Brain – CNS

Neurological emergencies

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Consciousness

- In philosophy
  - **Consciousness**—The having of perceptions, thoughts, and feelings; awareness.
- Psychological
  - Modern scientific investigations into consciousness based on psychological experiments
- Medical aspects / practically oriented/
  - in (E/I) medicine, consciousness is assessed as a "level" ranging from coma and brain death at the low end, to full alertness and purposeful responsiveness at the high end.

Assessmen

- In medicine, consciousness is examined using a set of procedures known as neuropsychological assessment
- neurological examination
- Lost of consciousness: how is the evaluation - clinical examination ?
- In EM and CCM (orientational neurological examination)
  - Should be completed with standart scale… .GCS

Why GCS ?

- This scale ……make quatitification of deepness of coma
- It is standart scale
- We can folow the course of diseasse
- Comunication with other doctors
- Scientific articles

Advantage

- It is known all over the world

Disadvantage

- Failed in children /Children does not speak
- Not for sedated patient

Glasgow coma scale

Eyes opening	spontaneously	4
	to speech	3
	to pain	2
	none	1
Best verbal response	oriented	5
	confused	4
	inappropriate	3
	incomprehensible	2
	none	1
Best motor response		
to verbal command	obeyes	6
to painful stimulus	localizes	5
	withdraws from pain	4
	flexes to pain	3
	extends to pain	2
	none	1
Total		3-15

Best score 15
Worst score 3 (brain death)

- GCS 15-14 mild
- GCS 13-9 moderate
- GCS 8 and less……severe trauma
- Change from flexion to extension

Etiology of altered consiousness

- Many diferent causes
  - trauma
  - vascular (ICH, SAH , CVA)
  - brain tumor
  - hypoxemia, hypoperfusion
  - other:

    metabolic

    toxic

    seizures

- Diferent causes…….same picture
- Then…..Nearly the same treatment

scheme

- Inzult (i.g.trauma)
- Patological found…….brain oedema
- Brain oedema……lost of consciousness
- Brain oedema ….lead to……
  ……..intracranial hypertension

Brain oedema

Brain aedema

- Vasogenic……trauma, colateral oedema, focal lesions
- Cytotoxic…….hypoxemia, difuse lesion
- Osmotic……osmotic dysbalamce
- Interstitial oedema……..hydrocephalus

patophysiology

- Monroe Kelly doctrine
- Compensatory mechanism
- Autoregulation

see table…..

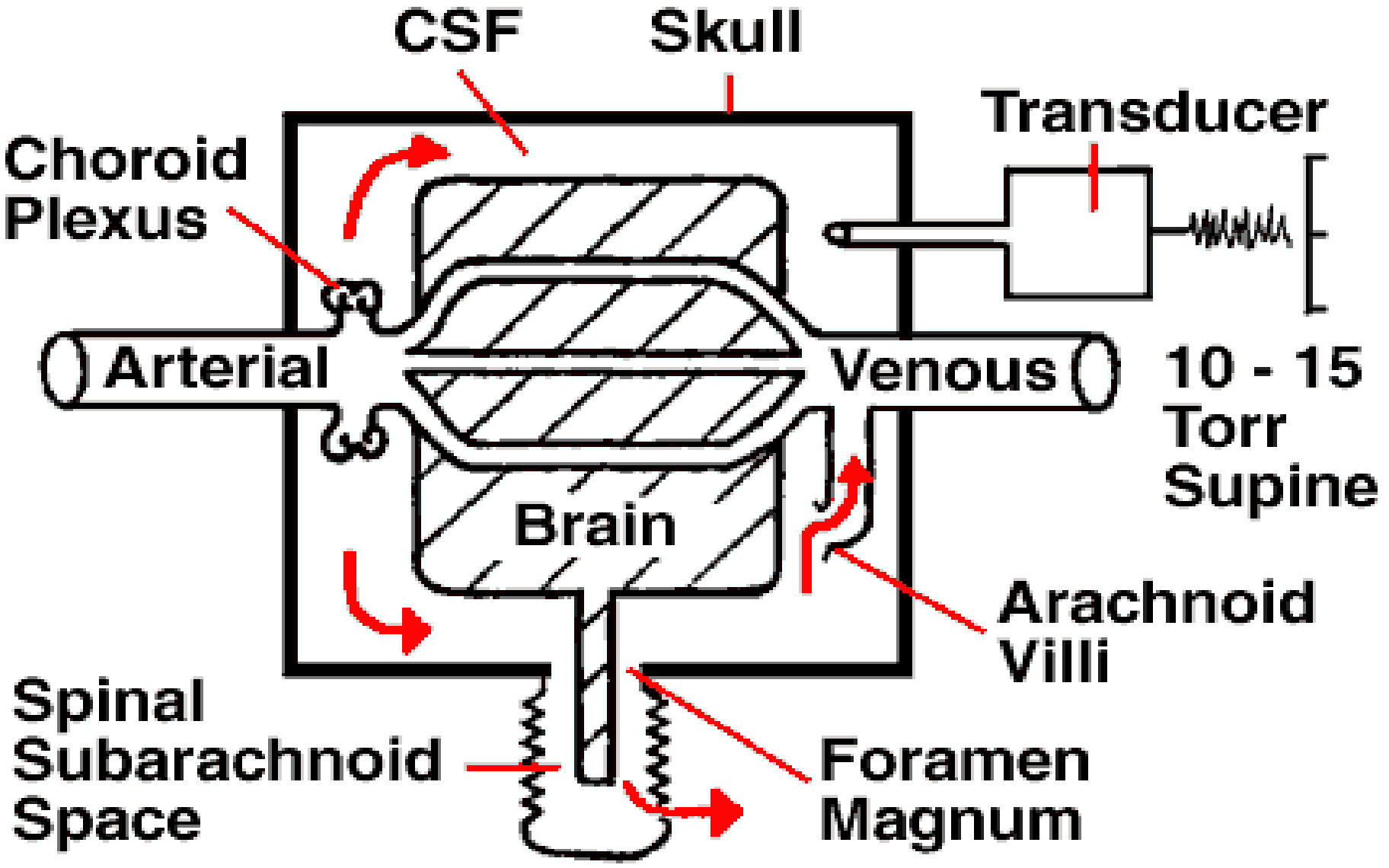


Fig 1a

Schematic of Normal Intracranial Contents

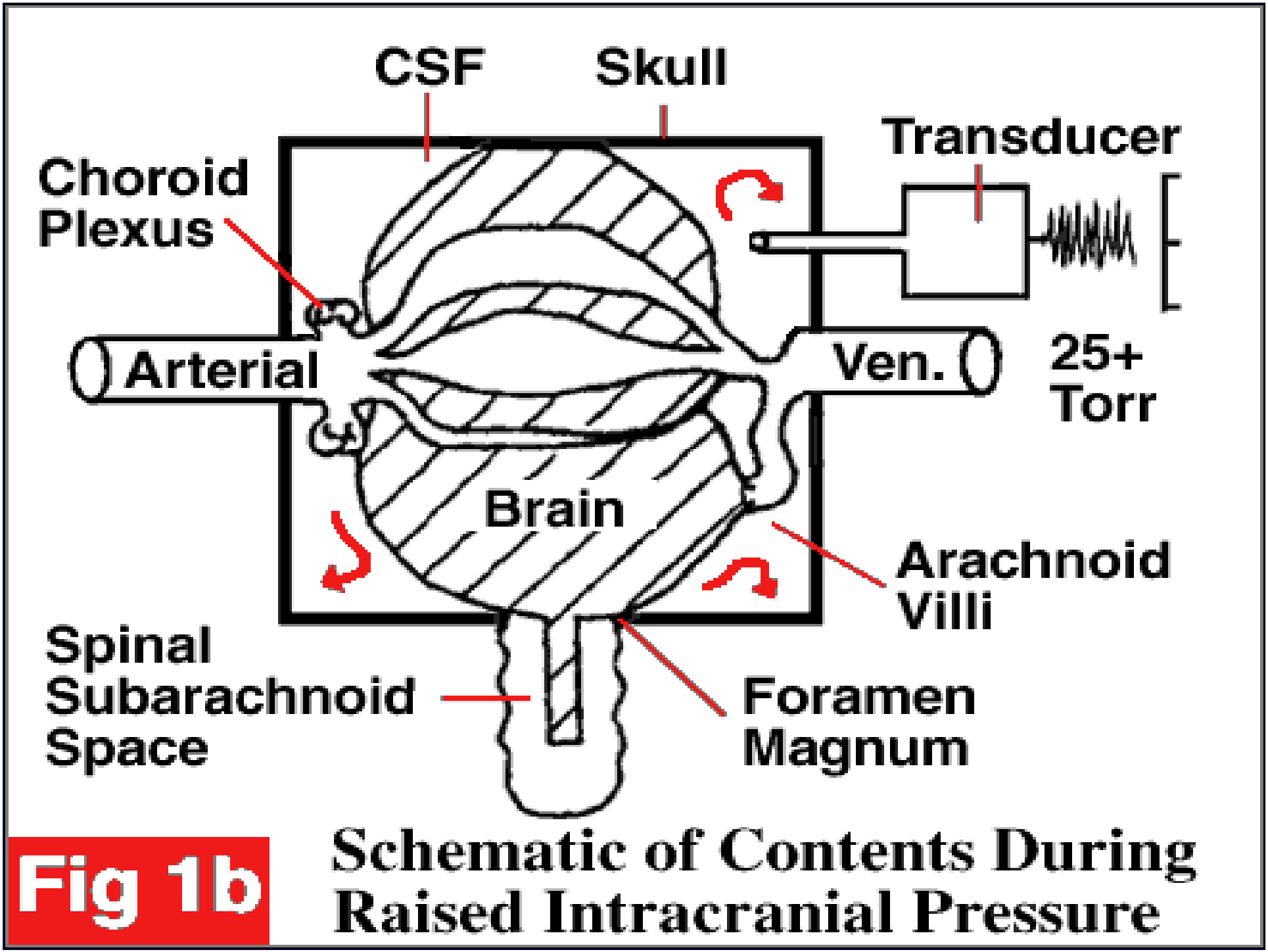


Fig 1b Schematic of Contents During Raised Intracranial Pressure

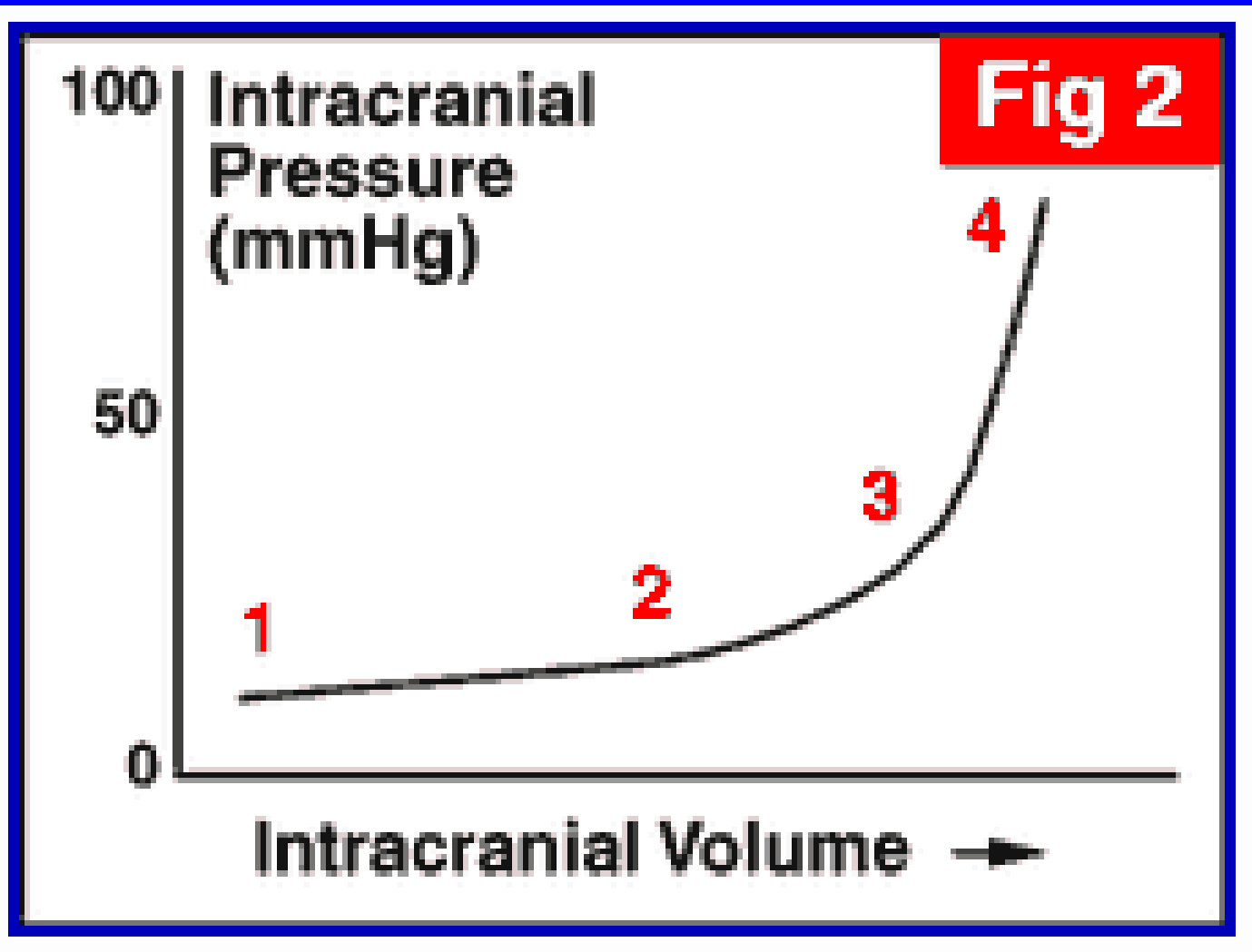


Fig 2
100
Intracranial
Pressure
(mmHg)
50
0
1
2
3
4
Intracranial Volume

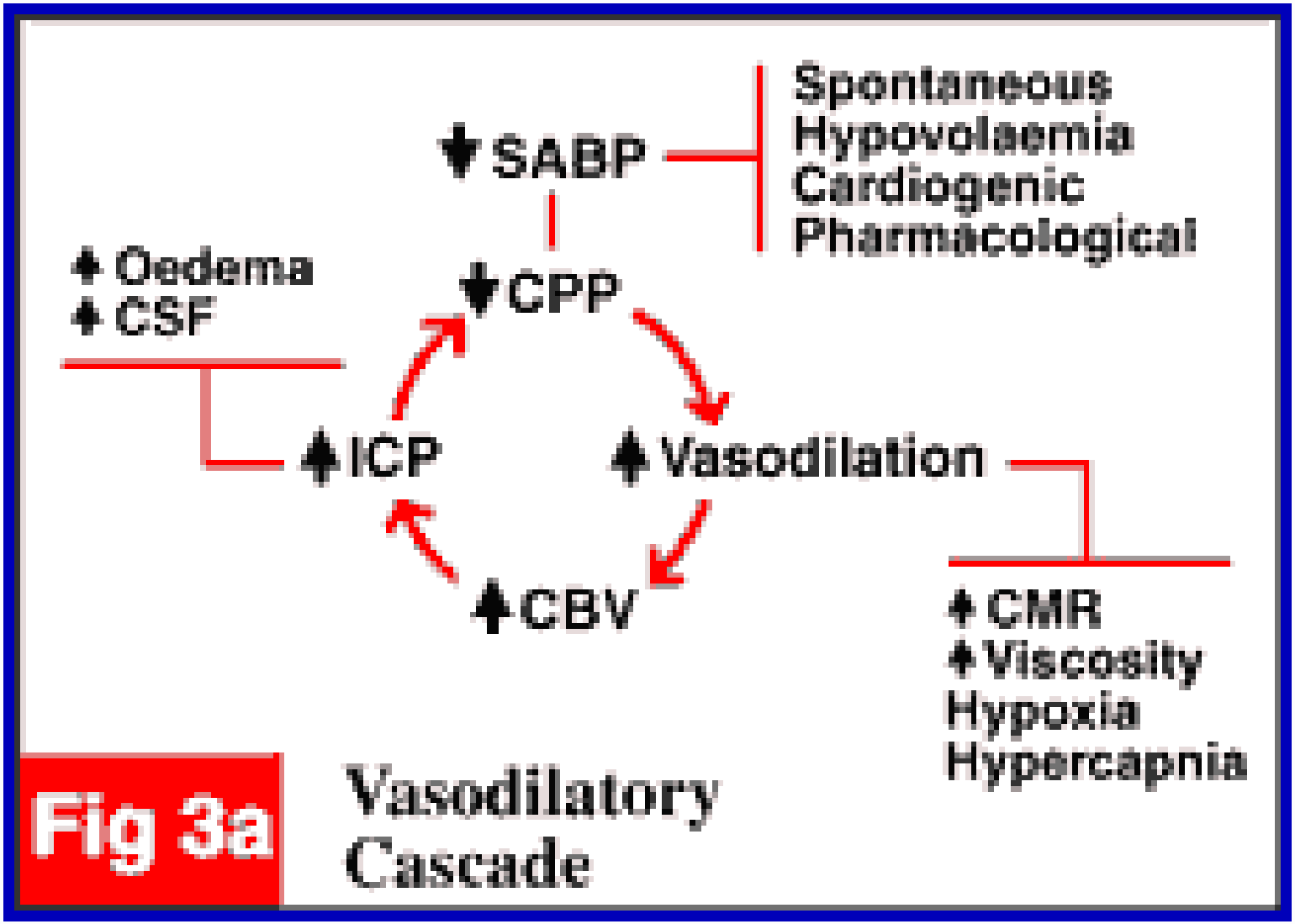


Fig 3a Vasodilatory Cascade

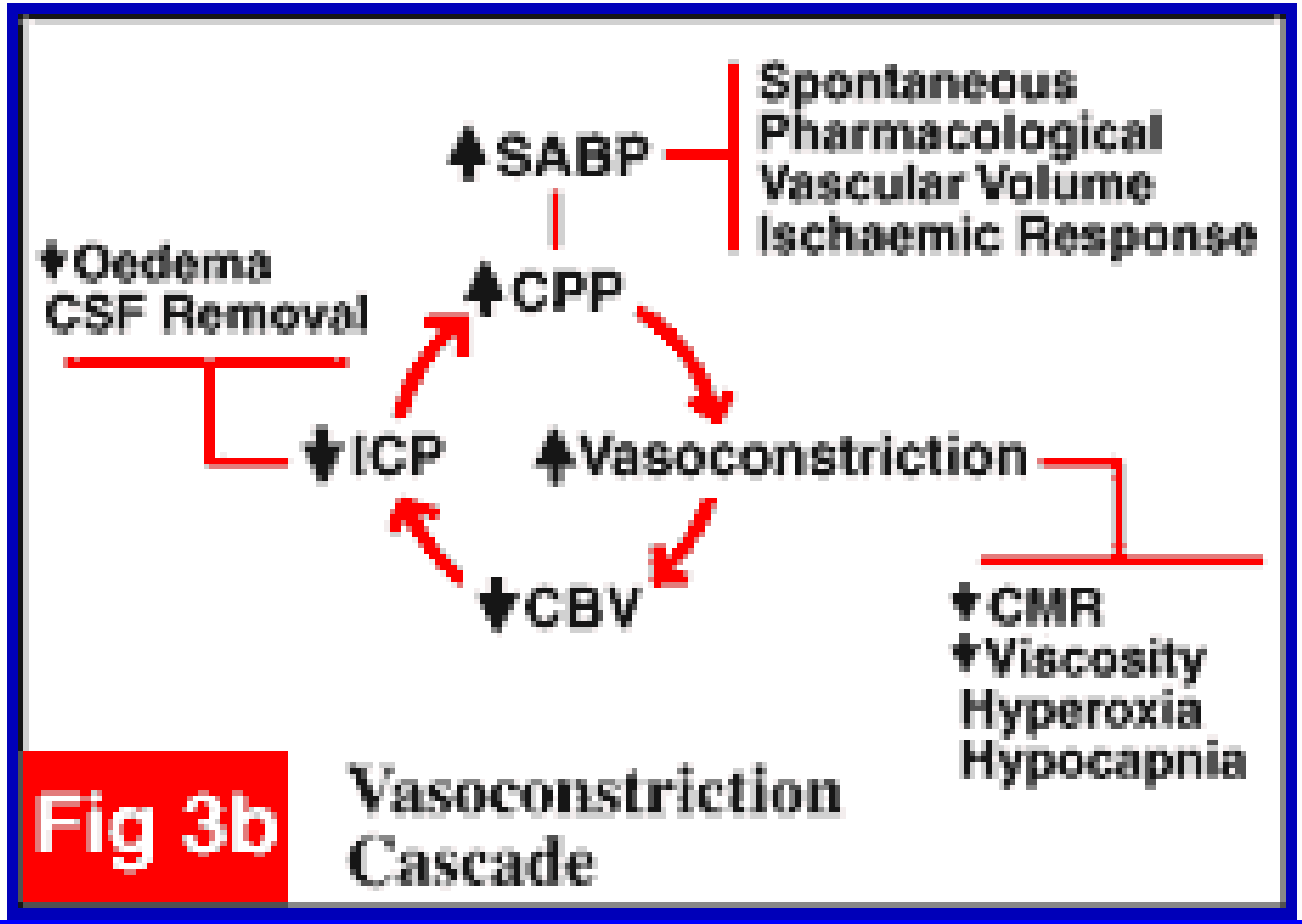


Fig 3b Vasoconstriction Cascade

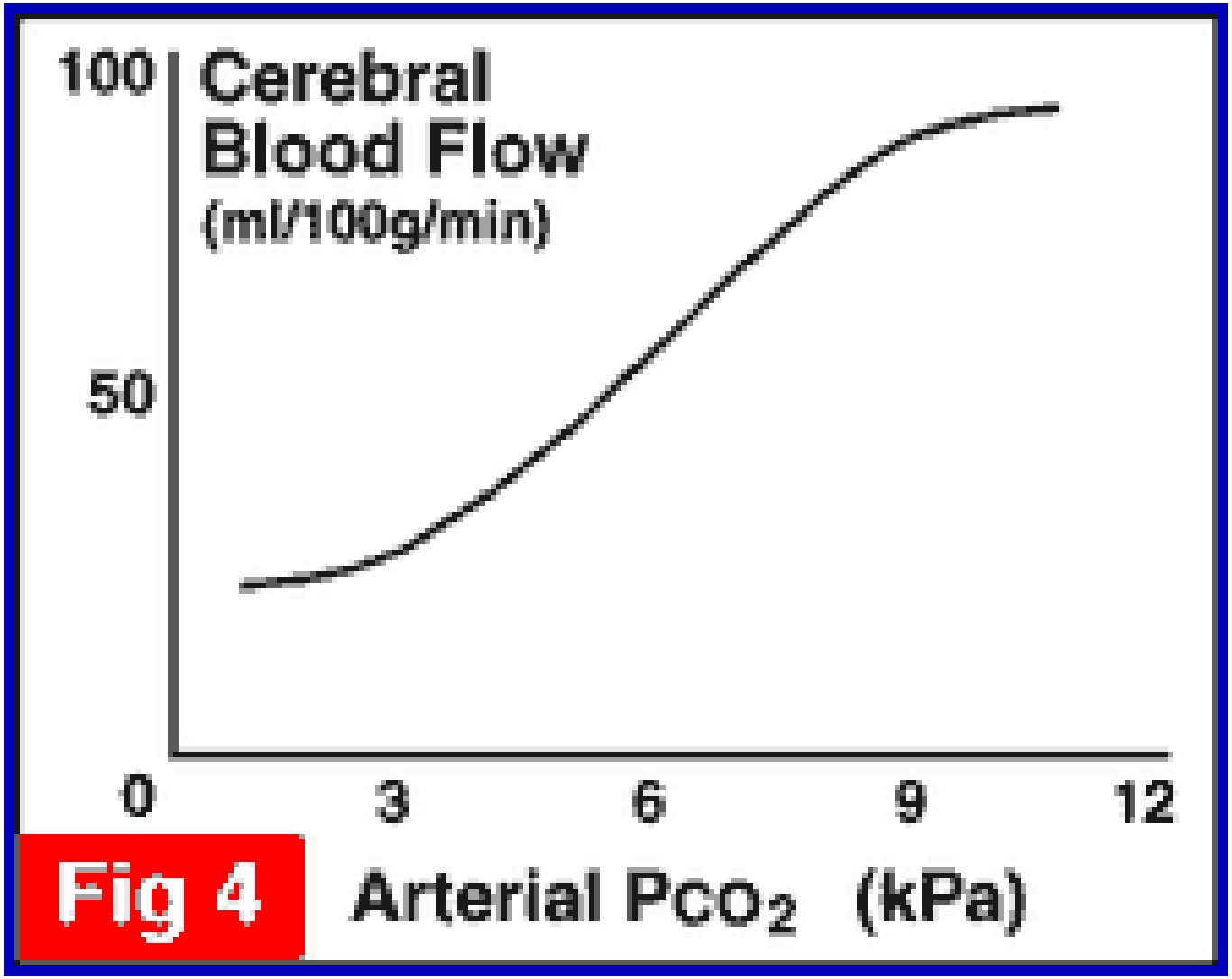

100
Cerebral
Blood Flow
(ml/100g/min)
50
0
3
6
9
12
Arterial PCO_2 (kPa)

Fig 4

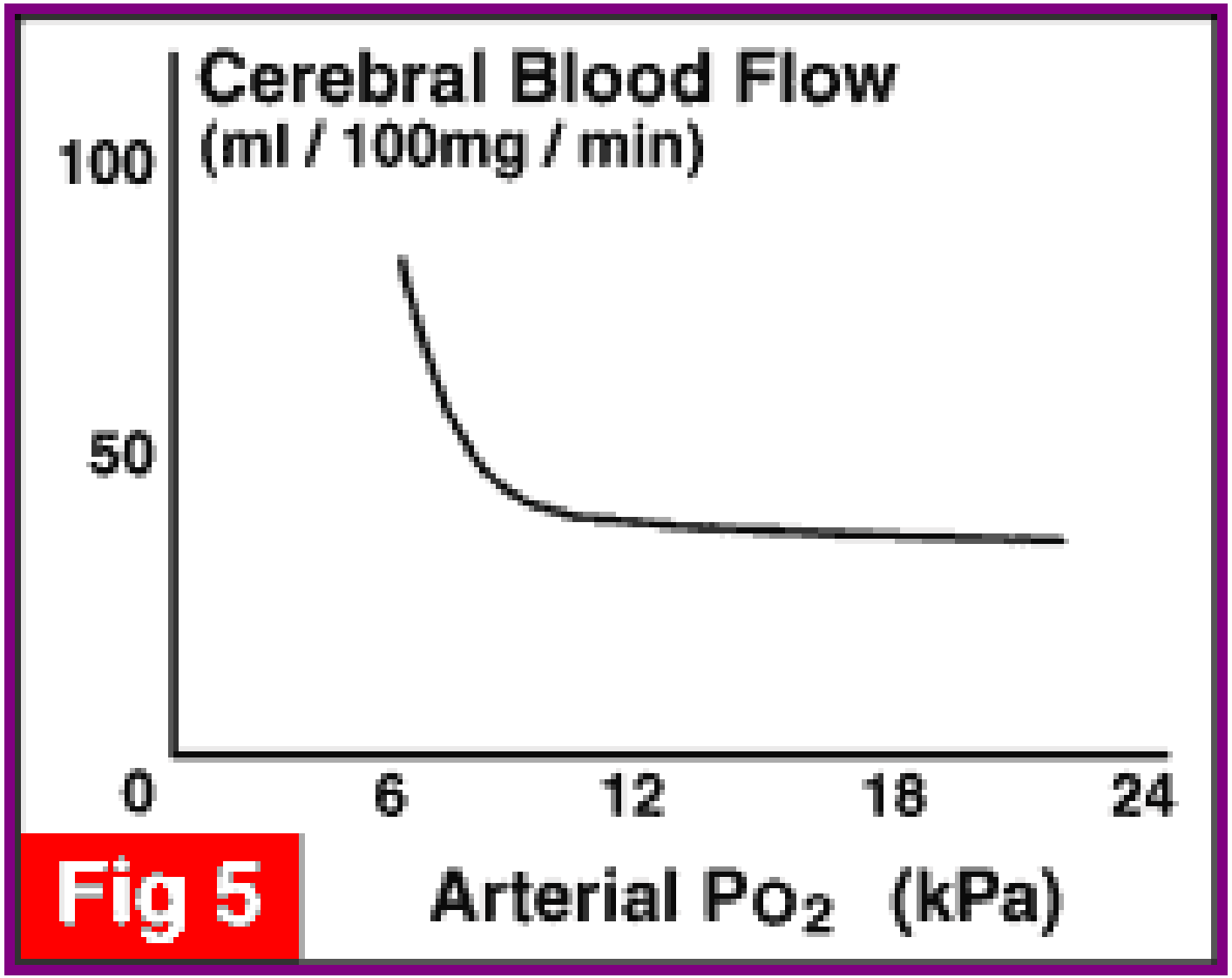
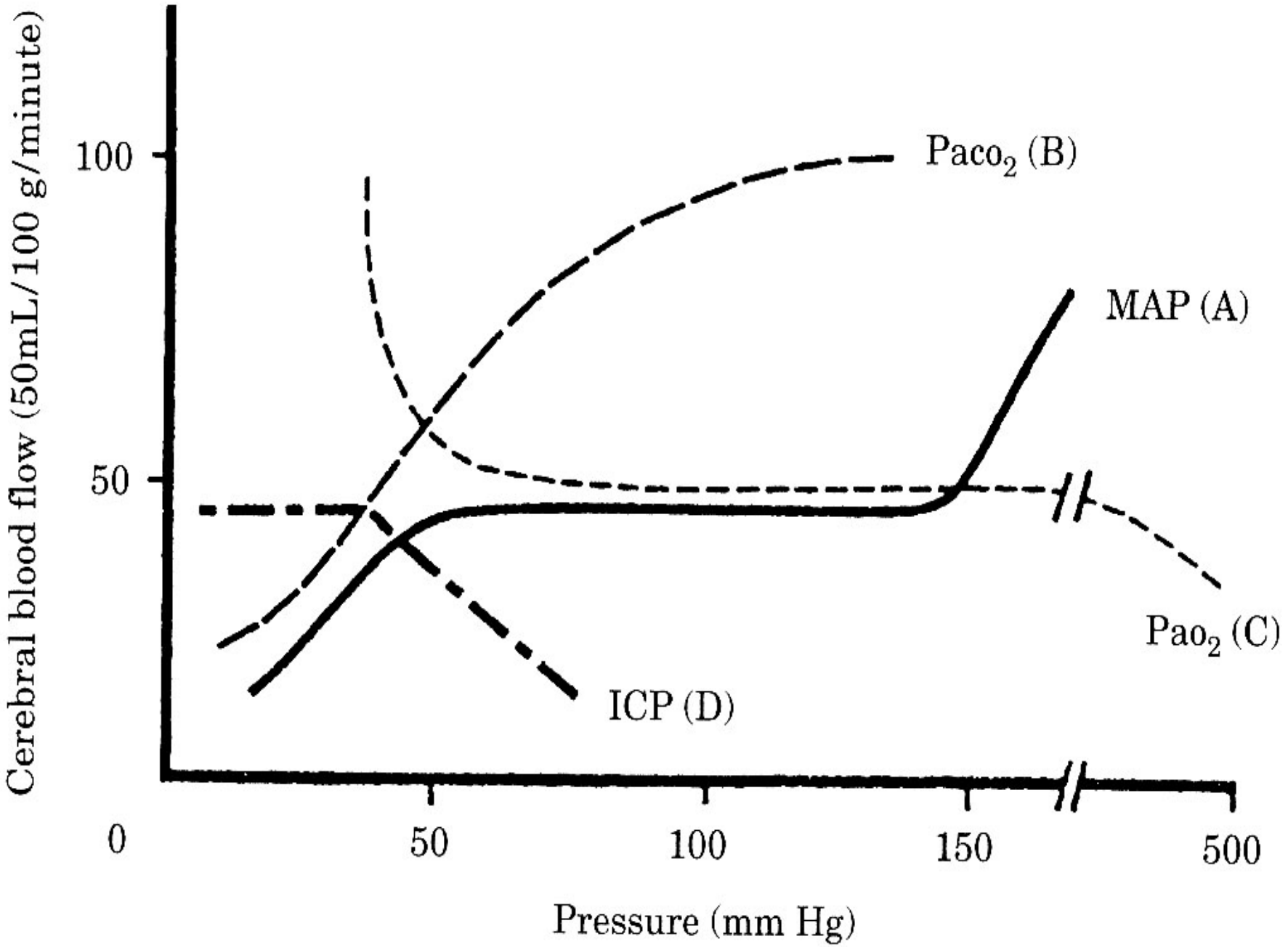

Cerebral Blood Flow
(ml / 100mg / min)
100
50
0
6
12
18
24
Arterial PO_2 (kPa)

Fig 5


Cerebral blood flow (50mL/100 g/minute)
100
50
0
50
100
150
500
Pressure (mm Hg)
Paco2 (B)
MAP (A)
Pao2 (C)
ICP (D)

Systemic complication contributing to secondary brain injury

- Minutes or hours after initial impact:
  - hypoxia /hypotension
  - hypercarbia
  - anemia
  - hyper/hypoglycemia
- Hours or days after initial impact:
  - electolyte disterbance
  - seizures
  - infection/sepsis
  - hypertermie
  - coagulation abnormalities

treatment

- is focused on this grey area
- This cell are still vital not fully damaged

treatment

- Main area is head trauma

  ……good chance to recovery

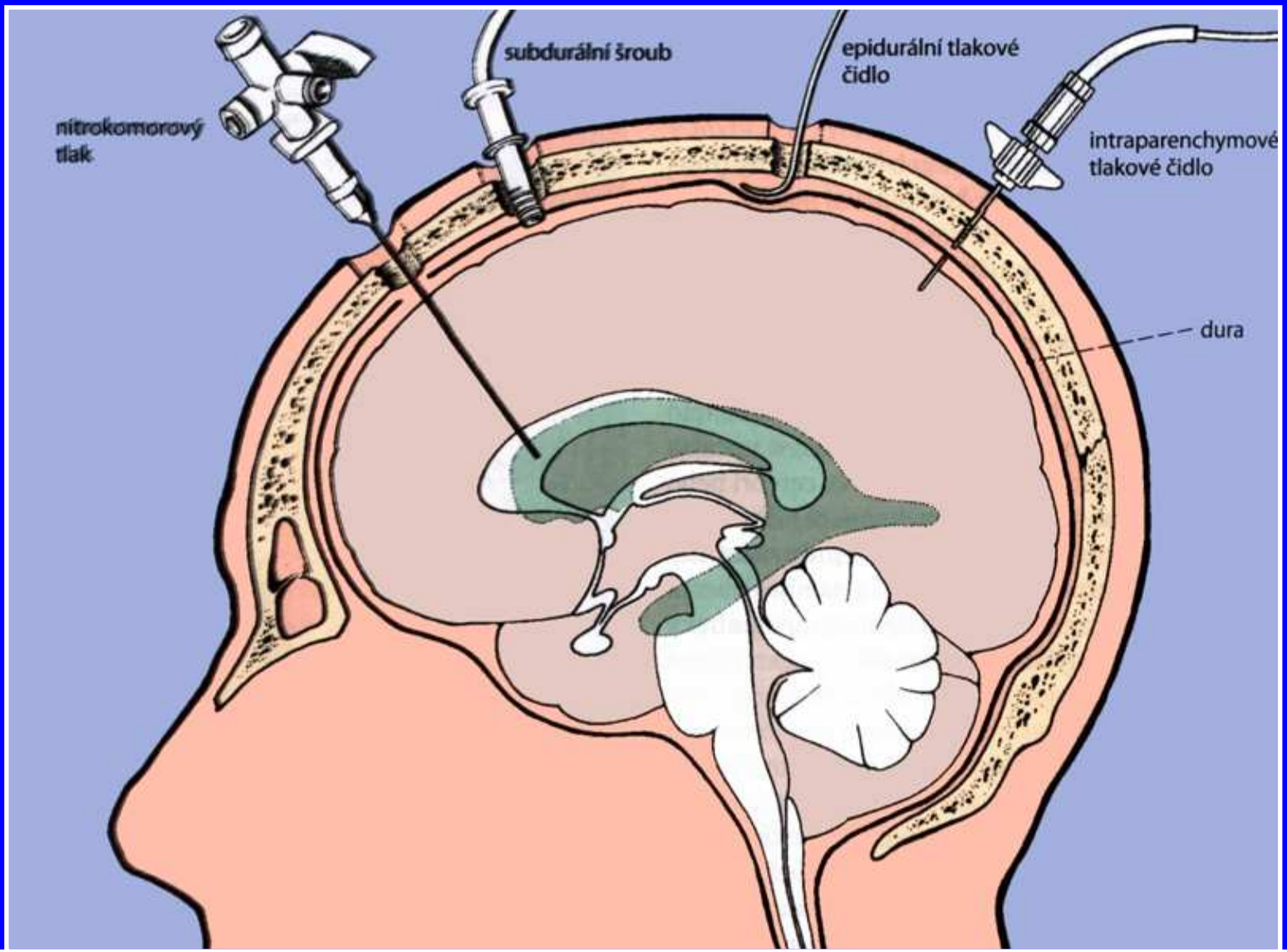
- Difuse lesions (hypoxemia)

  …….bad prognosis

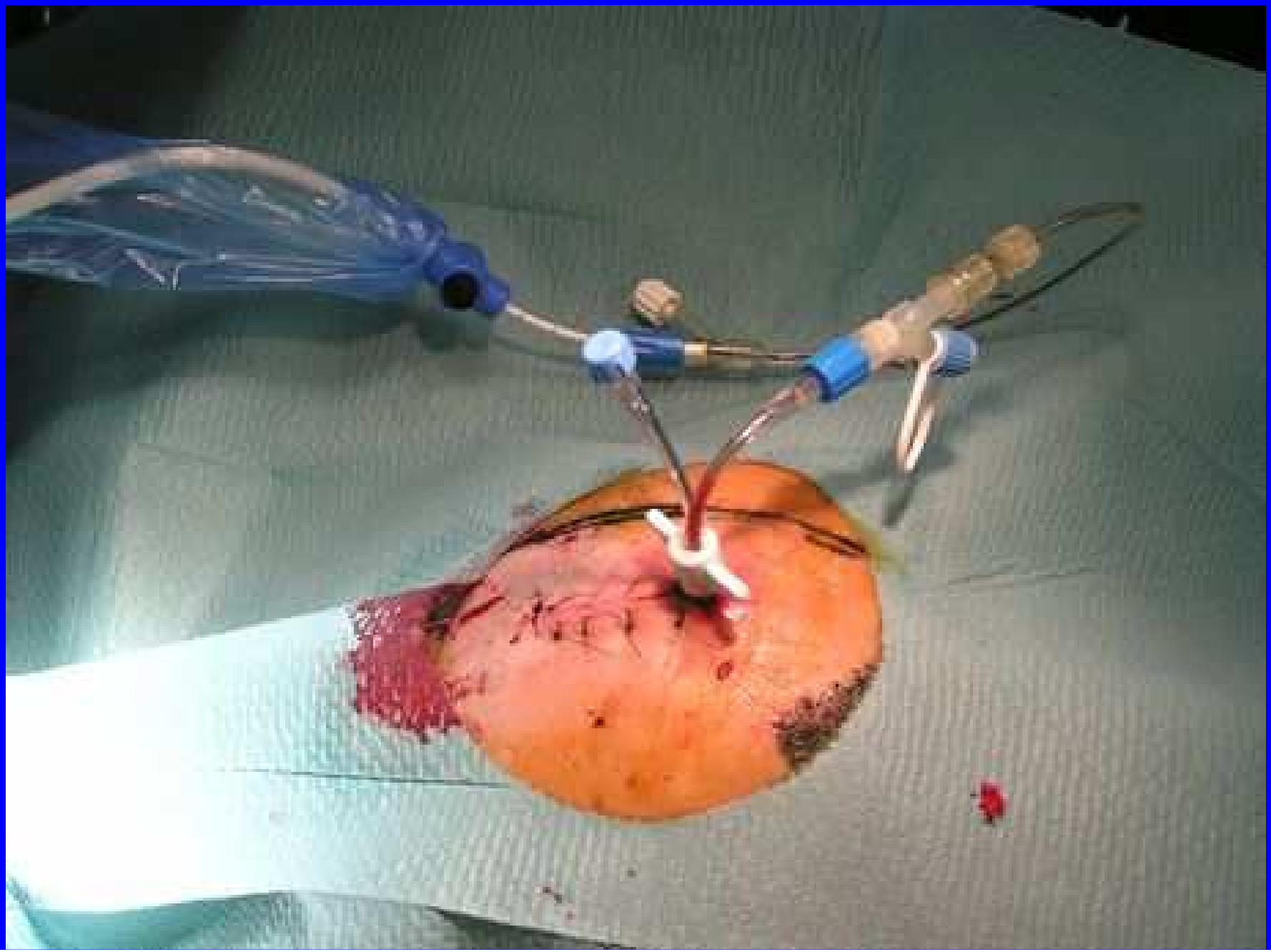
How we recognise intracranial hypertension…???

- Headache
- Nausea, vomiting
- Papilledema
- Unilateral pupillary dilataion
- Oculomotor or abducents palsy
- Depresses level of couciousness
- Irregular breatging
- Midline shift (o,5cm) or encroachment of expanding brain on cebral ventrcles (CT scan or MRI)

ICP monitoring




INFUZE
7.07
6.03
0.7



Treatment

- ICP 0 – 15 mmHg normal values
  over 20 – 25 treatment !
- CPP = MAP - ICP ……min. 60 mmHg

……

- Other monitoring: NIERS spect, TCD, PtiO2, T Cerebral flow, c EEG

decision

- Period without monitoring of ICP
- Period with monitoring ICP

Terapeutic aproach:

- 1rst tier therapy without monitoring of ICP
- 2nd severe situation usualy need monitoring of ICP
- Indication for ICP monitoring
- Salvageable patient with GCS 8 and less, + abnormal CT scan or normal CT scan + 2 from 3 condition:
  - Unilateral or bilateral motor posturin
  - sBP below 90 mm Hb
  - Aged over 40 yr

Treatment of brain oedema/intracranial hypertesion

- First rule: ABCD

  check respiration, protect the airway , O ?, Intuabatinon? CMV, keep moderate hyperventilation,

  check circulation, BP ove 90 torr systolic or better over 70, better 70 MAP, support (fluids, analeptics)

- Then:

  Sedation

  Analgesics

  Avoid hypertermia, seizures

protocol

- Hyperventilation: only moderate hypocapnia 35 mmHg
- Head positioning 25-30dgr
- Manitol: limit 320 mosml hyperosmolality
- Avoid hypotension: because of resulting in low CPP(keep MAP over 5O mg Hg)
- Avoid hypoosmolality…check Na+
- CSF: obstruction, -ventricular dreinage (EVD)

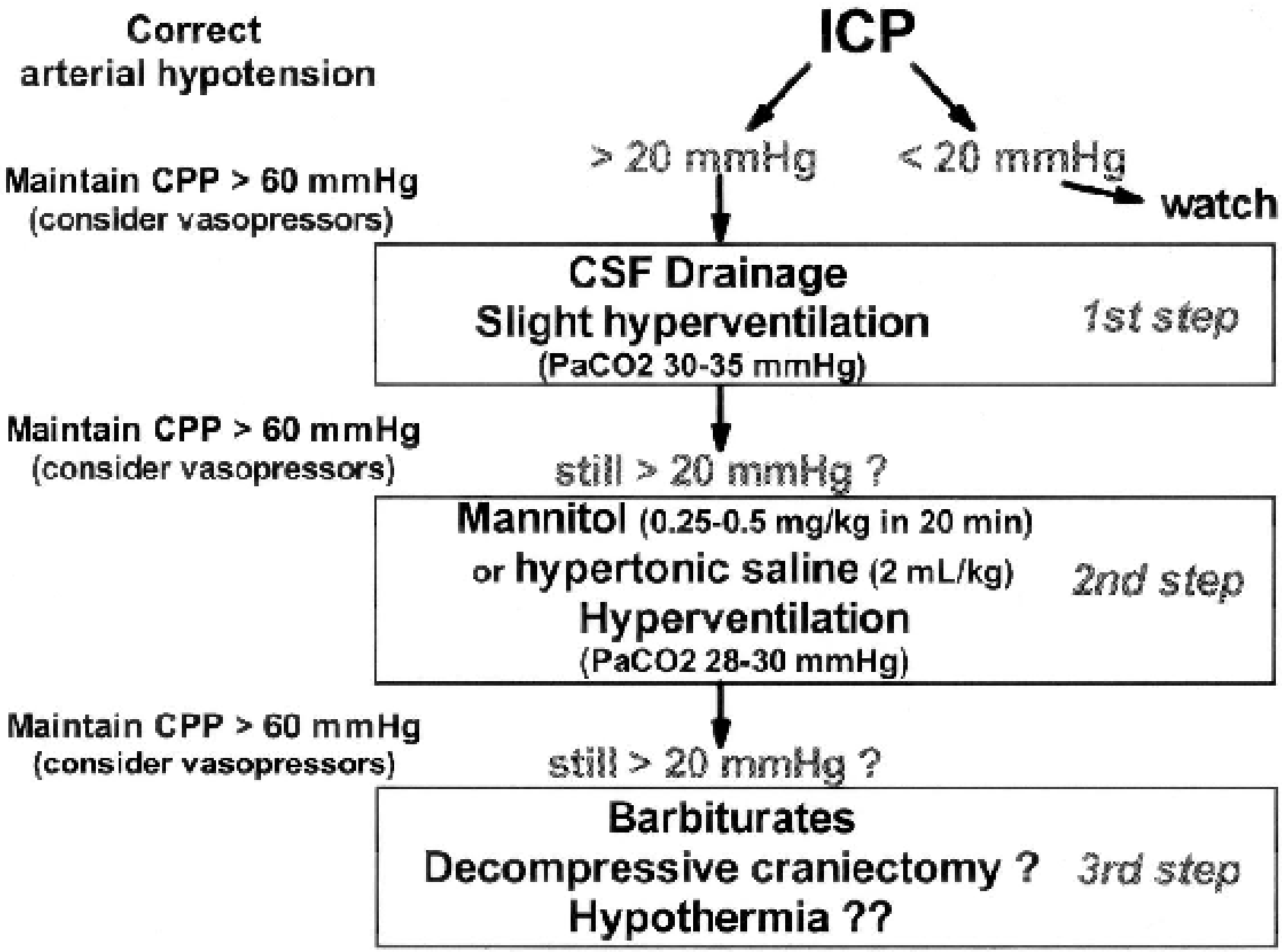


Figure 1. Management of intracranial hypertension in three steps. *ICP*, intracranial pressure; *CPP*,

Protocol 2

- Barbiturates

  barb. coma
- Hypotermia

- Cranial decompresion

  (decompresive cranioectomy)

corticosteroids

- Brain oedema…..no !
- Only vasogenic oedema…..around tumors

  dexametason
- Transversal spinal cord lesion C part

  metylprednisolon

  first 24 hours

terapie

Brain trauma foundation guidelines (1995, 2000) 2007 Journal of neurotrauma vol 24, Suppl 1, 2007

Pediatric pat.: guidelines PCCM 2003 guidelines BTF)

CPP targeted/guided therapy,

ICP **targeted/guided therapy** ICP/CPP – PtiO2 guided

Brain death

- Clinically: complete unresponsiveness, apne, and loss of brain stem rr. – coma
- The conditions that mimic brian death have been ruled out clinically /severe intoxication including anest + NMCD, sevee hypotermia, severe metsbolic dysbalance, lock-in sy/
- Absence of cerebral perfusion: cerebral angiogaphy, CT angio, brain scintigraphy, TCD BAEP

ické známky smrti mozku.

……..

jméno a podpis vyšetřujícího lékaře A

……..

jméno a podpis vyšetřujícího lékaře B

S nepřesahuje č.4, lze provést některé z vyšetření potvrzující nevratnost smrti mozku možného dárce.

infratentoriální lézí se provádí pouze klinické vyšetření.

……..

jméno a podpis vyšetřujícího lékaře, odbornost a stupeň odbornosti

ující lékař musí mít specializovanou způsobilost v oboru radiobiologie a zobrazovací metody

……..

jméno a podpis vyšetřujícího lékaře, odbornost a stupeň odbornosti

sí mít specializovanou způsobilost v oboru radiobiologie a zobrazovací metody

……...

jméno a podpis vyšetřujícího lékaře, odbornost a stupeň odbornosti

řující lékař musí mít specializovanou způsobilost v oboru nukleární medicína

ých tepnách.

……..

jméno a podpis vyšetřujícího lékaře, odbornost a stupeň odbornosti