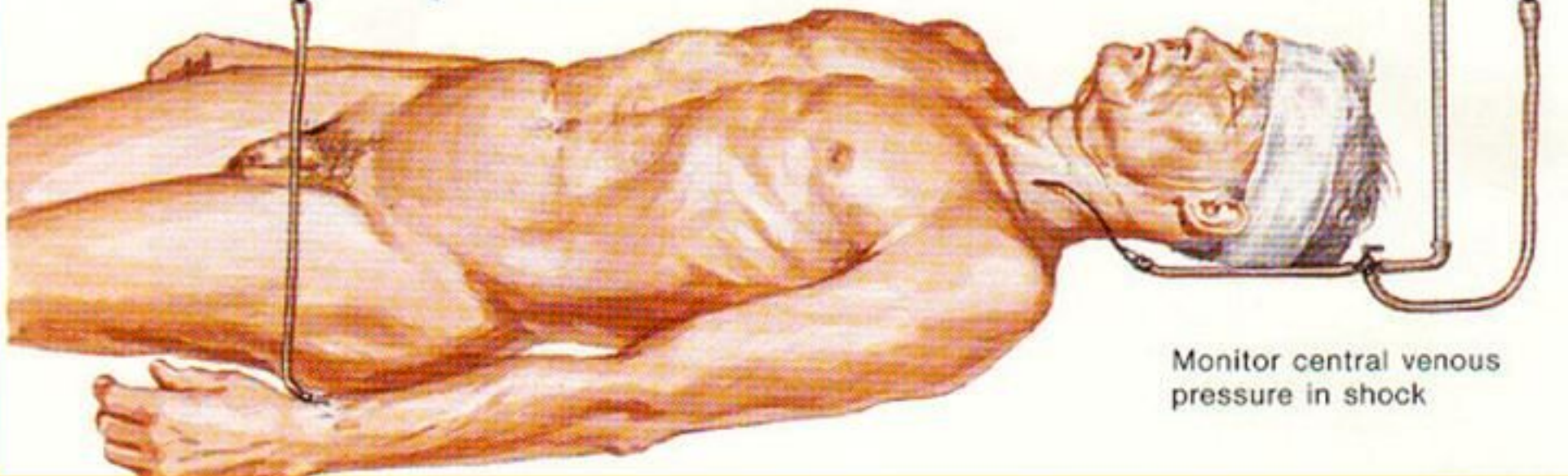
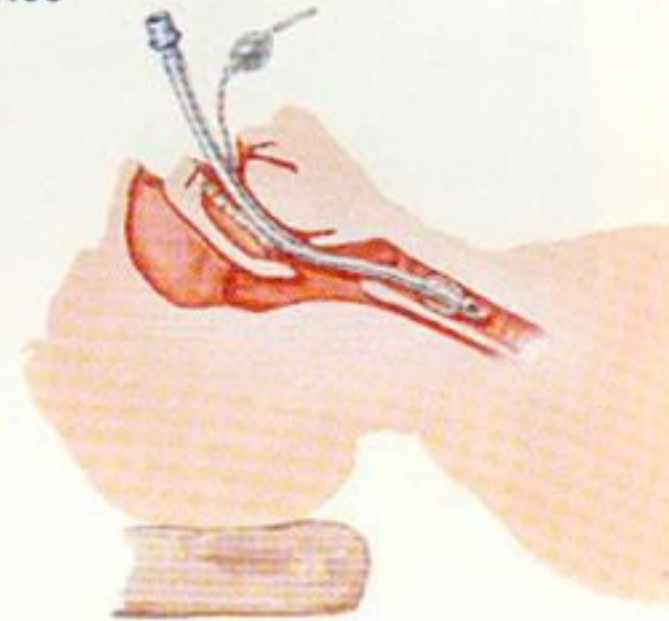
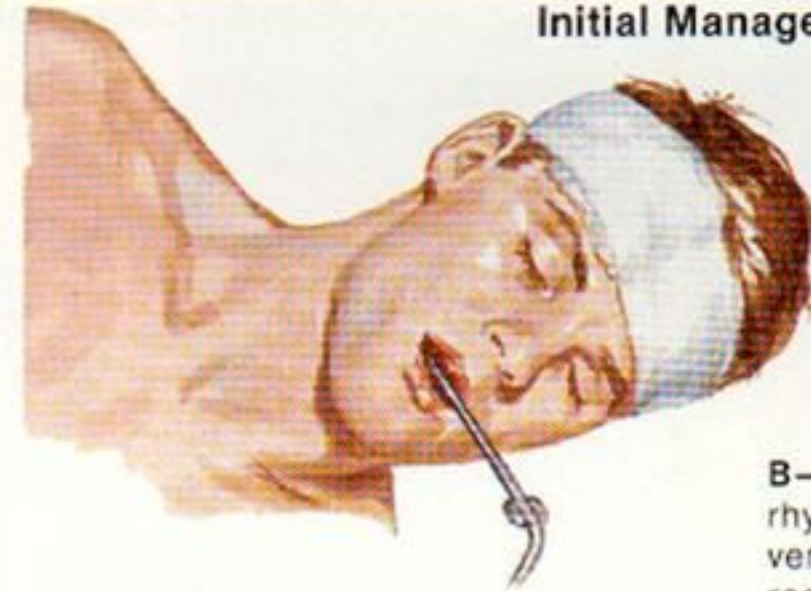
Initial Management of Severe Head Injuries

"ABC" assessment

A—airway: suction to free pharynx from blood and other material; intubate after cervical spine evaluation

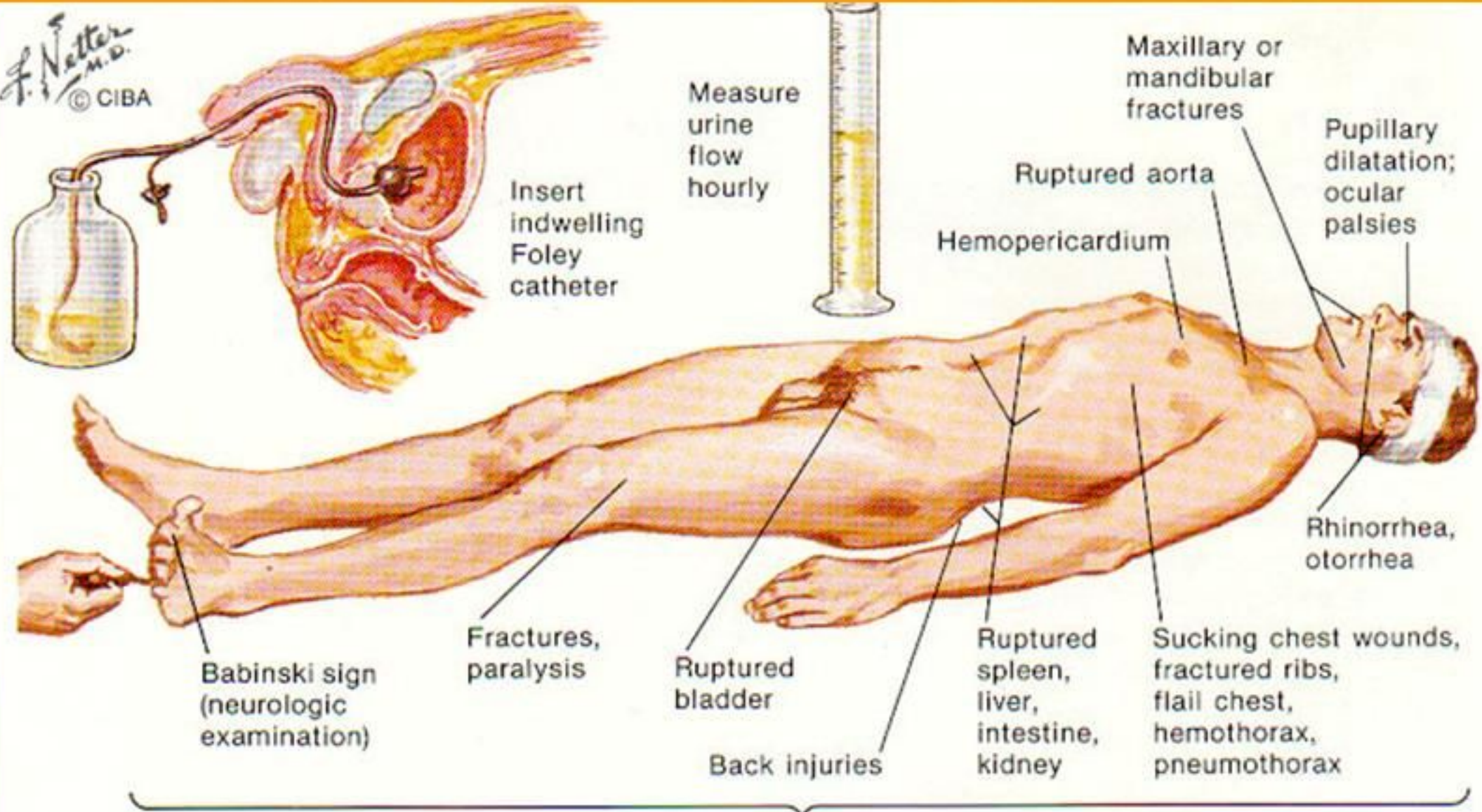
B—breathing: evaluate rate, rhythm and breath sounds; ventilate to raise PaO₂ and reduce PaCO₂ (to lower ICP); monitor ABG levels

C—circulatory status: start intravenous infusion of lactated Ringer's or normal saline solution, followed by blood if indicated; obtain immediate laboratory work and x-rays; administer steroids and phenytoin, plus pressor agent if required (shock rarely due to head injury alone; search for cause)



Monitor central venous pressure in shock

F. Netter M.D.
© CIBA



Conduct complete physical examination and repeat periodically

ANATOMI FISIOLOGI CEDERA KEPALA

SCALP



SKIN

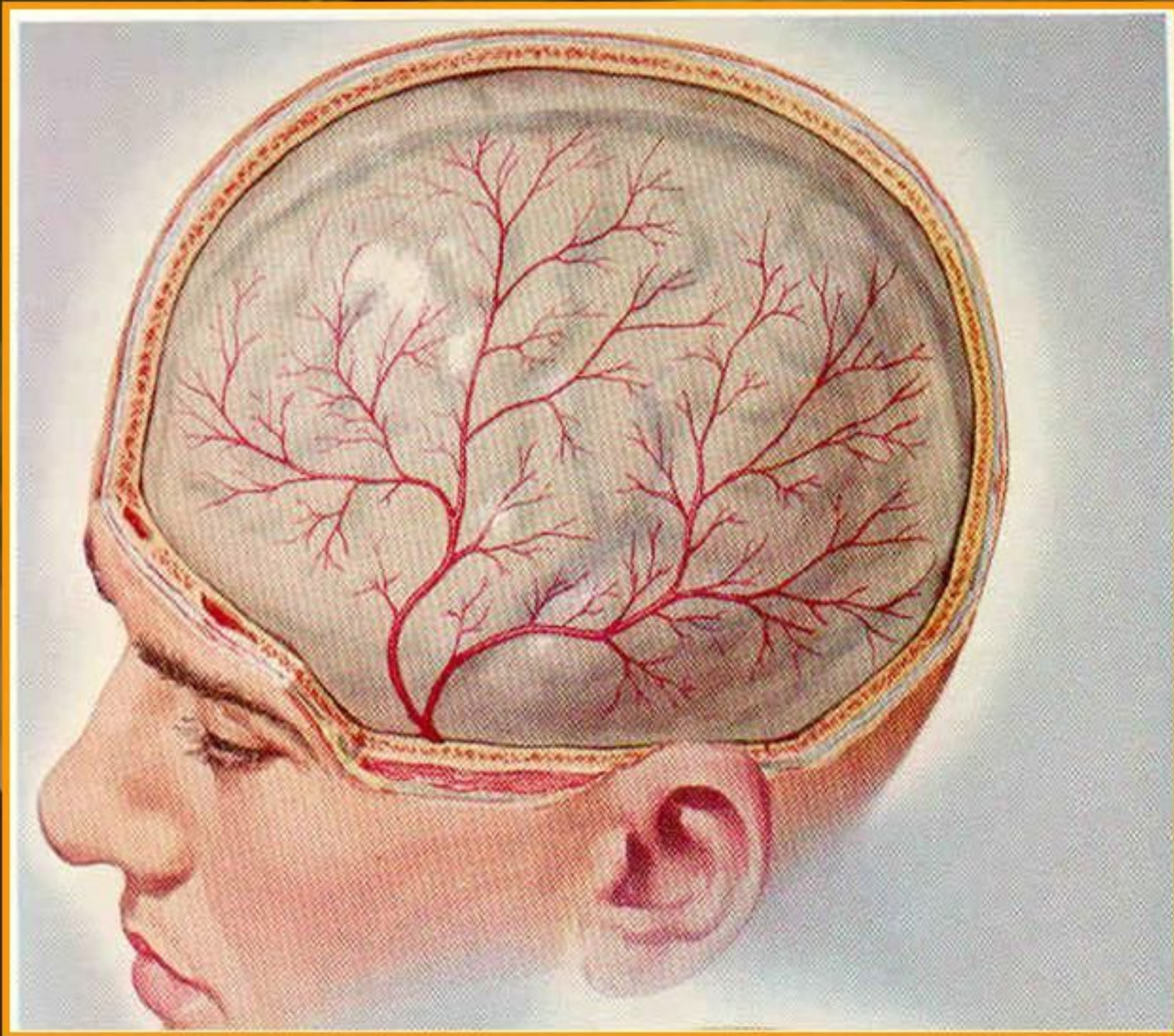
CONNECTIVE TISSUE

APONEUROSIS/GALEA

LOOSE AREOLAR TISSUE

PERICRANIUM

**vaskularisasi sangat baik,
perdarahan hebat potensial menimbulkan syok**



SCALP

SKULL

MENINGES

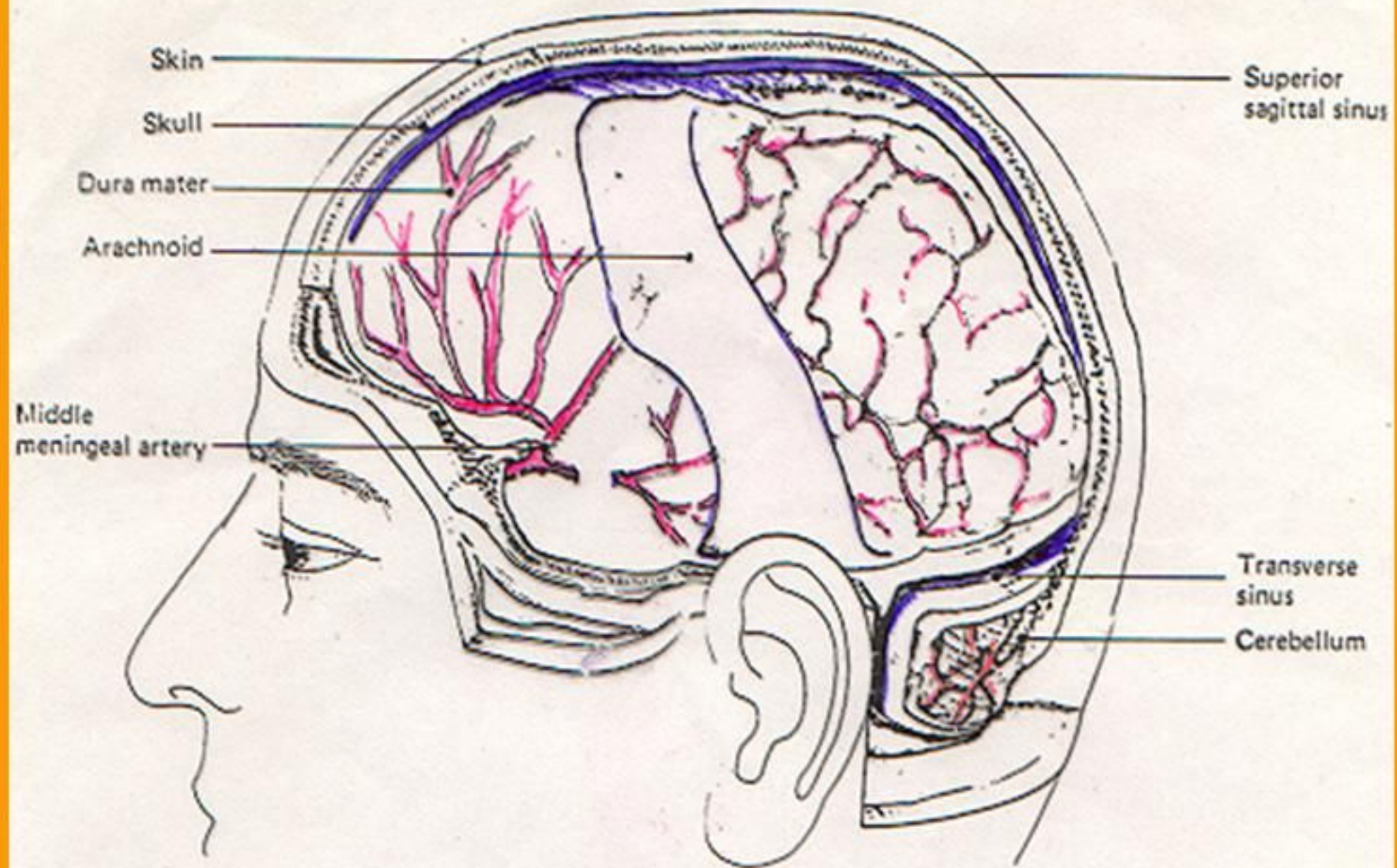
BRAIN

LCS

TENTORIUM

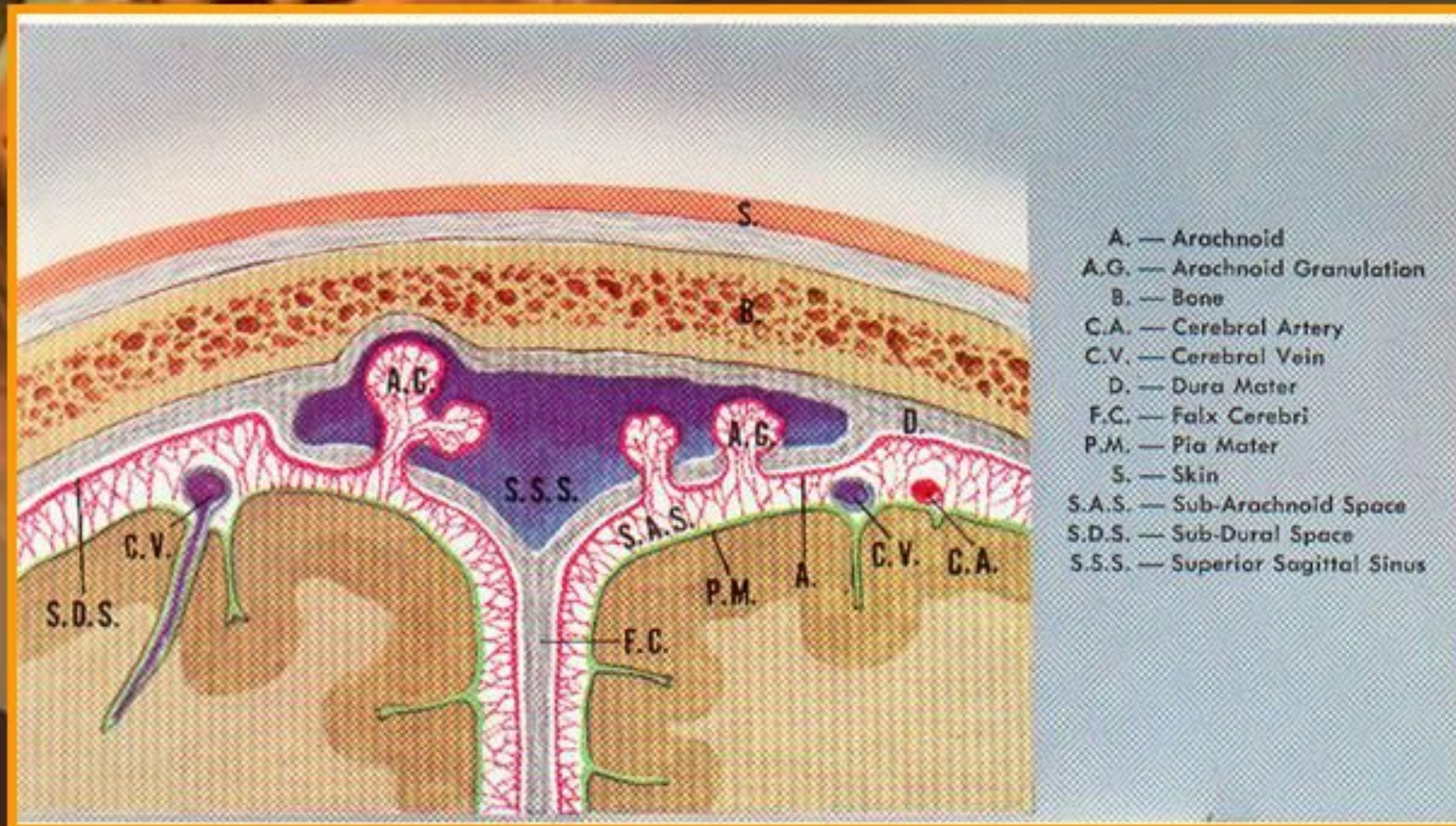
GCS

ICP



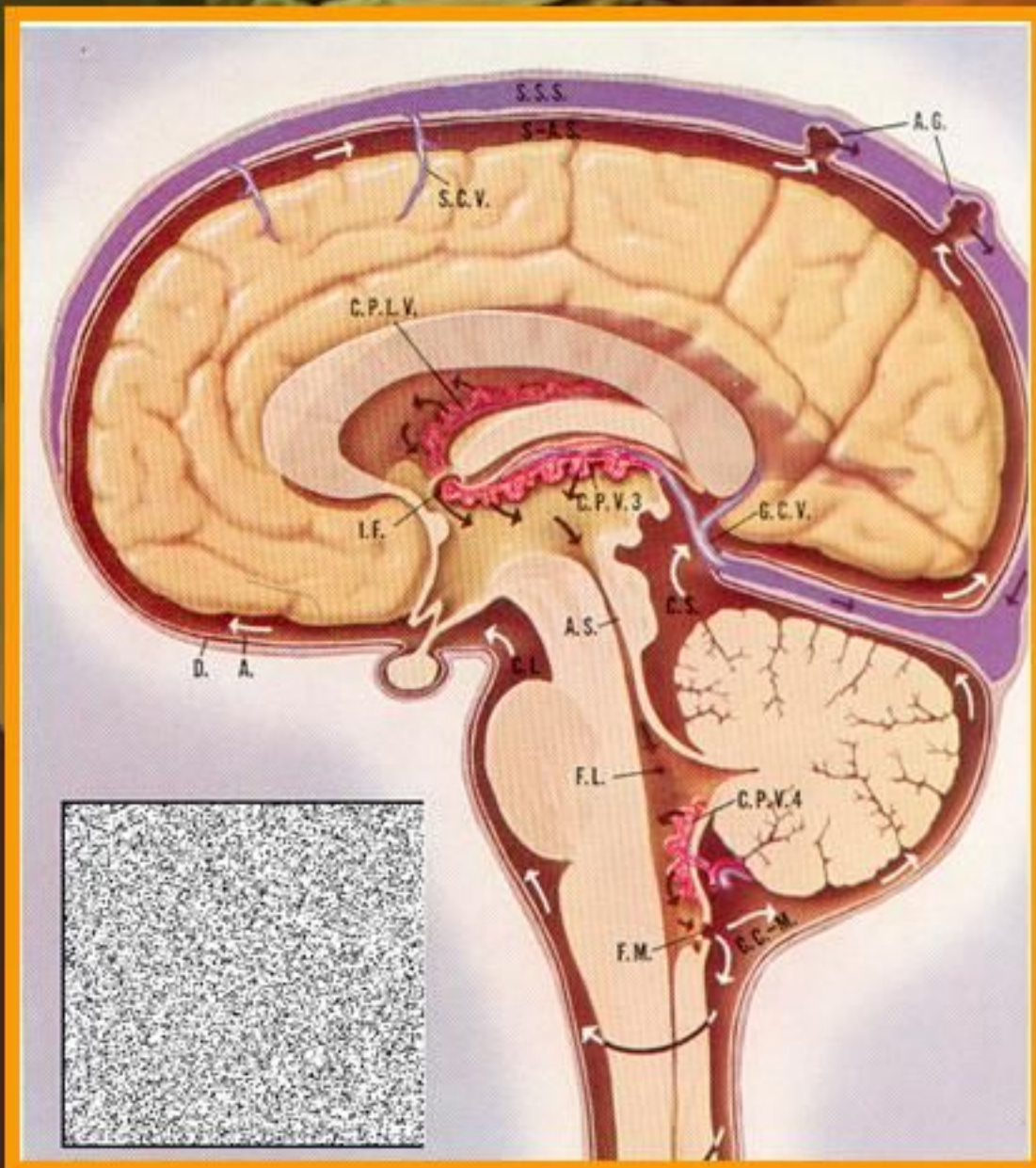
MENINGES

Tiga lapis : duramater, arachnoid, piamater
Arteri Meningea Media, potensial terlibat pada kasus EDH



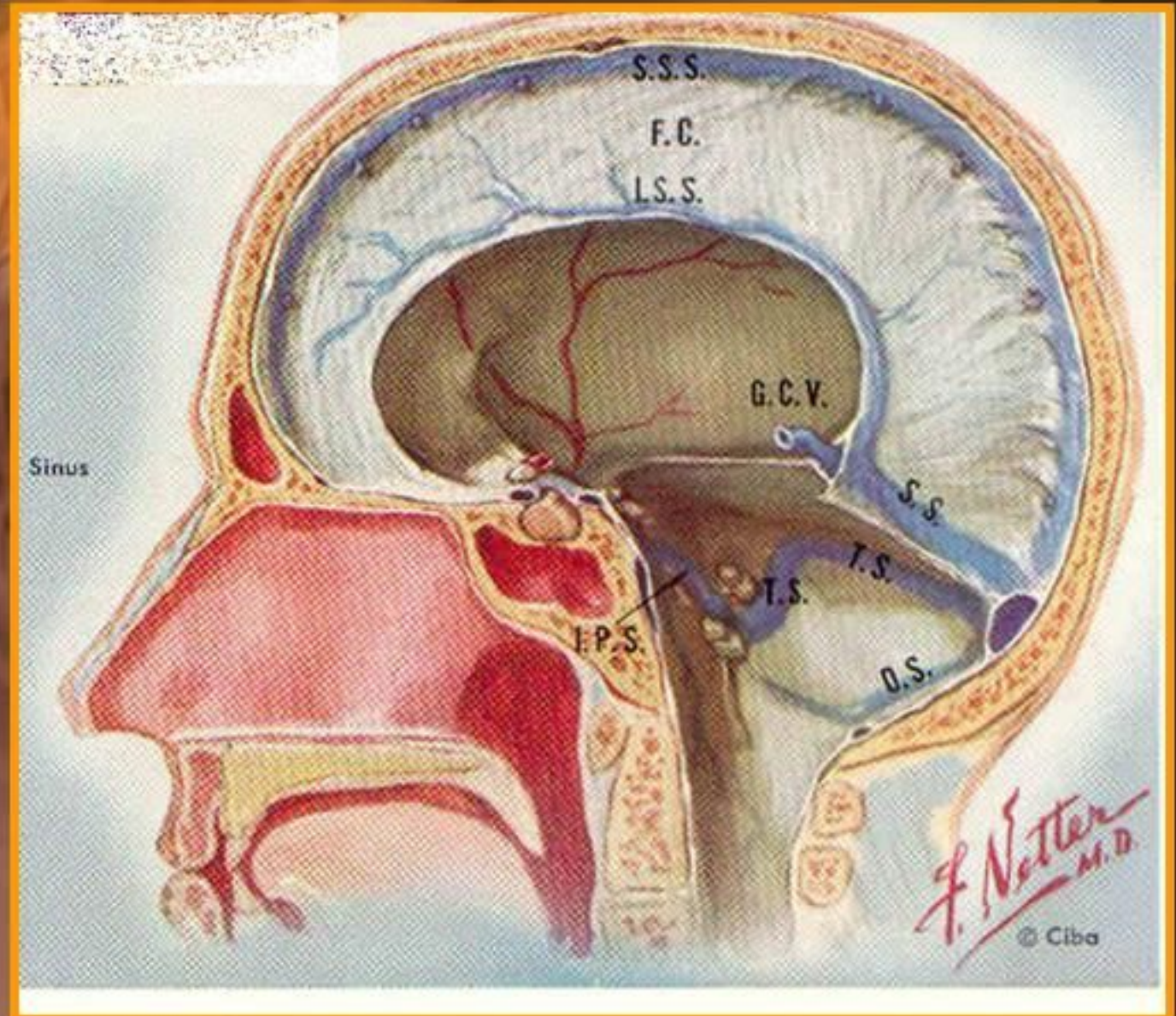
CAIRAN SEREBROSPINAL

*Diproduksi oleh pleksus koroideus
Rata-rata 30 ml per jam
Bersirkulasi*



TENTORIUM

Membagi 2 ruangan intrakranial
Supratentorial dan Infratentorial





CEREBRAL PERFUSION PRESSURE (CPP)

Merupakan **PRIORITAS UTAMA**

Rumus : $CPP = \text{Mean Arterial Pressure} - \text{ICP}$

CEREBRAL BLOOD FLOW (CBF)

Normal : 50 ml/100 gram otak/ menit

Bila mencapai 5 ml/ menit :

cell death & irreversible damage



TEKANAN INTRAKRANIAL

Normal : 10 mmHg (136 mm air)

Makin **tinggi** TIK makin **jelek** prognosis

HUKUM MONRO-KELLIE

Prinsip : total volume intrakranial bersifat **TETAP**,
Oleh karena kranium merupakan **NON EXPANSILE BOX**

Monro Kellie

$$V_k = V \text{ darah} + V \text{ likwor} + V \text{ parenkim}$$



SECONDARY SURVEY

Whole Examination

ANAMNESIS

PEMERIKSAAN FISIK

PENUNJANG

INFORMASI PENTING



***USIA DAN MEKANISME TRAUMA
STATUS RESPIRASI & KARDIOVASKULER
KESADARAN, REAKSI PUPIL, LATERALISASI
ADANYA TRAUMA NON SEREBRAL
HASIL PEMERIKSAAN DIAGNOSTIK***



TANDA – TANDA PENTING



**PUPIL ANISOKOR
LATERALISASI MOTORIK
LUKA TERBUKA DGN KEBOCORAN LCS
PERBURUKAN NEUROLOGIS
FRAKTUR DEPRESI TULANG TENGGORAK
SAKIT KEPALA HEBAT**

KOMPONEN GLASGOW COMA SCALE

E :: BUKA MATA: 1 - 4

V :: SUARA : 1 - 5

M :: GERAKAN : 1 - 6

KOMPONEN MATA

Glasgow Coma Scale

Eye opening (E)



Spontaneous = 4

Open
your
eyes



Response to speech = 3



To pain = 2

Nil (no response) = 1

E

Spontaneous

To speech

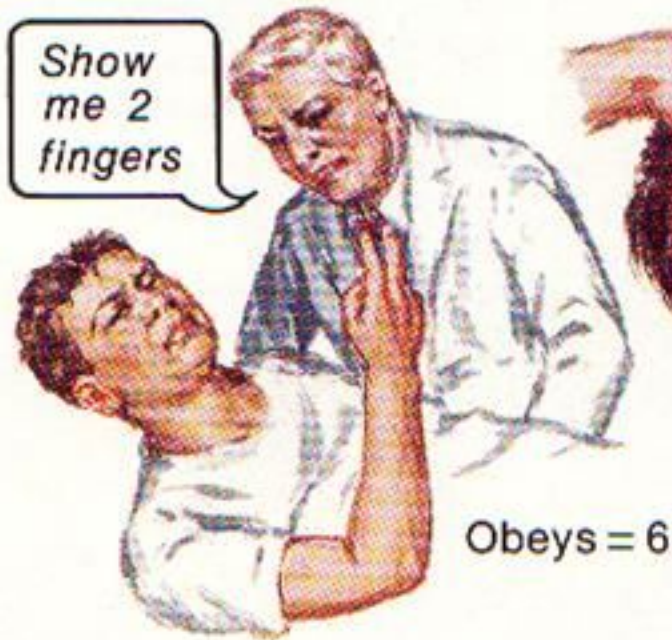
To pain

Nil

KOMPONEN MOTORIK

Motor response (M)

Show me 2 fingers



Obeys = 6



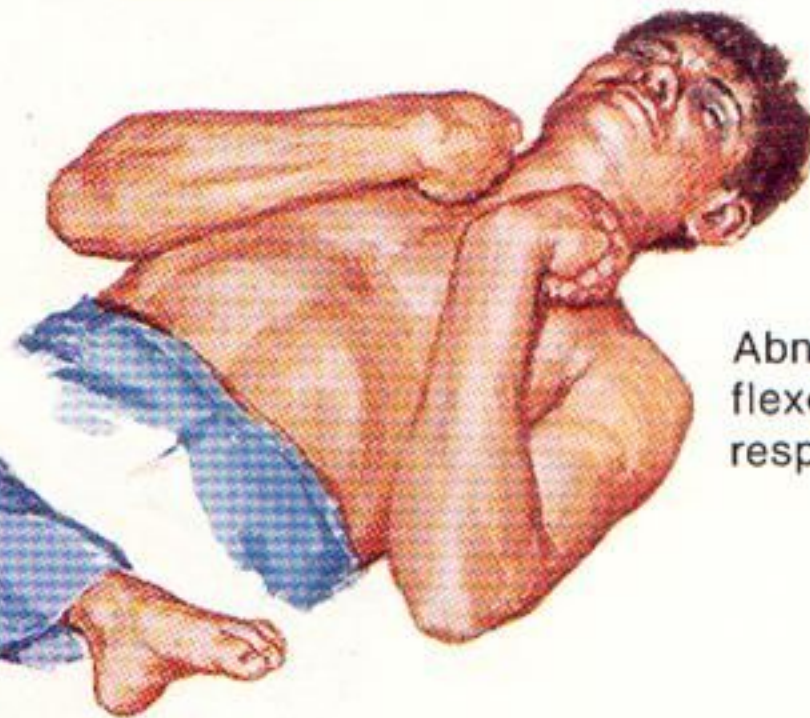
Localizes = 5



Withdraws = 4



Extensor response = 2



Abnormal flexor response = 3

Nil (no response) = 1

F. Netter M.D.
© CIBA

M

Obeys

Localizes

Withdraws

Abnormal flexion

Extensor response

Nil

KOMPONEN VERBAL

Verbal response (V)

What year is this?

1983

1972

Oriented = 5

Yesterday
Mother

Inappropriate words = 3

Scream,
groan,
moan

Incomprehensible sounds = 2

No response

Nil = 1

V
Oriented
Confused conversation
Inappropriate words
Incomprehensible sounds
Nil

Coma score (E + M + V) = 3

KLASIFIKASI

TUMPUL



KLL

MEKANISME
MEKANISME



TAJAM
(PENETRATING)



TRAUMA TEMBAK
TRAUMA TUSUK

SEVERITY



RINGAN :GCS 14 - 15
SEDANG :GCS 9 - 13
BERAT :GCS 3 - 8

MORFOLOGI

Berdasarkan Patofisiologi



FRAKTUR KRANIUM

linear }
depresi } terbuka/tertutup
basis cranii



LESI INTRAKRANIAL

LESI INTRAKRANIAL

1. Primary Brain Injury:

a. Focal Brain Injury:

- Cerebral Contusions,
- Cerebral Laceration,

b. Diffuse Brain Damage:

- Diffuse Axonal Injury,
- Diffuse Vascular Injury.

2. Secondary Brain Injury:

a. Traumatic Intracranial Haematoma,

- Extradural Haematoma,
- Subdural Haematoma (Akut, Sub-akut, dan Kronik),
- Subdural Hygroma,
- Intracerebral Haematoma,
- Intraventricular Haematoma,
- Subarachnoid Haemorrhage,

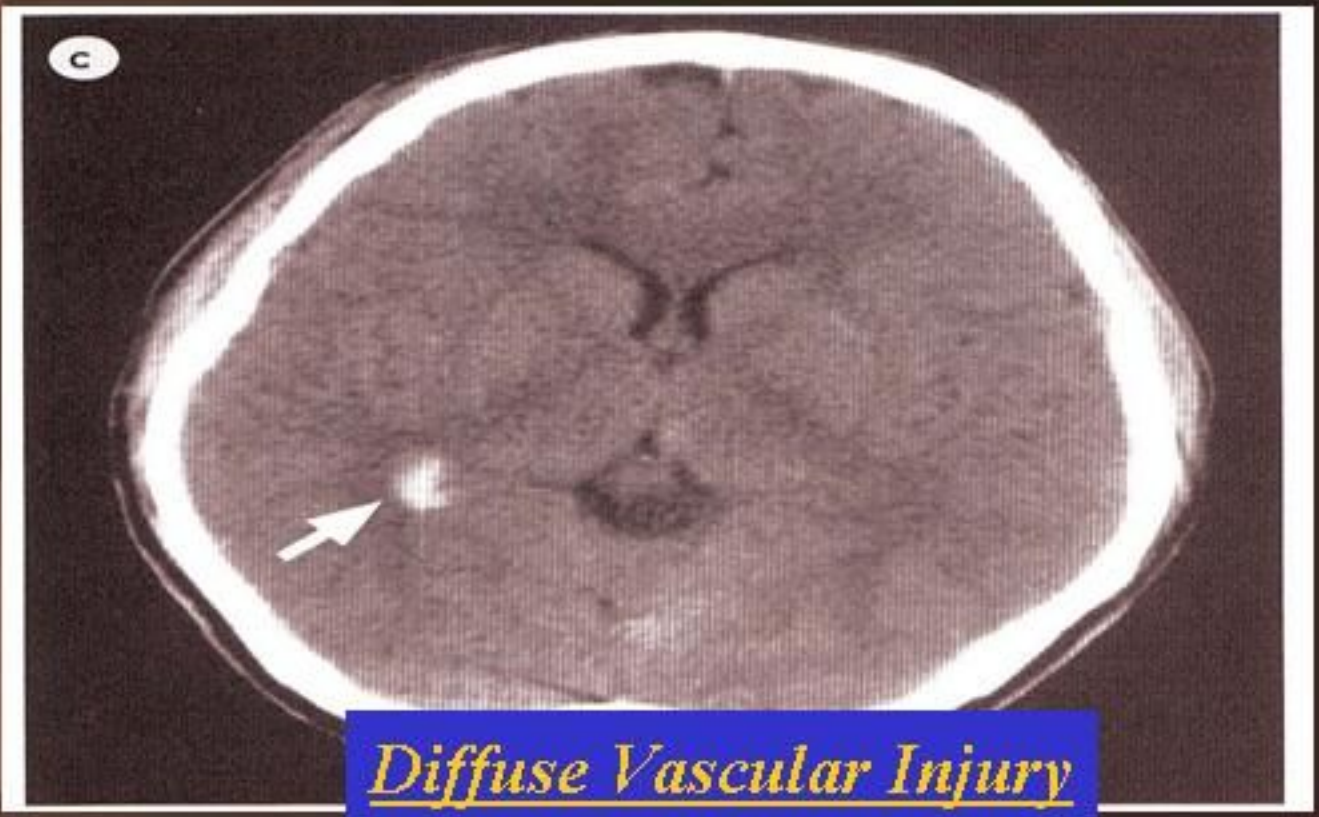
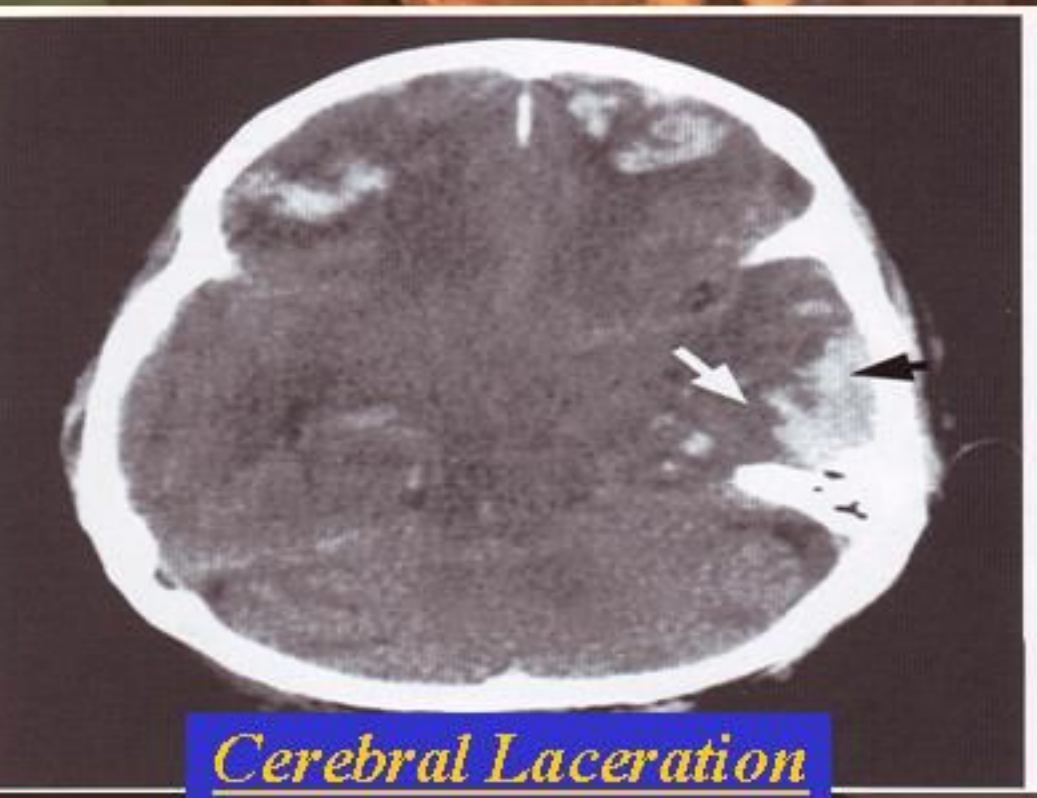
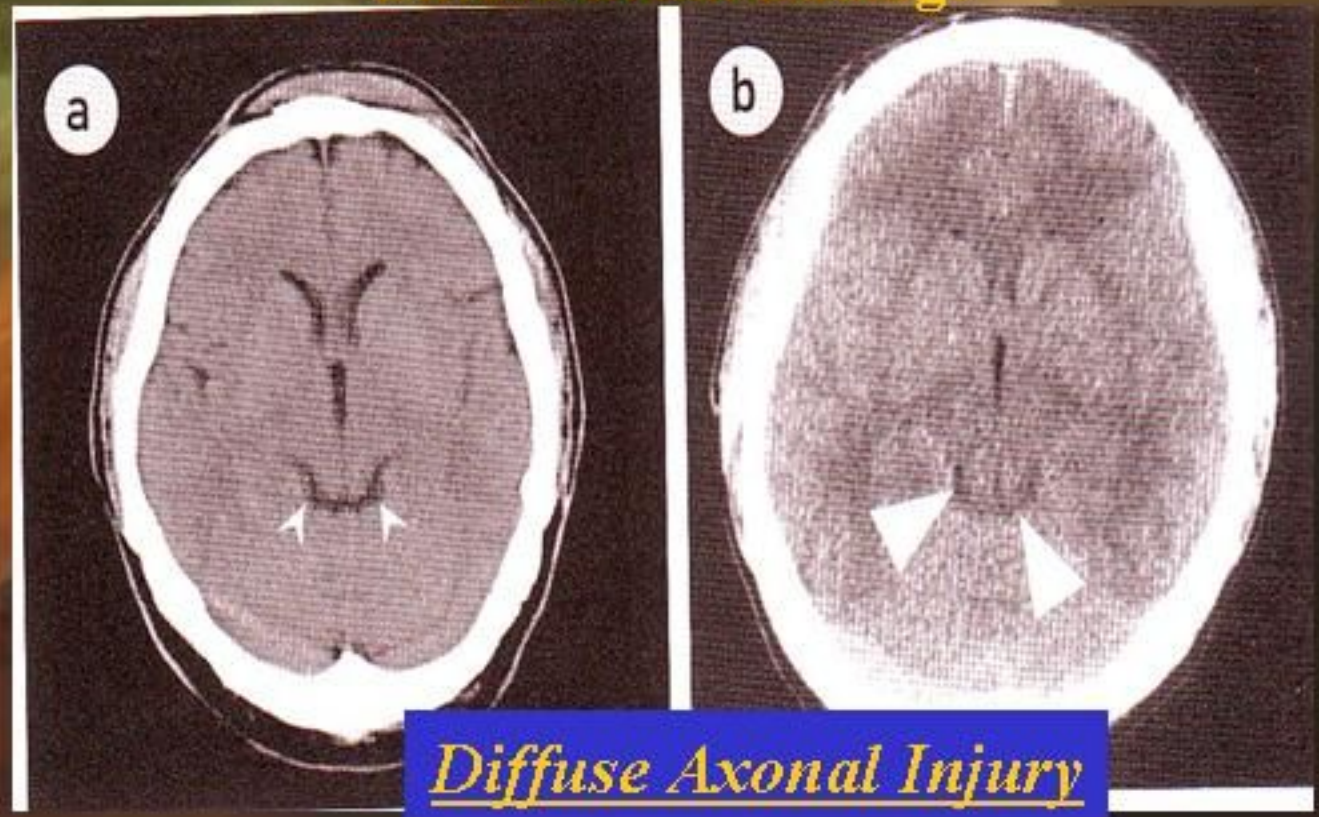
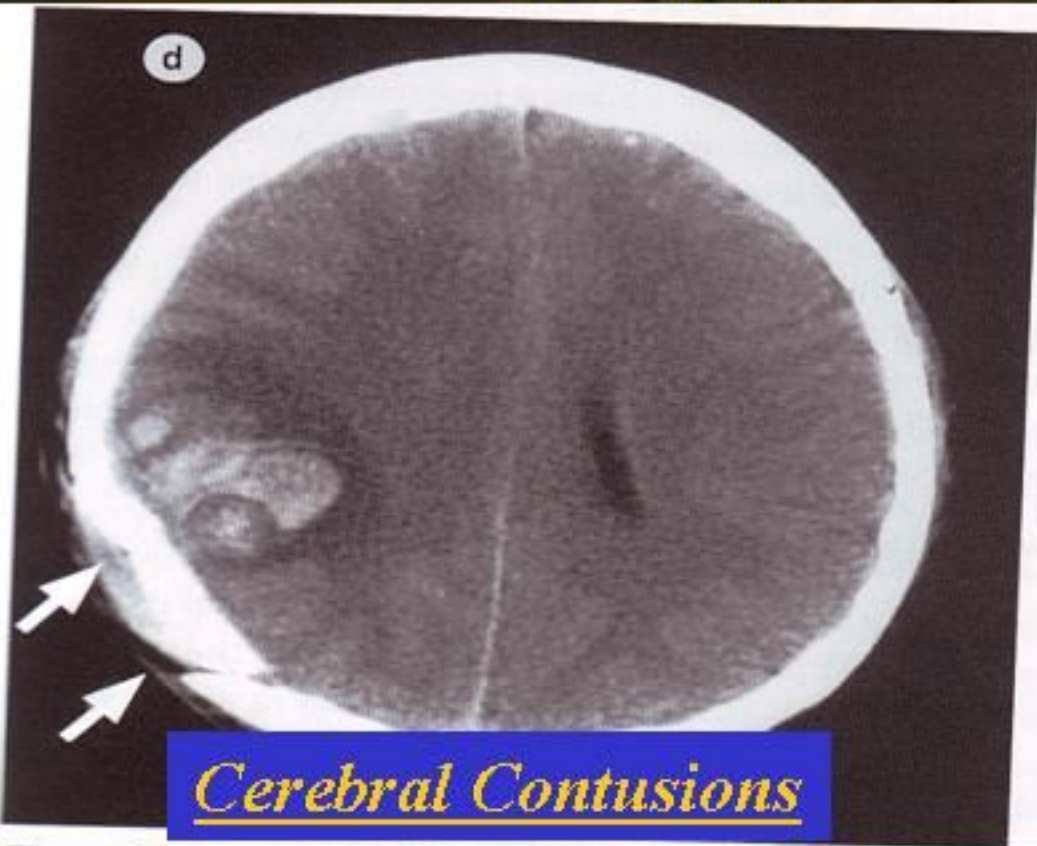
b. Post Traumatic Brain Swelling,

c. Focal Brain Damage Secondary to Brain Shift and Herniations

Primary Brain Injury:

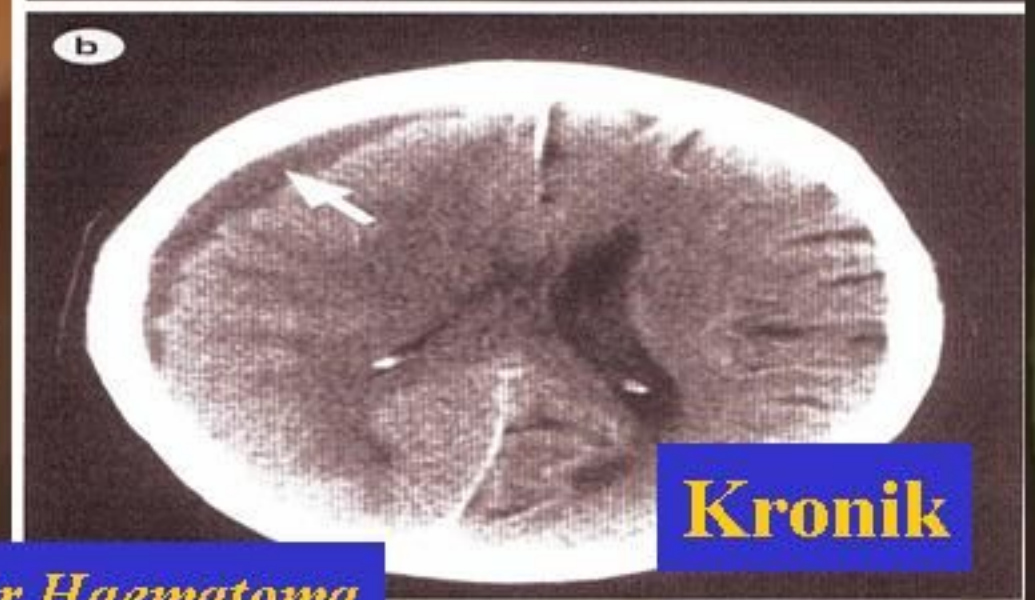
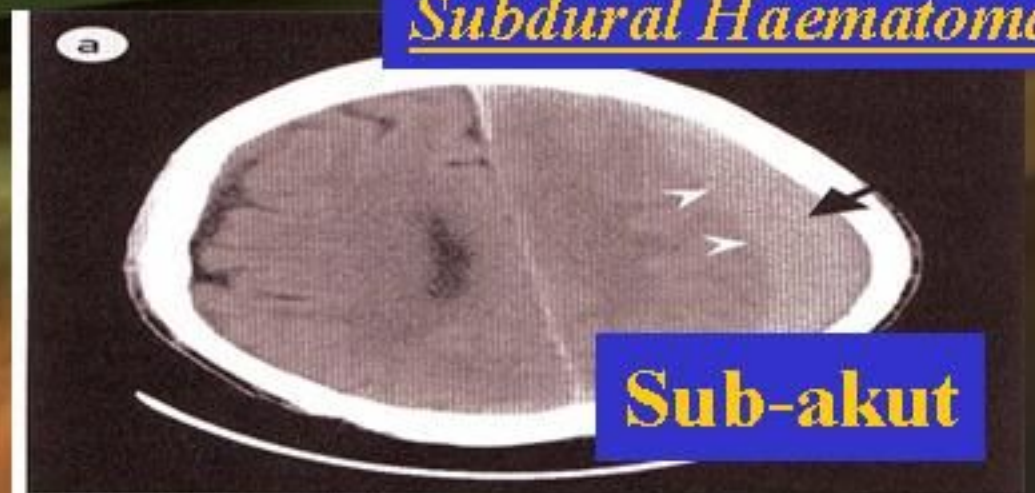
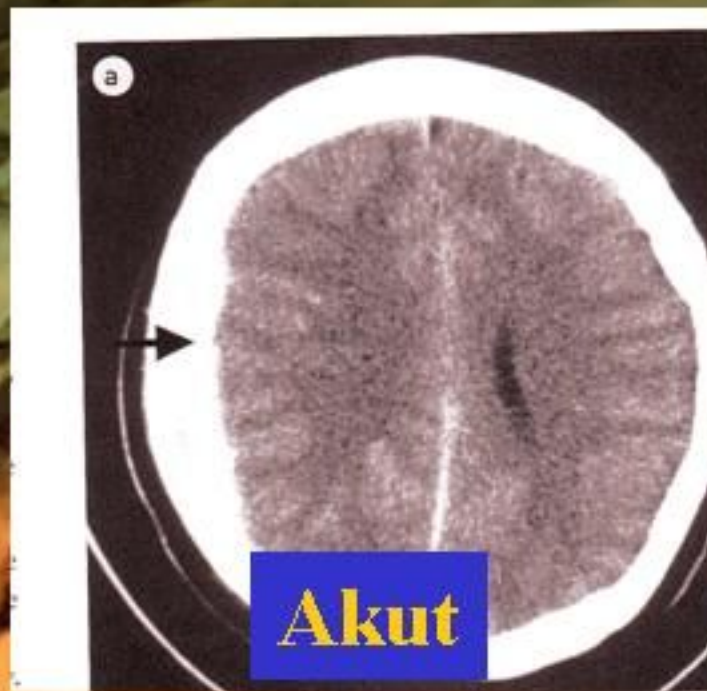
Vocal Brain Injury

Diffuse Brain Damage



Secondary Brain Injury:

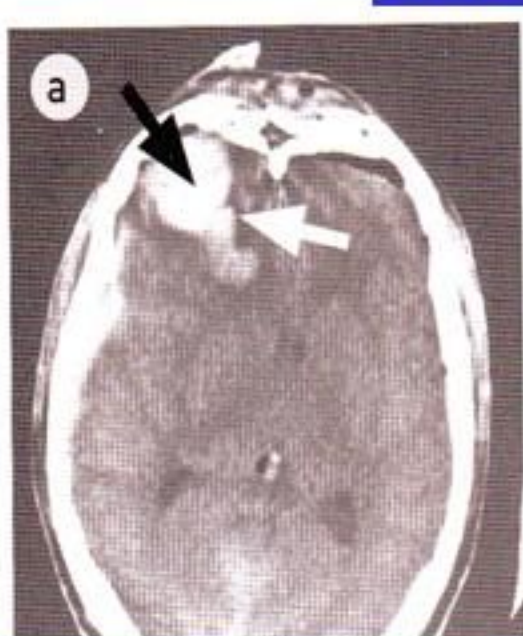
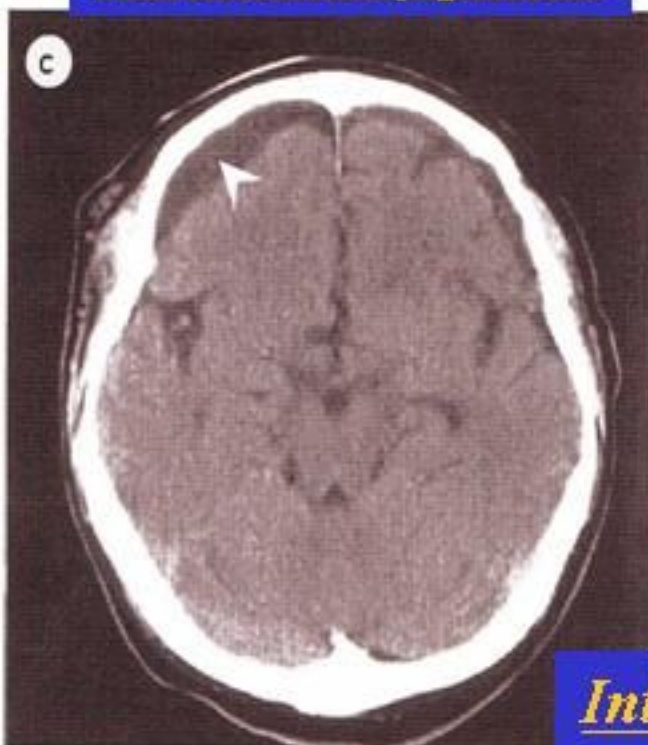
Traumatic Intracranial Haematoma



Extradural Haematoma

Subdural Hygroma

Intraventricular Haematoma

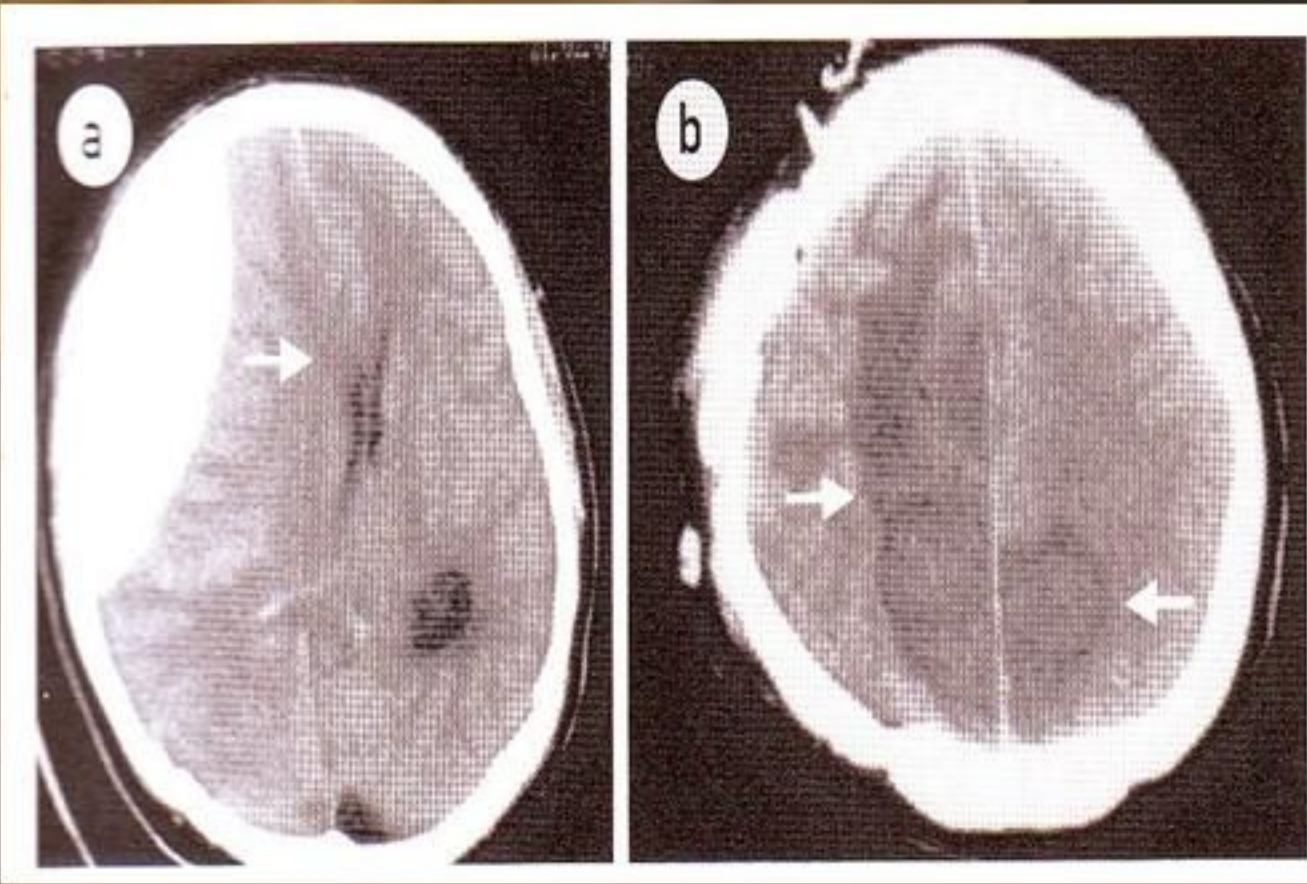
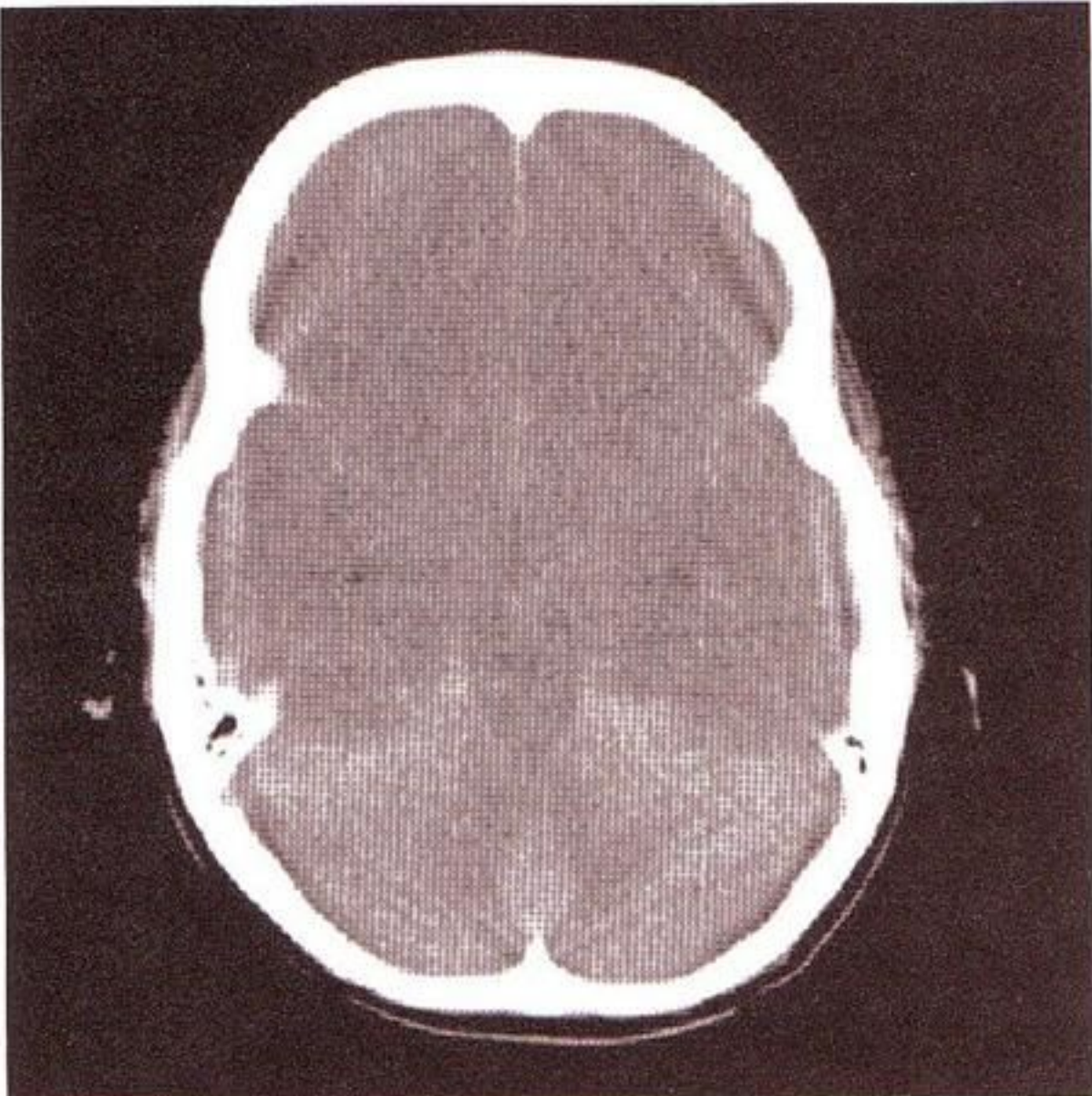


Intracerebral Haematoma

Subarachnoid Haemorrhage

*Focal Brain Damage
Secondary to Brain Shift
and Herniations*

Post Traumatic Brain Swelling





PRINSIP

MEMELIHARA KEBUTUHAN METABOLIK OTAK

CEGAH/OBATI HIPERTENSI INTRAKRANIAL

HIPOKAPNEA

KONTROL CAIRAN

DIURETIK (MANNITOL)

RINGKASAN

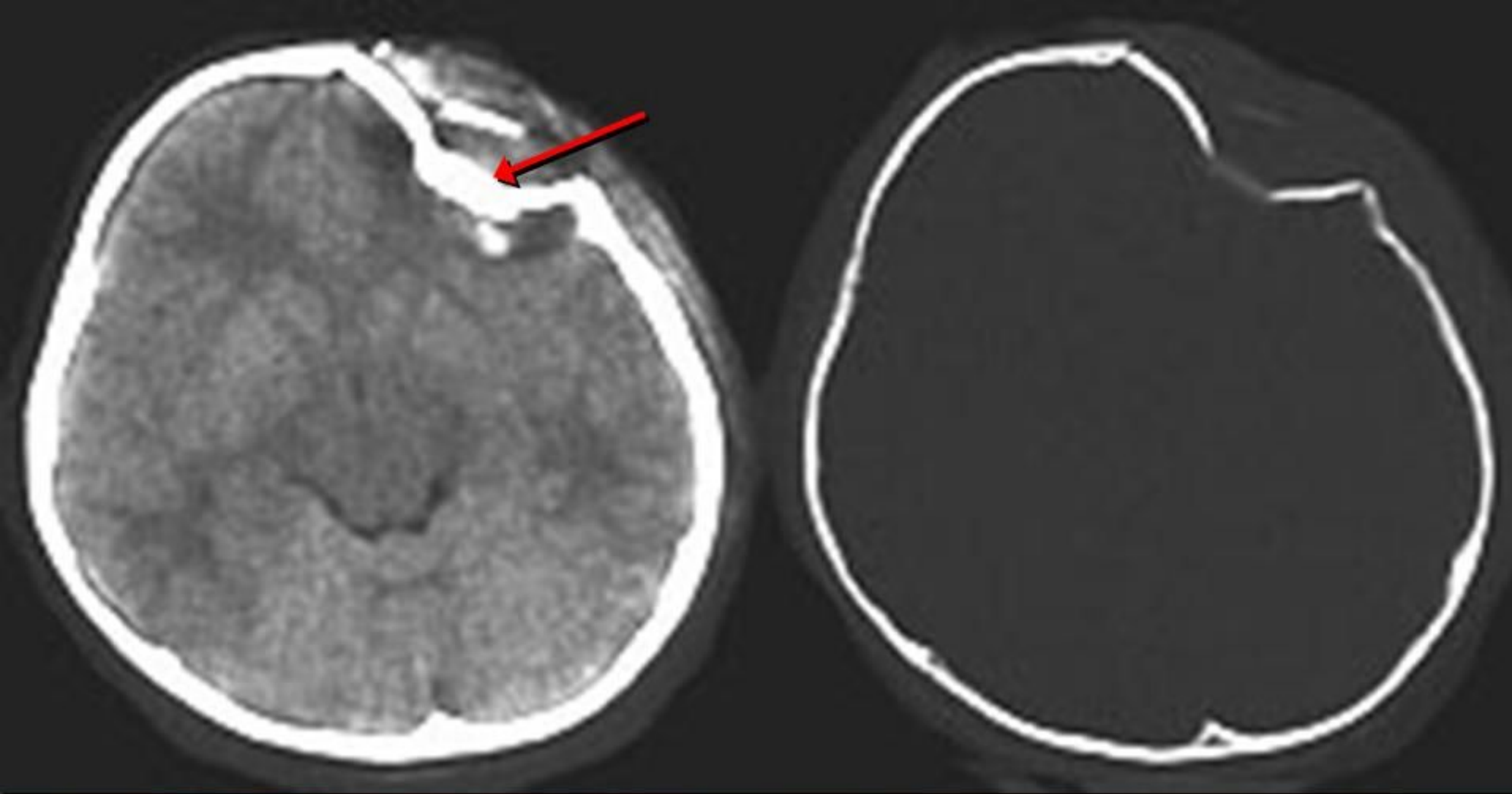
- *JAGA PATENSI JALAN NAFAS*
- *JAGA VENTILASI*
- *ATASI SYOK*
- *PERIKSA NEUROLOGIS*
- *CEGAH CEDERA OTAK SEKUNDER*
- *CARI CEDERA YANG TERKAIT*
- *BILA STABIL, PERIKSA PENUNJANG*
- *BILA PERLU KONSUL BEDAH SARAF*
- *TERUSKAN ASESMEN*



ILUSTRASI KASUS CEDERA KEPALA

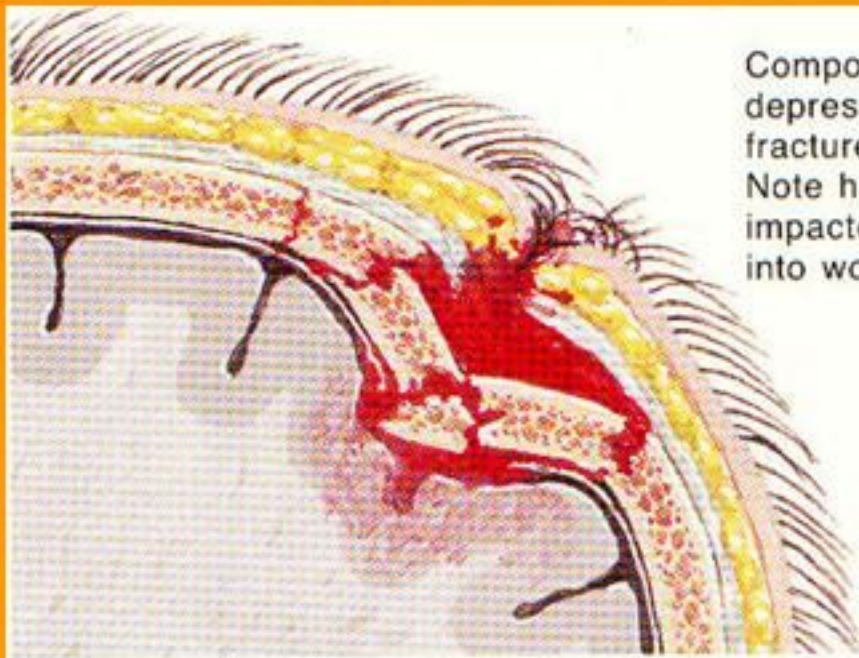
Fraktur Impresi



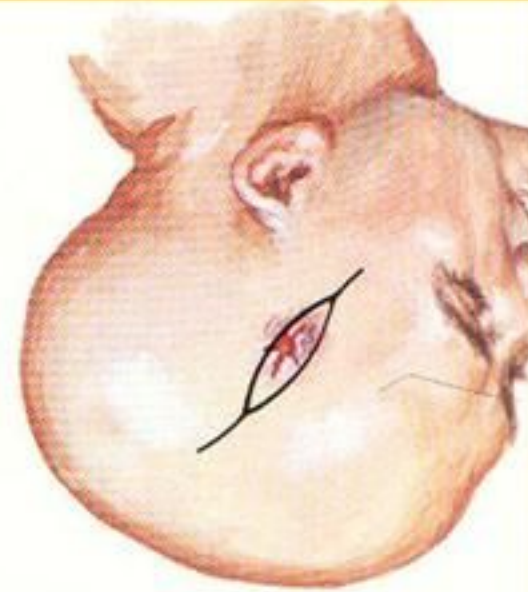


CT scan
Impresi Fraktur

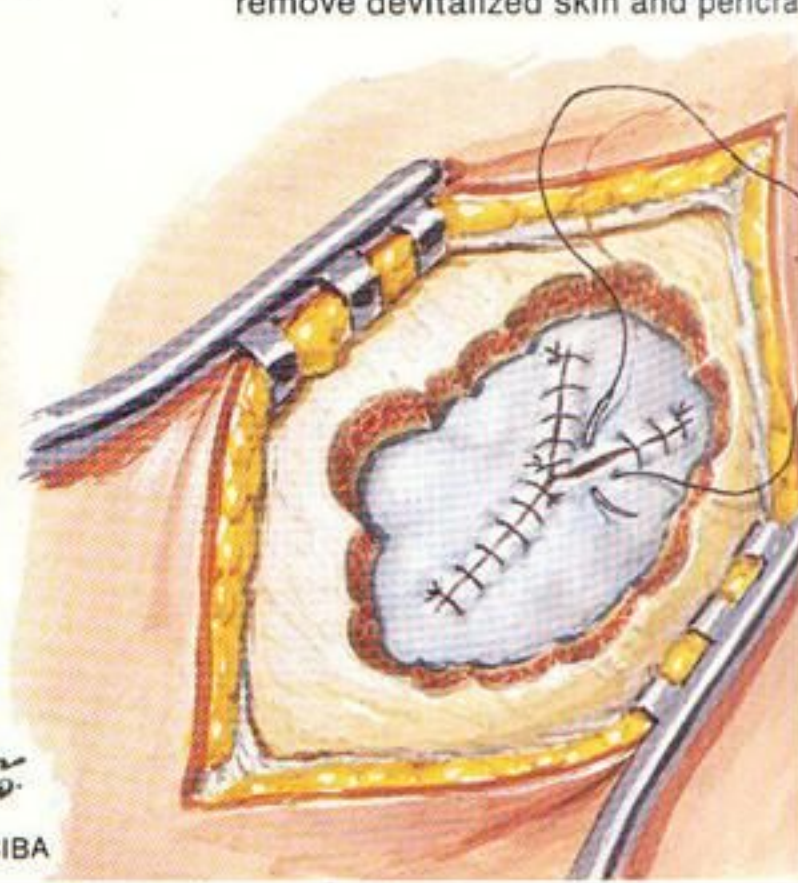
TINDAKAN OPERATIF FRAKTUR DEPPRESI



Compound depressed fracture. Note hair impacted into wound



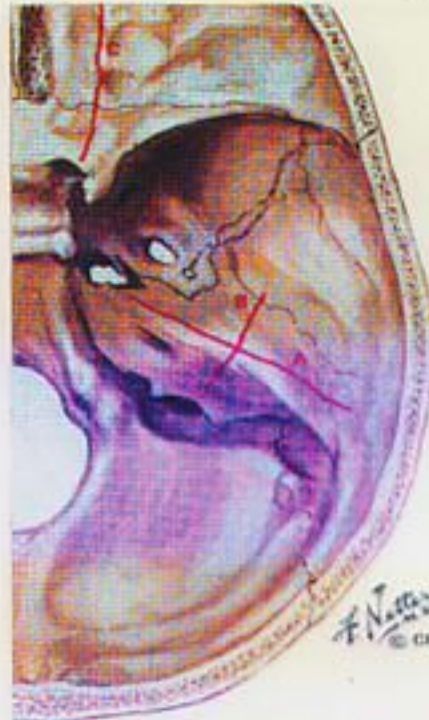
Elliptical incision with extensions to remove devitalized skin and pericranium



F. Netter M.D.
© CIBA

BASILAR SKULL FRACTURES

Basilar Skull Fractures



"Panda bear" or "raccoon" sign due to leakage of blood from anterior fossa into periorbital tissues. Absence of conjunctival injection differentiates fracture from direct eye trauma

Longitudinal (A) and transverse (B) fractures of petrous pyramid of temporal bone, and anterior basal skull fracture (C)



Rhinorrhea



Otorrhea or ear hemorrhage



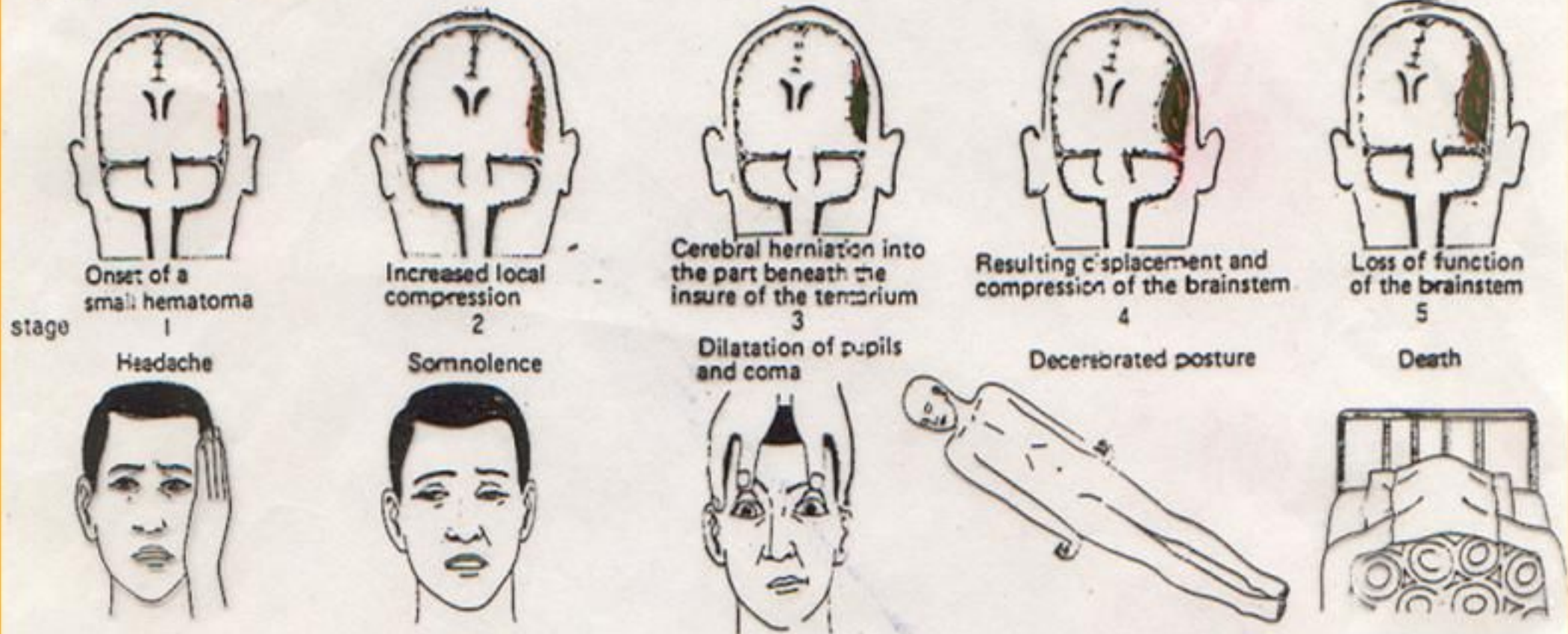
Battle's sign: postauricular hematoma

**EPIDURAL
HEMATOM**



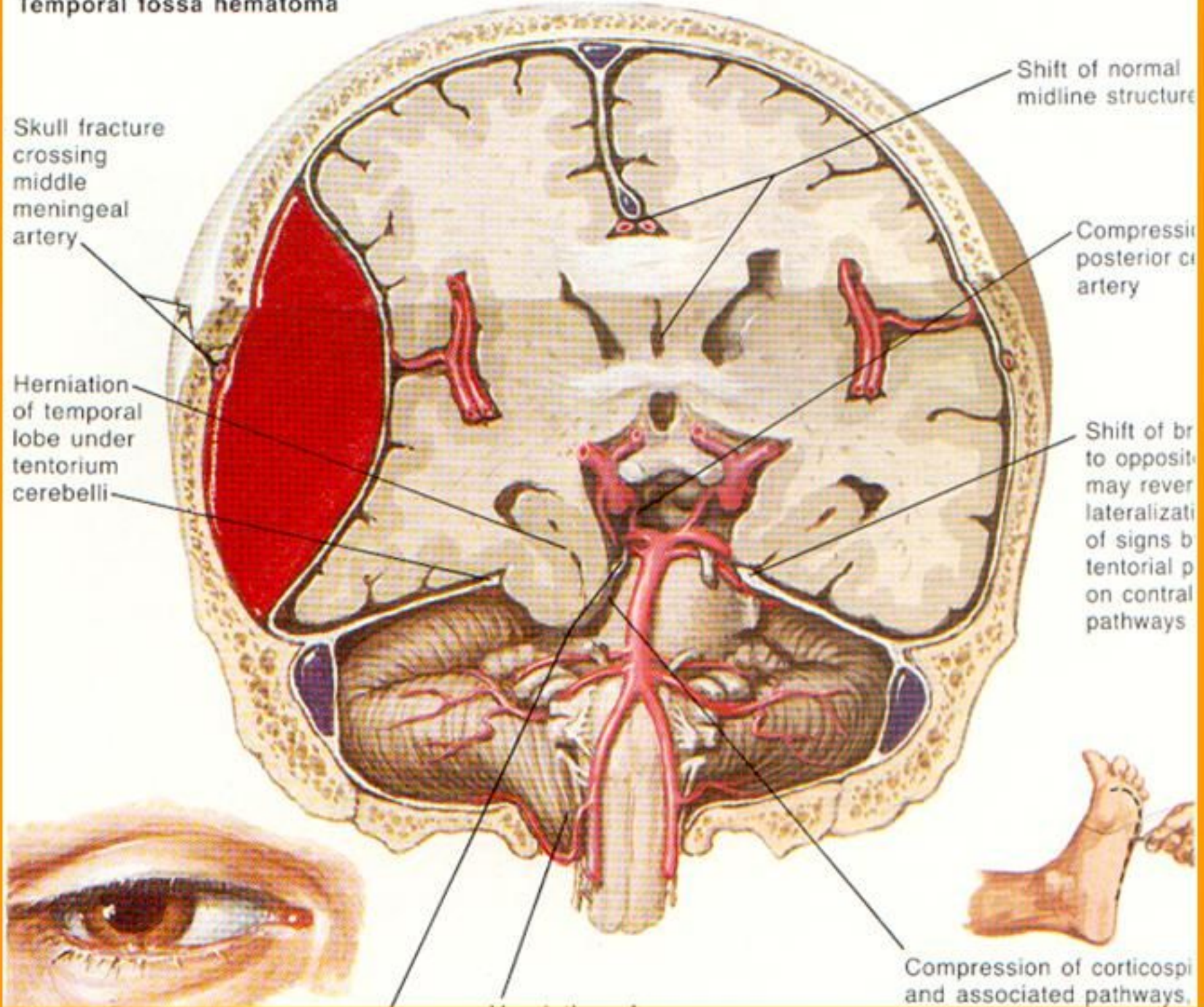
PERJALANAN KLINIK EDH

■ Enlargement of intracranial hematoma and progression of symptoms



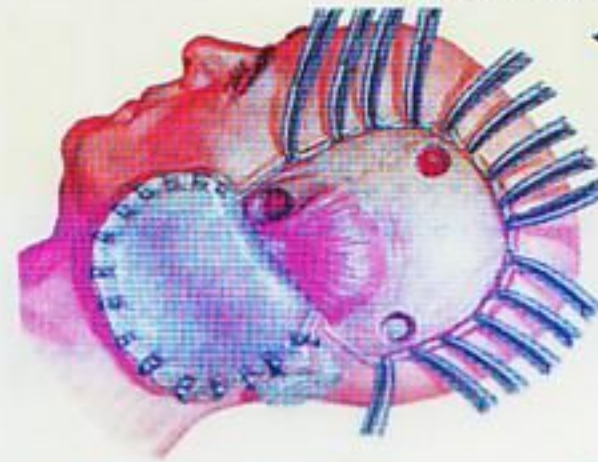
Epidural Hematoma

Temporal fossa hematoma

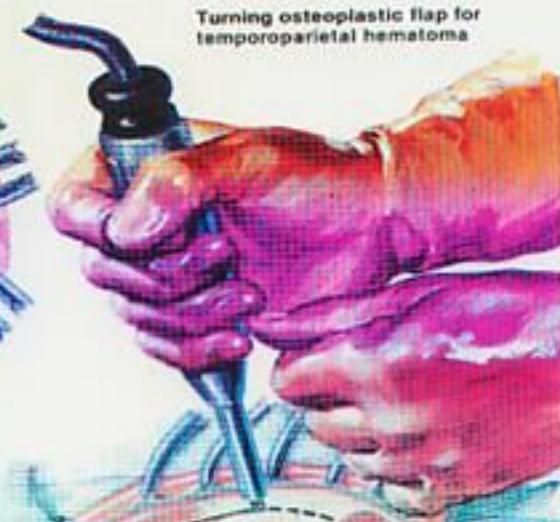


ACUTE EPIDURAL HEMATOMA

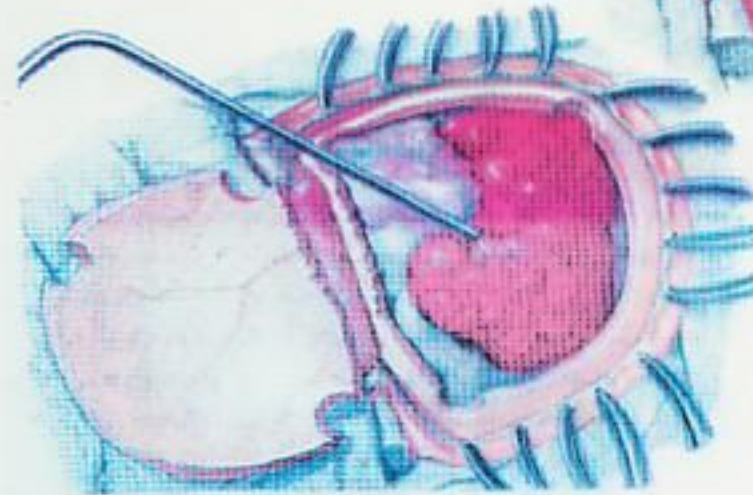
Acute Intracranial Hematoma



A. Incisions for burr holes extended and joined, forming flap of skin and fascia, which is turned down (drapes removed to demonstrate location)



B. Skull opened by connecting burr holes with craniotome

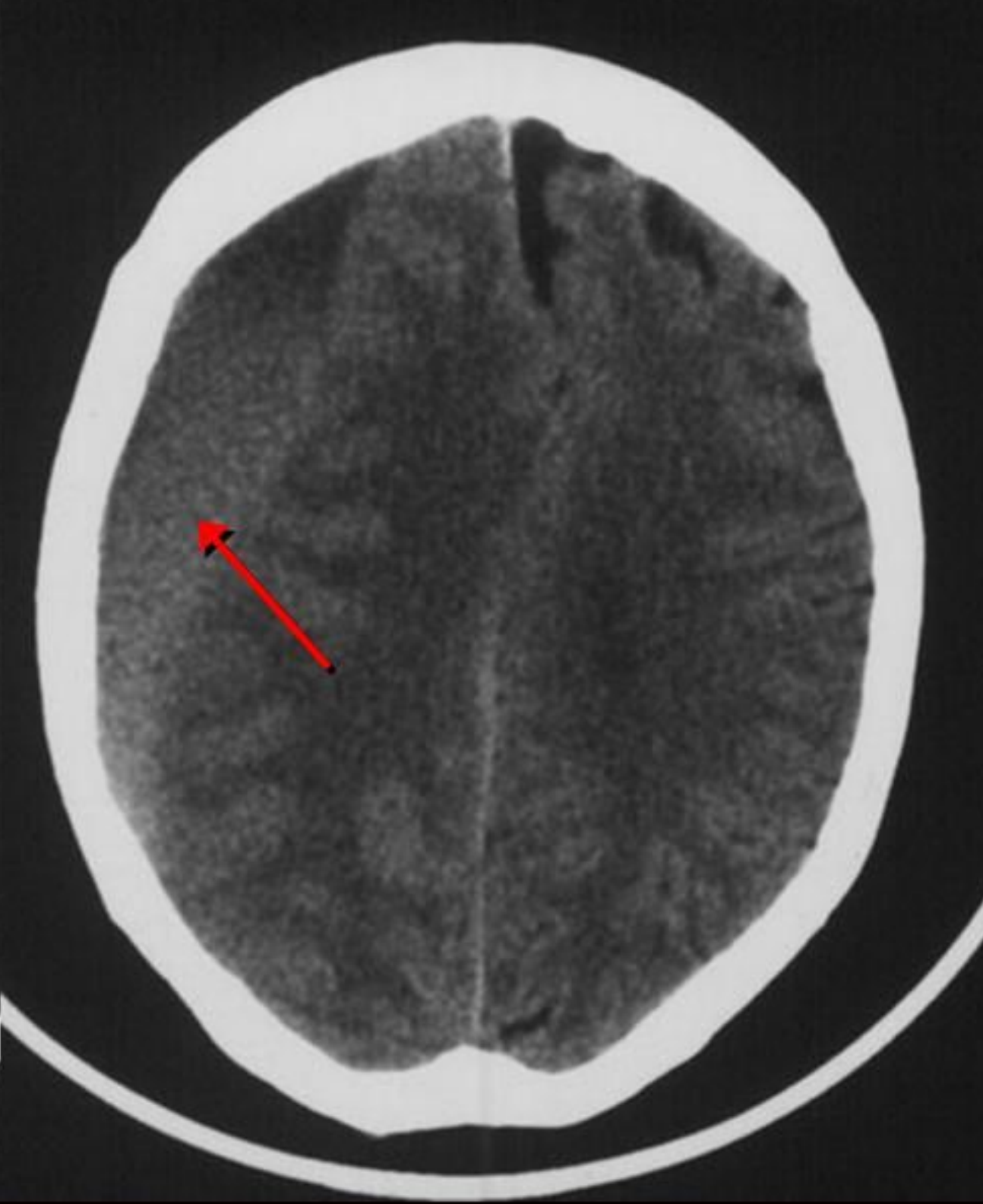
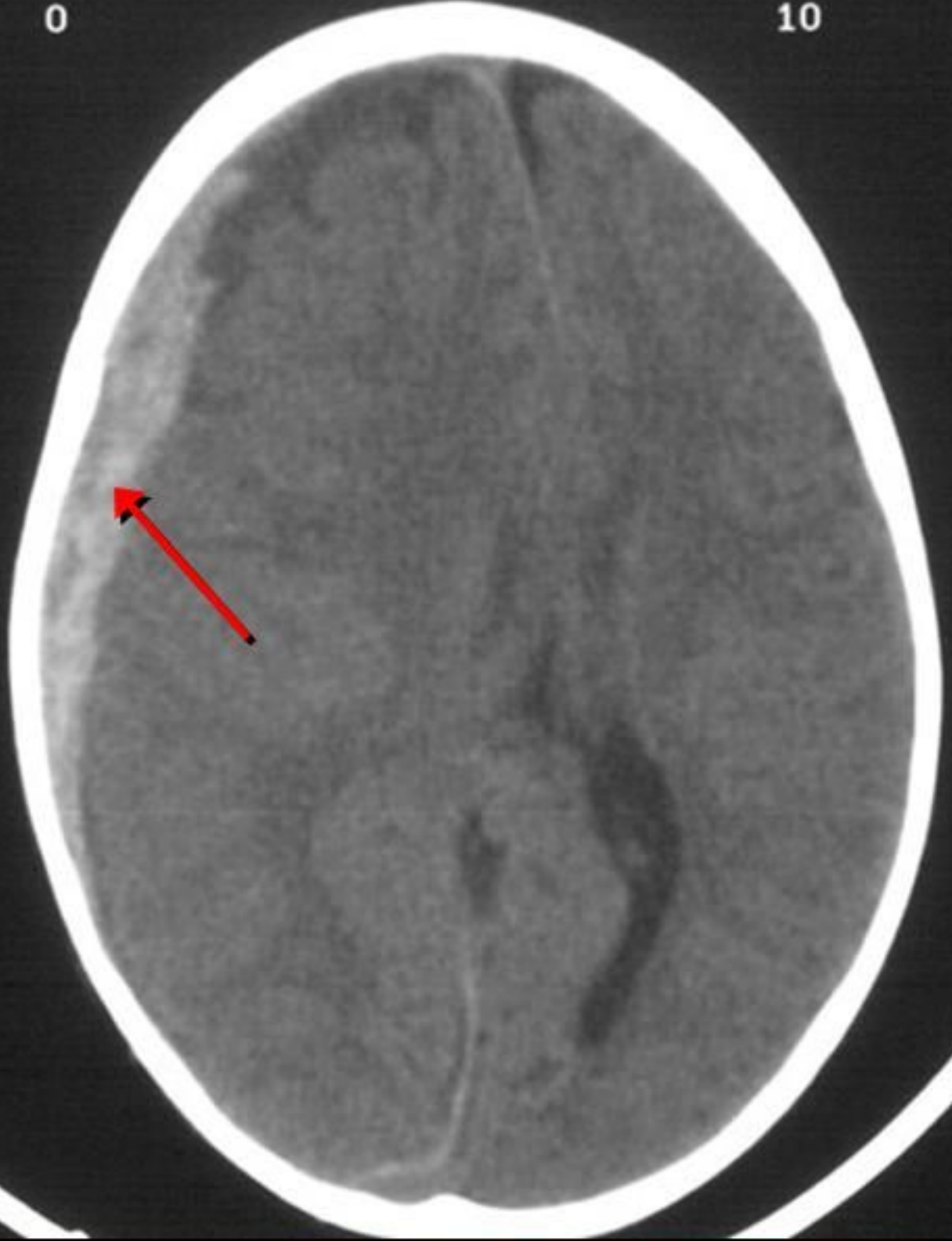


C. Bone flap turned down by cracking uncut segment of margin, exposing epidural hematoma, which is removed by suction, spoon or Penfield dissector

F. Netter
© CIBA

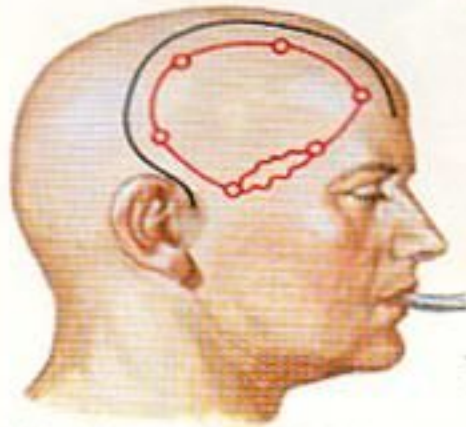
0

10



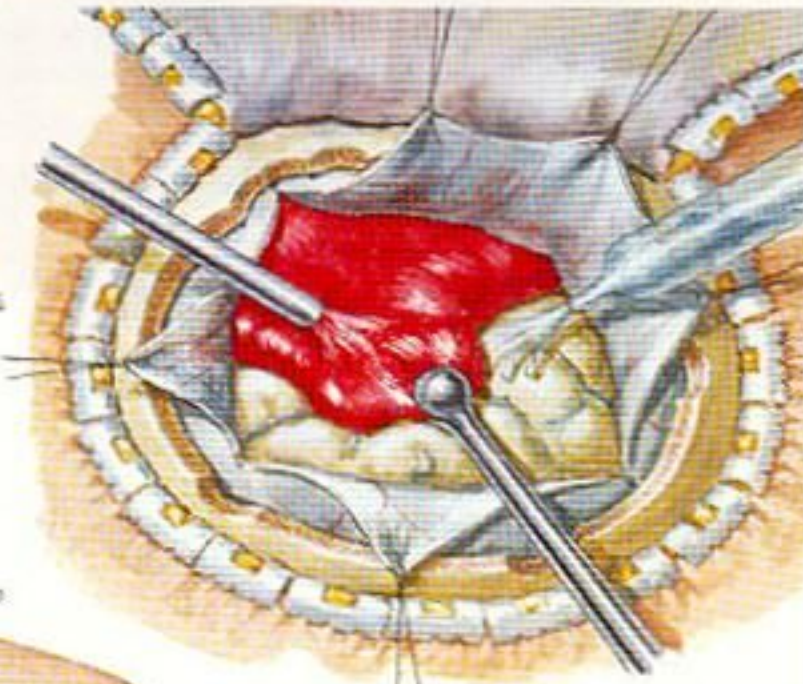
Subdural hematoma

Acute Subdural Hematoma

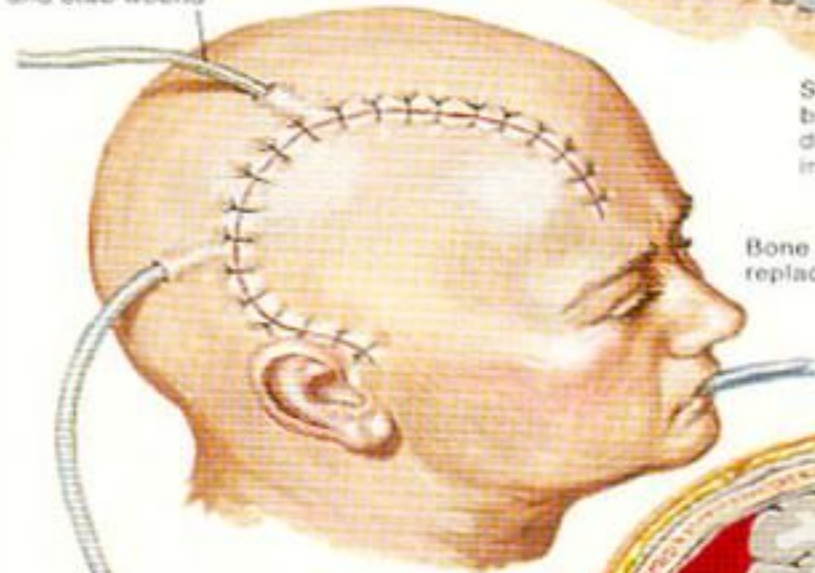


"Question mark" skin incision (black); outline of free bone flap and burr holes (red)

Catheter to monitor intracranial pressure, emerging through burr hole and stab wound



Skin flap reflected (Raney clips control bleeding). Free bone flap removed and dura opened. Clot evacuated by irrigation, suction and forceps



Bone and skin flaps replaced and sutured

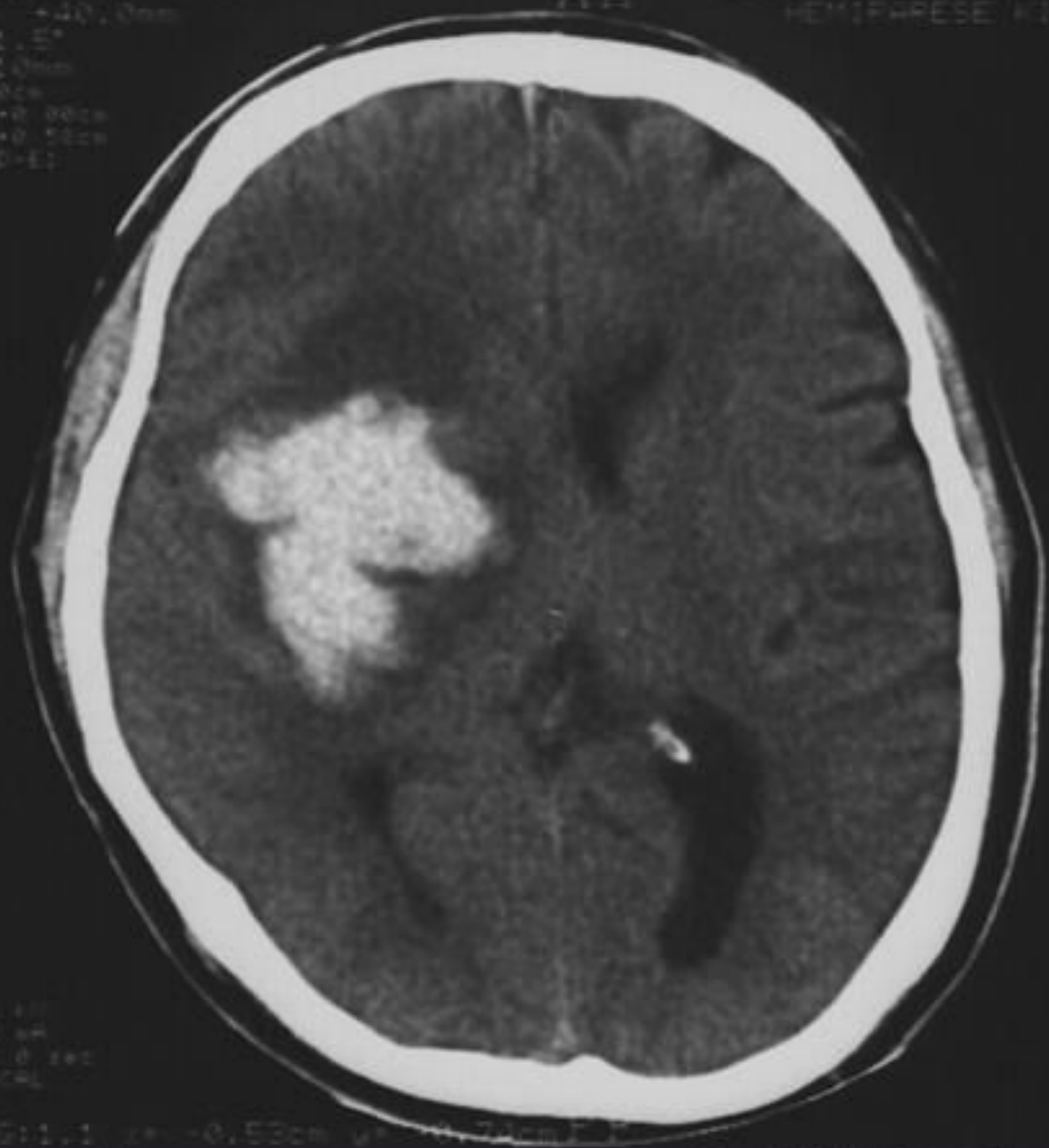
Jackson-Pratt drain, emerging from subdural space via burr hole and stab wound



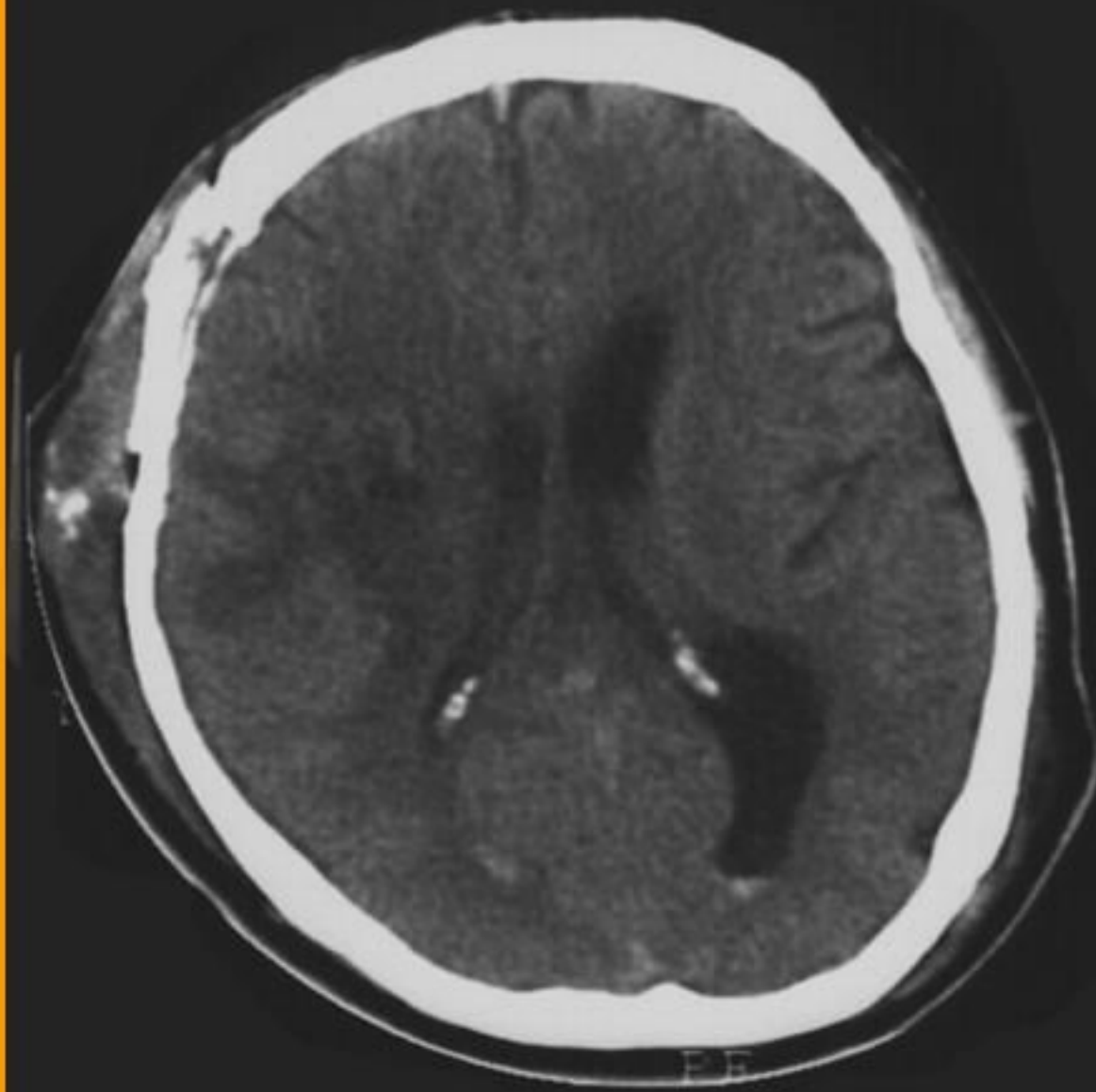
F. Netter
© CIBA



Section showing acute subdural hematoma on right side and subdural hematoma associated with temporal lobe intracerebral hematoma ("burst" temporal lobe) on left

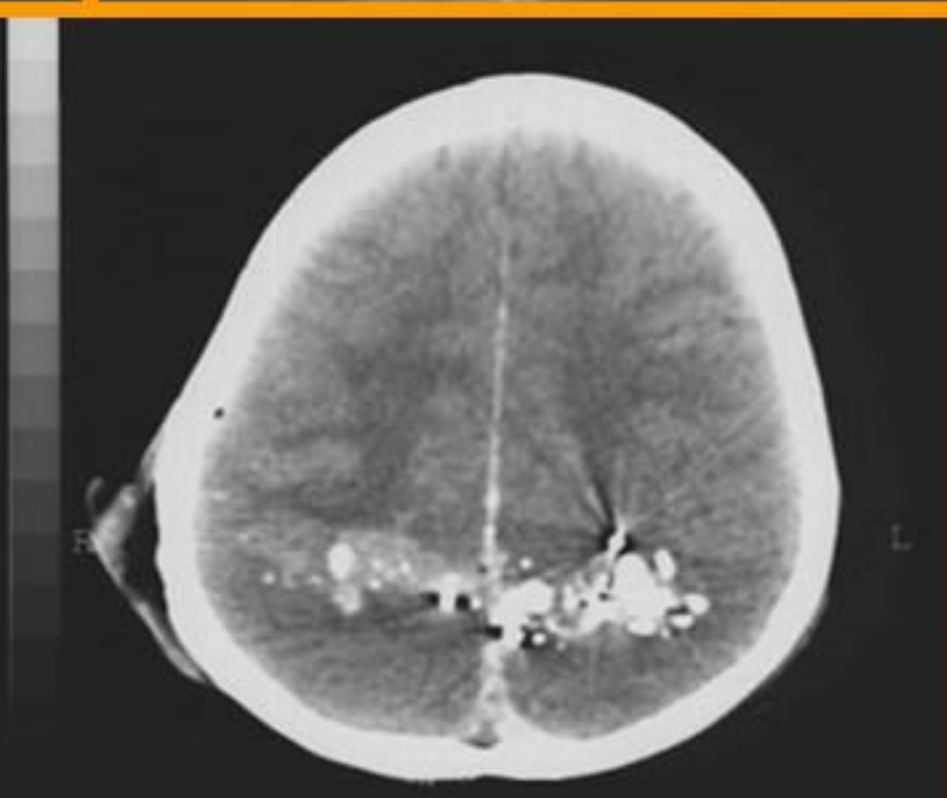
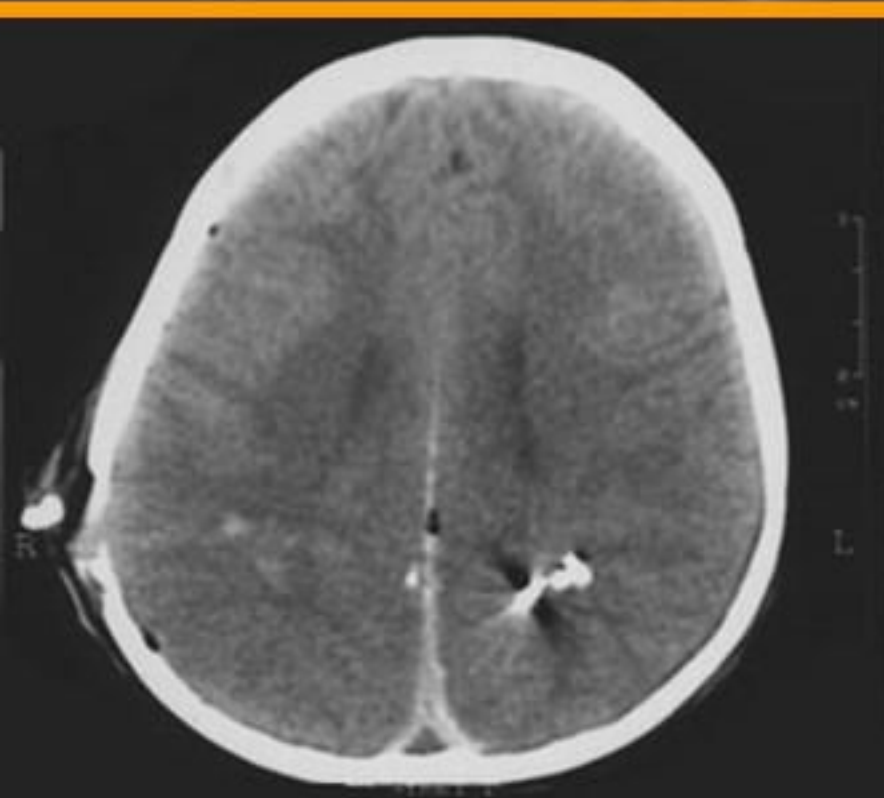


Pre operasi



Pasca Operasi

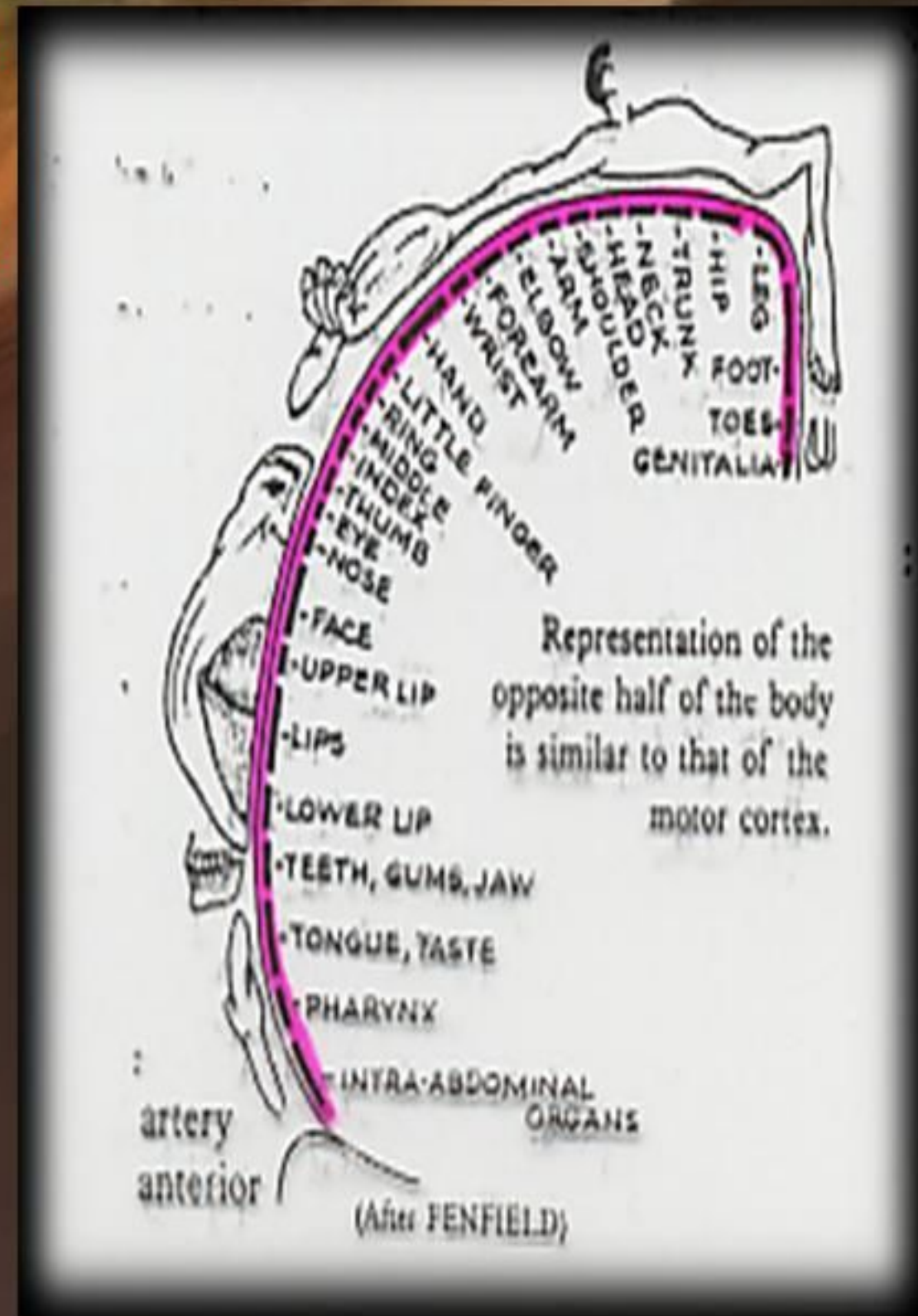
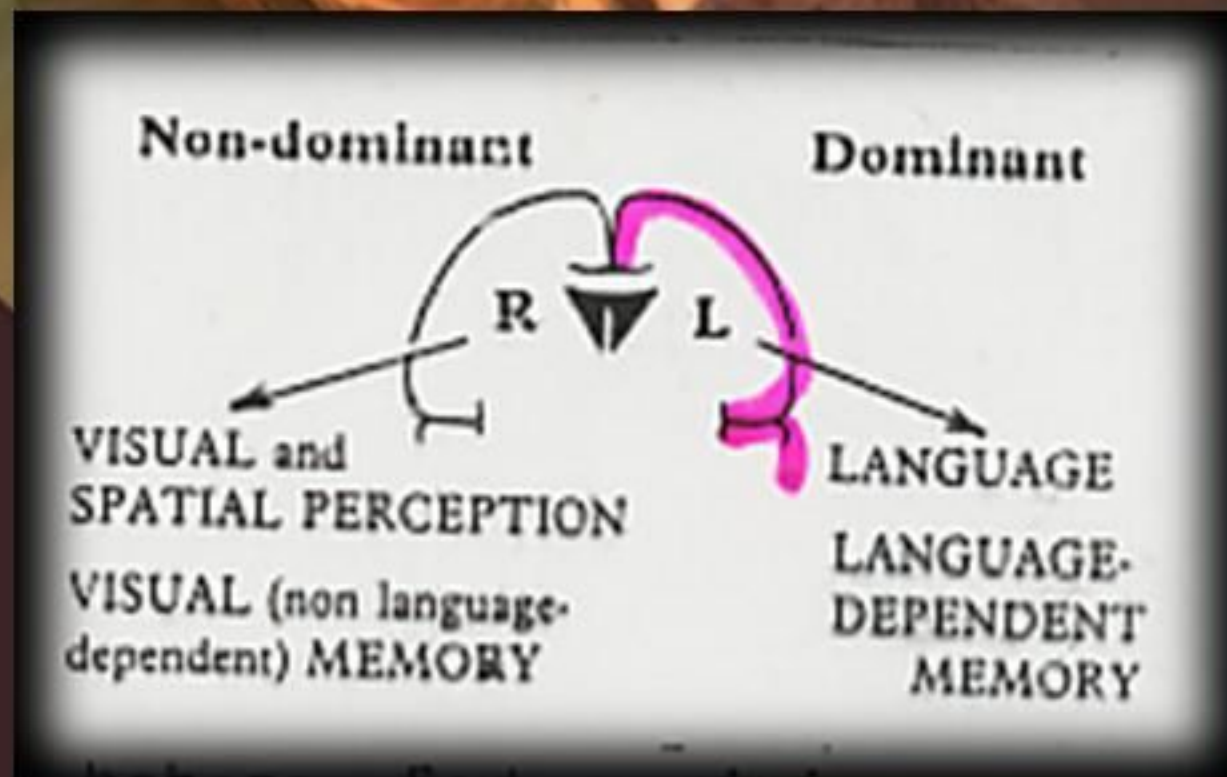
**Intraserebral
hematom**



**Korpus
Alienum**

FUNGSI OTAK

- Sisi dominan untuk yang tidak kidal adl yg sebelah kiri
- Orang kidal, 75 % sisi dominan adalah kiri
- Fungsi sisi dominan adalah untuk bahasa dan memori yang berdasarkan bahasa
- Sisi kanan untuk memori visual



LOBUS FRONTALIS

1. PRE-CENTRAL GIRUS

Pusat motorik untuk muka, tangan, kaki, badan, dsb.

2. AREA BROCA

Pada sisi dominan adalah pusat bicara ekspresif motorik

3. AREA MOTOR TAMBAHAN

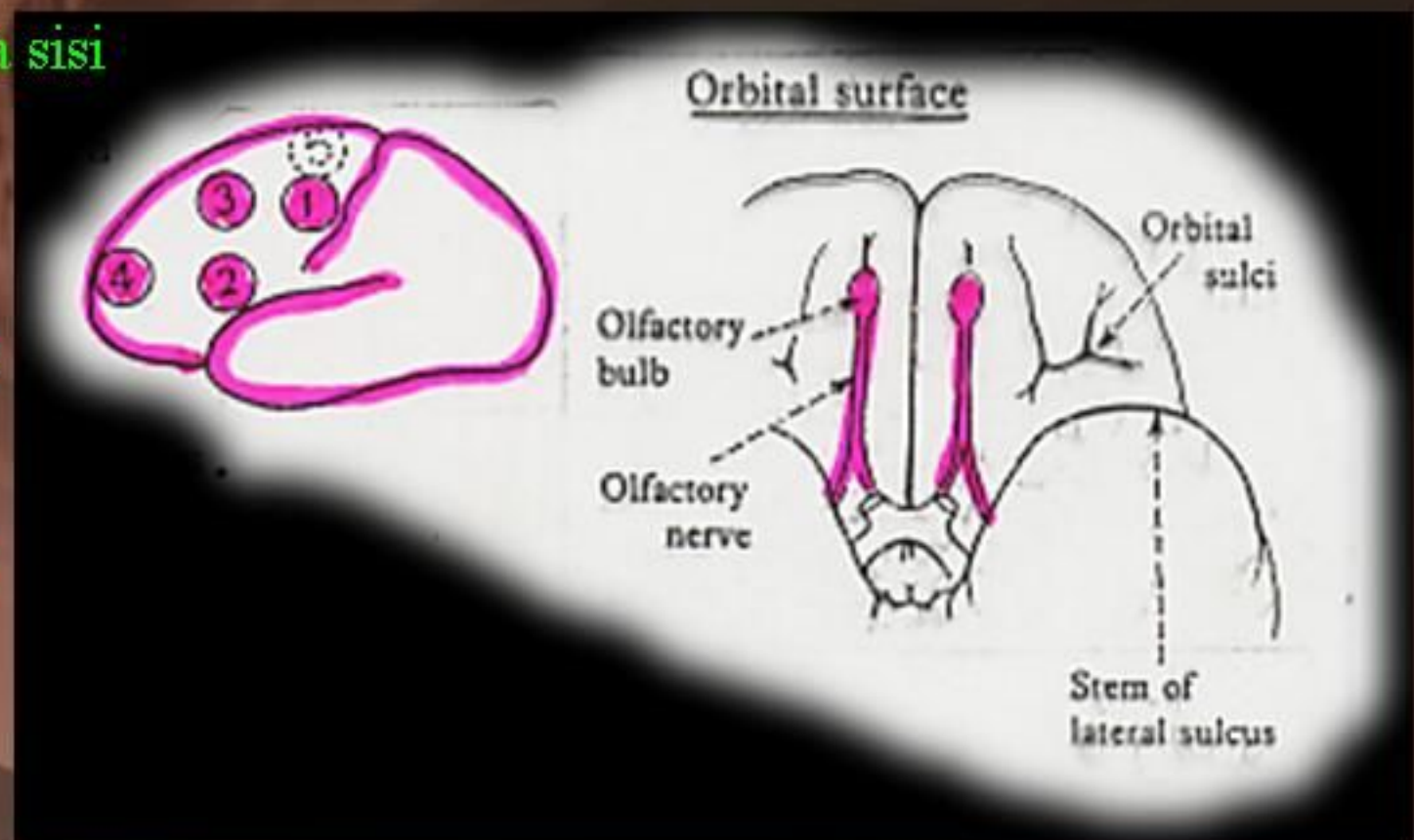
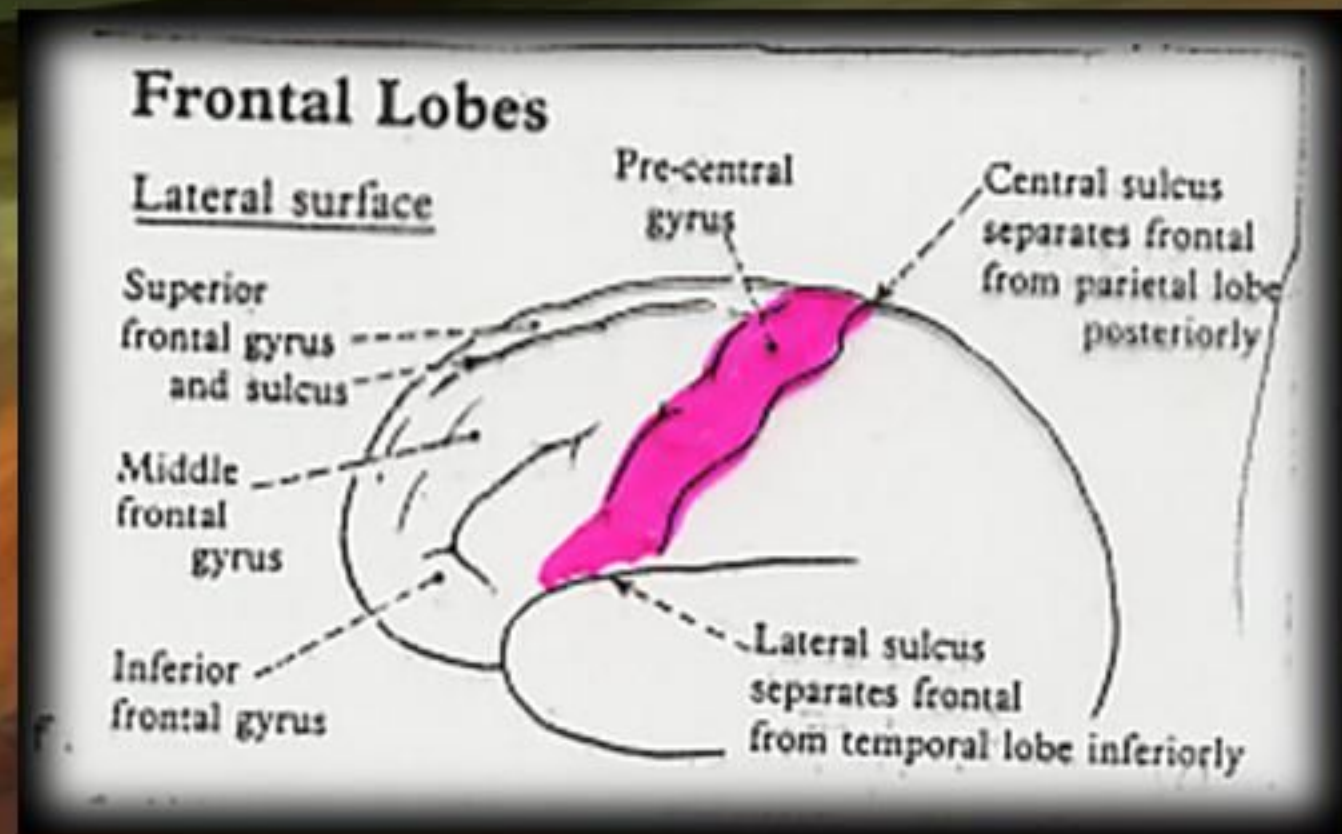
Untuk gerakan mata dan kepala sisi yang berlawanan

4. AREA PRE-FRONTAL

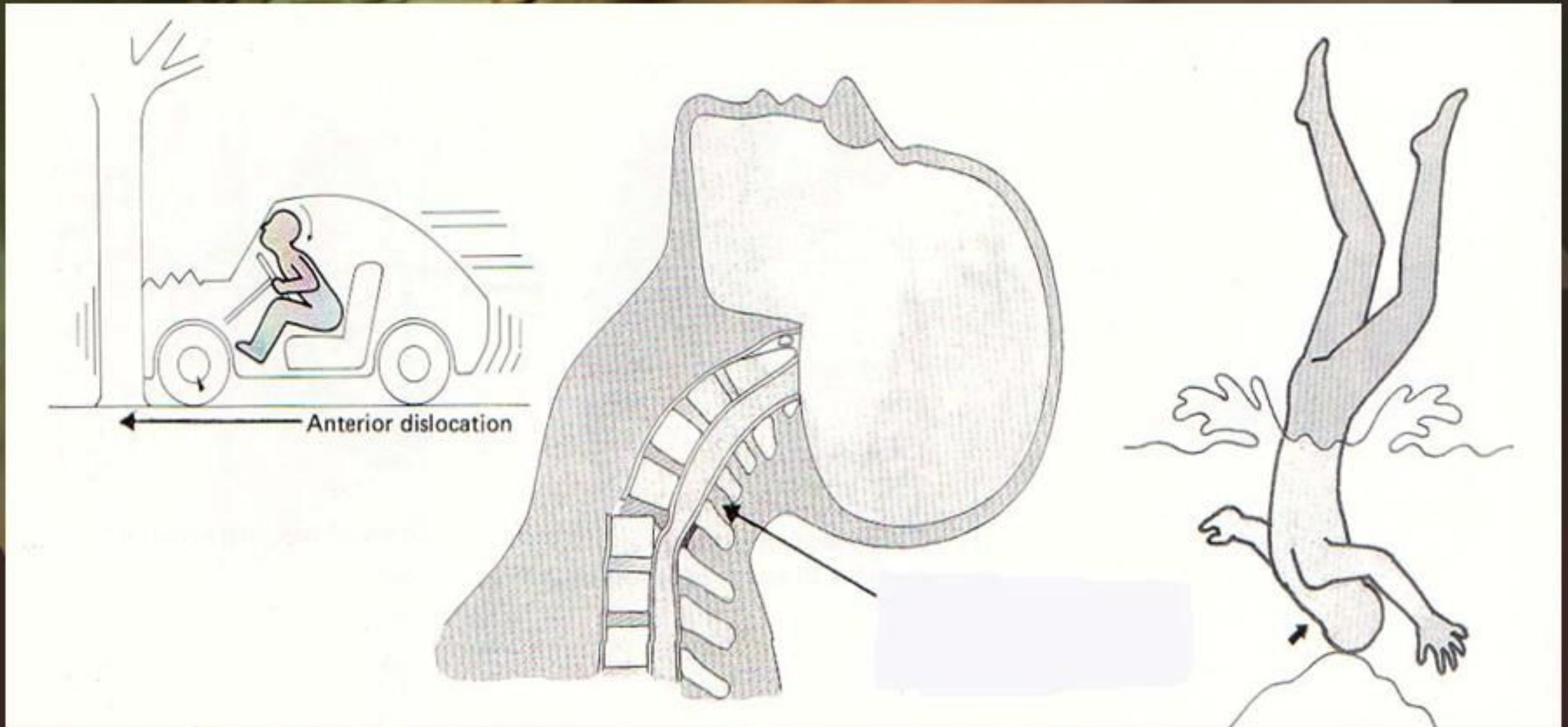
Untuk inisiatif dan personalitas

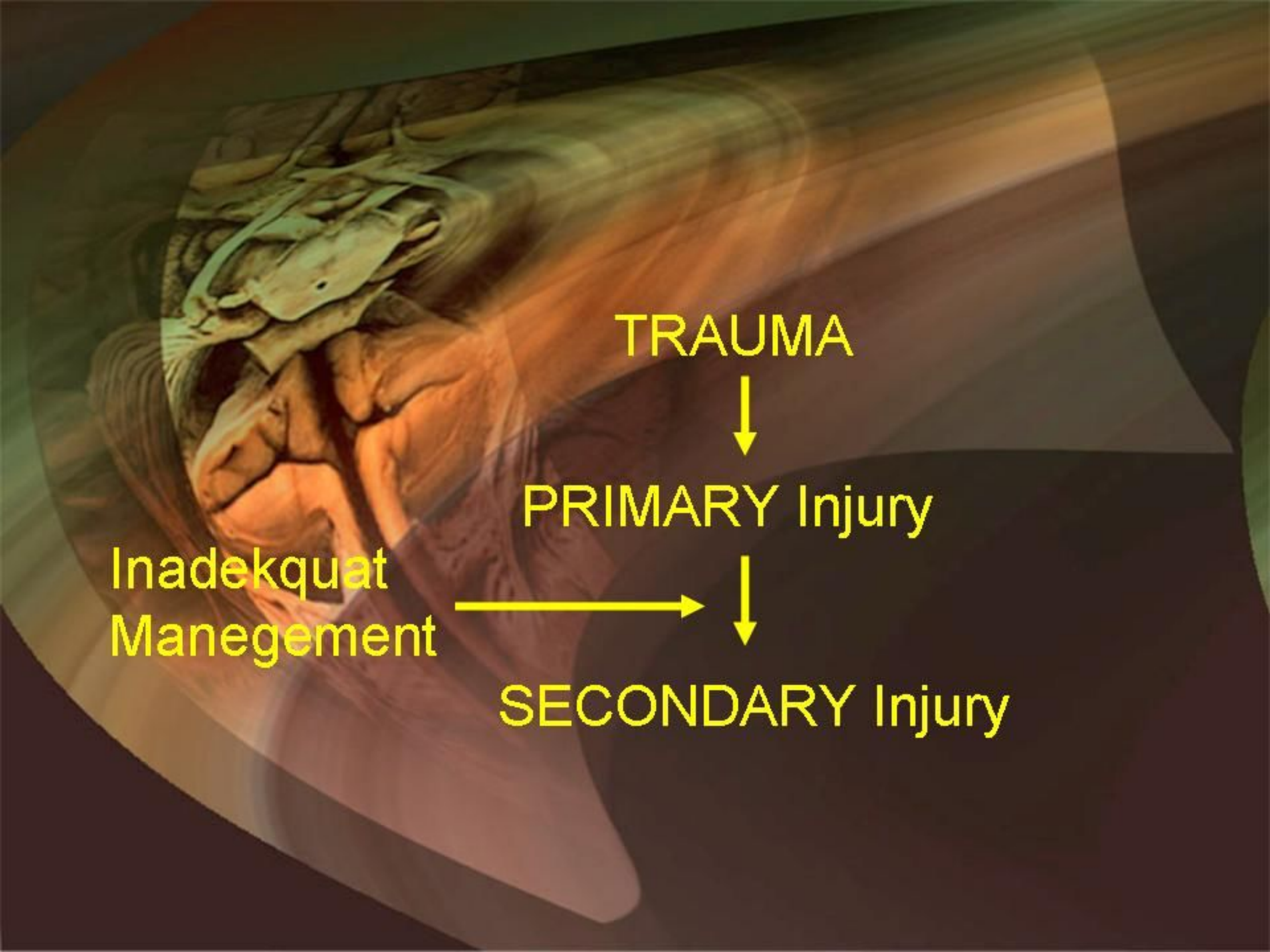
5. PARASENTRAL LOBUS

Pusat penahan BAK dan BAB



SPINAL CORD INJURY MECHANISM:





TRAUMA



PRIMARY Injury



SECONDARY Injury

Inadequate
Management



PATOFISIOLOGI OF TRAUMA

CRANIOSPINAL Trauma



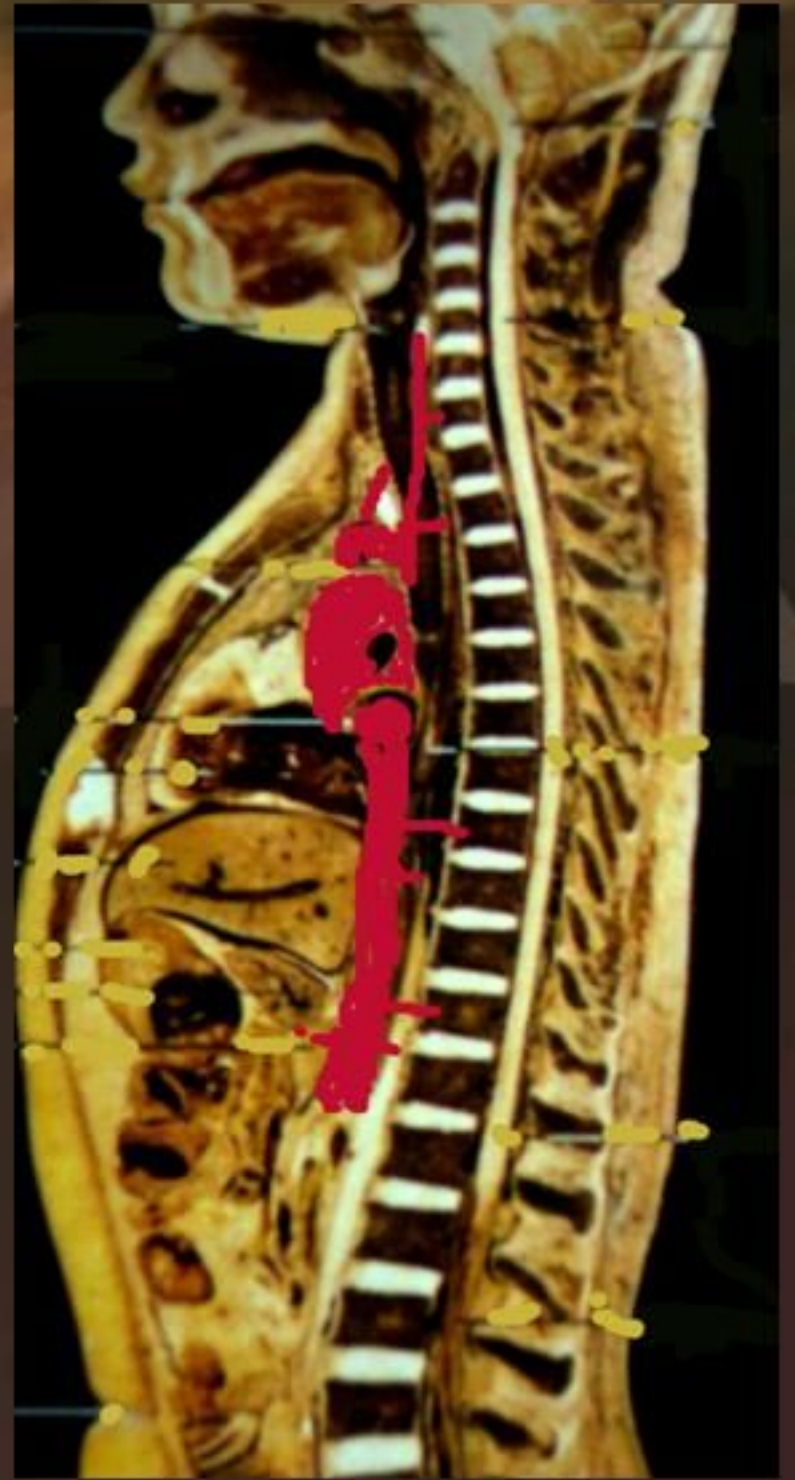
SPINE ANATOMI

- SPINAL CORD
- VERTEBRAE
- VESSEL
- CEREBROSPINAL LIQUOR

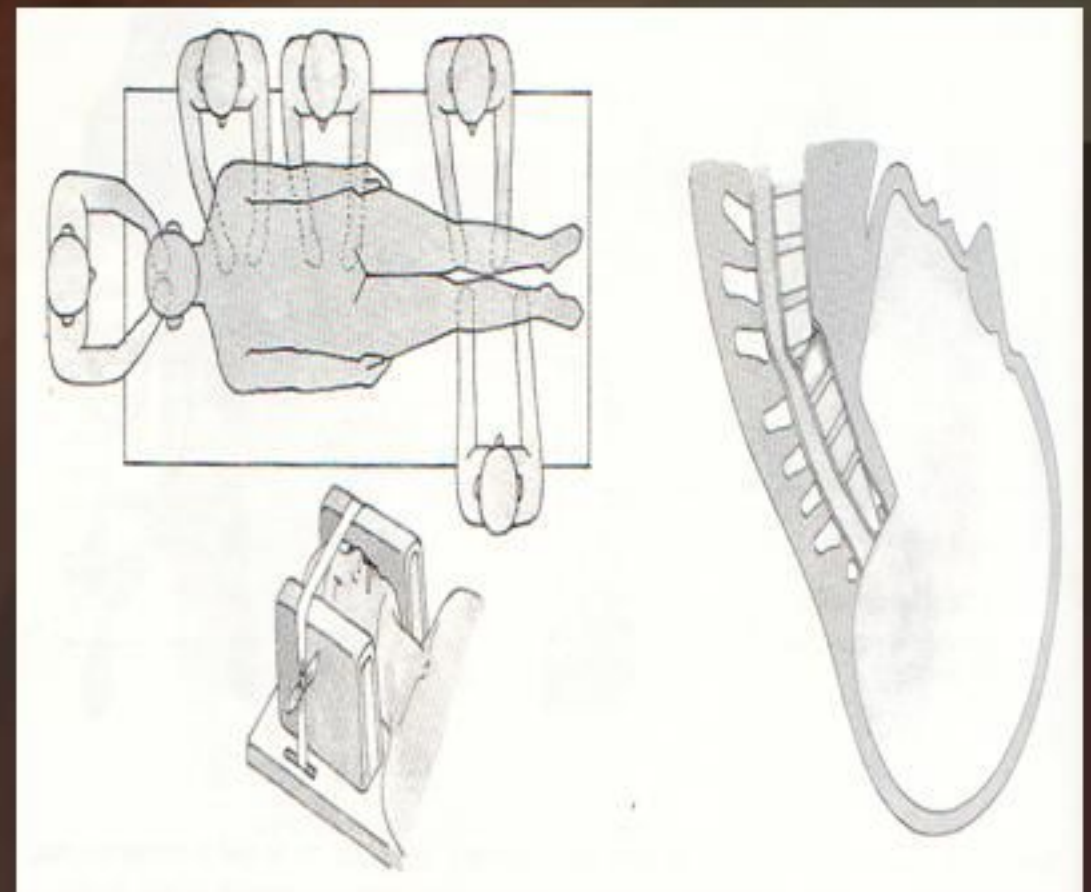




2002/01/09



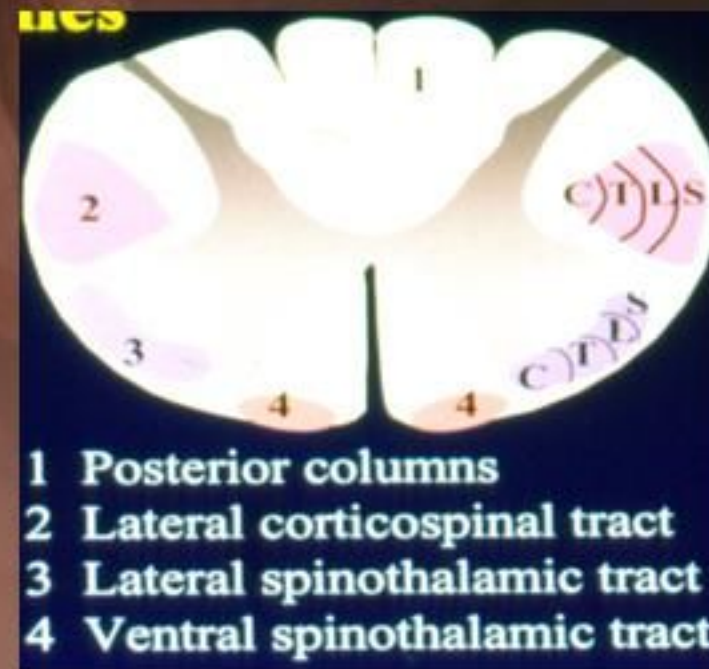
Only IF ABC is STABLE
Perform
SECONDARY SURVEY



Proper TRANSPORTATION

ANATOMICAL/ MORFOLOGICAL DIAGNOSIS OF SPINE TRAUMA

Fraktur / dislocation ? : Stabel/ Unstabel
Intracanal Enchroachment ? : soft tissue/ bone
Spinal cord injury complete/ incomplete
Penetrating Injury
Vaskular Injury



SURGERY for SPINE TRAUMA

- Dekompression : Save the cord
- Stabilisation : Many technique





Pustaka Baru :

Selladurai, Ben dan Reilly, Peter, *Initial Management of Head Injury – a Comprehensive Guide*, McGraw-Hill Australia, 2007.