

Subarachnoid hemorrhage

4TH Year medical students

The University of Jordan

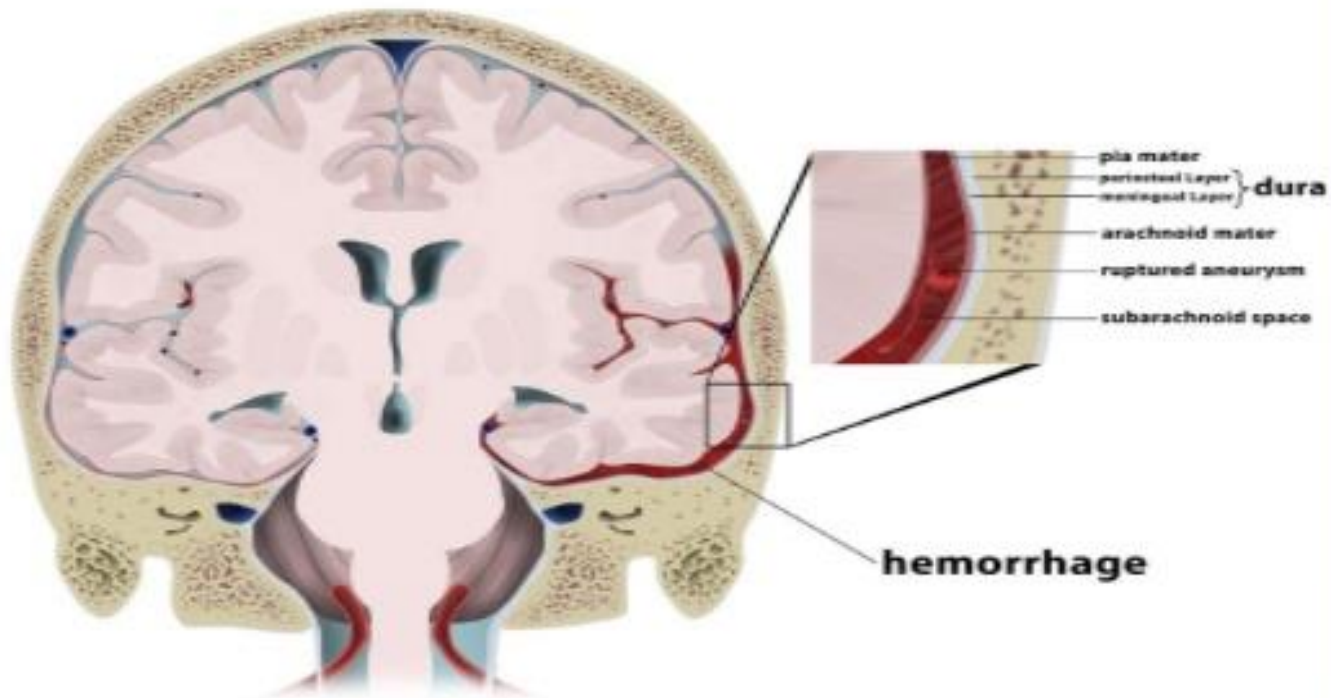
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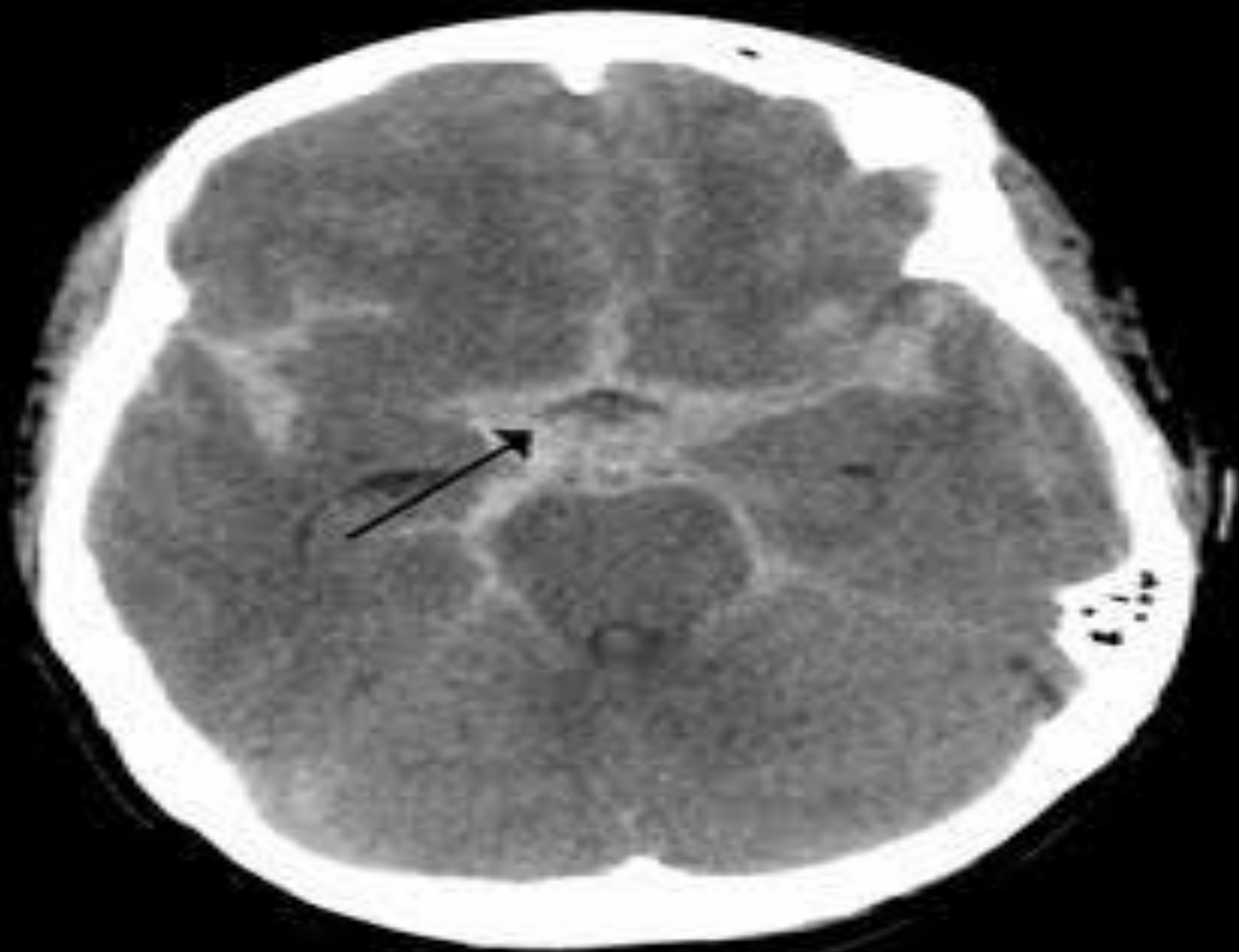
RELEVANT ANATOMY

- ▶ **Arachnoid** comes from the Greek "**arachne**" meaning spiderweb + "**eidōs**" meaning resemblance = spider-web-like.
- ▶ Subarachnoid space is the interval between the arachnoid membrane and pia mater.
- ▶ It is occupied by a spongy tissue consisting of trabeculae and intercommunicating channels in which the CSF is contained.
- ▶ The subarachnoid space extends from the basal cisterns surrounding the brainstem superiorly to S2 level inferiorly.
- ▶ Subarachnoid space is the location of the interface between the vascular tissue and CSF.

- Bleeding into the subarachnoid space (space between pia & arachnoid layers) where blood vessels lie & CSF flows

Subarachnoid Hemorrhage





Clinical manifestations

- General manifestations
- Manifestations related to site of bleed
- Systematic manifestations

CLINICAL MANIFESTATIONS-cont.

- With rupture , blood at high pressure gushes in the subarachnoid space resulting in following three patterns of presentations:
 - Pt. is stricken with severe headache & vomiting, and falls unconscious immediately
 - Severe generalized headache occurs suddenly but pt remains lucid with varying degrees of neck stiffness
 - Rarely pt suddenly becomes unconscious without any preceding complaint.
If the bleed is massive pt may die in minute to hrs.
So ruptured aneurysm should be considered in the differential diagnosis of sudden death

In these rapidly evolving cases the bleed is so massive that I/c pressure approaches systemic BP, thus severely compromising the cerebral perfusion

Manifestations related to site

- Focal neurological deficit

Intracerebral hemorrhage:high ICP

Intraventricular bleedind:Hydrocephalus

Vasospasm

Systematic manifestations

- Related to high ICP: **Cushing triad**
- Related to local extension :
Ophthalmological findings
- Related to release of some substances:
Pulmonary edema, ECG changes

SAH- etiology

- Excluding head trauma, the most common cause of SAH is rupture of a SACULAR ANEURYSM.
- Other causes include bleeding from a **vascular malformation** (arteriovenous malformation or dural arterial-venous fistula) and
- Extension into the subarachnoid space from a primary intracerebral hemorrhage.
- Mycotic aneurysms -Most result from **infected emboli due to bacterial endocarditis** causing septic degeneration of arteries and subsequent dilatation and rupture

ETIOLOGY

CATEGORY	CAUSES
TRAUMA	CLOSED, PENETRATING, ELECTRIC, ETC...
VASCULAR	ANEURYSMS, ATHEROSCLEROSIS, AVM, VASCULITIDES
IDIOPATHIC	BENIGN PERIMESENCEPHAIC SUBARACHNOID HEMORRHAGE
BLOOD DYSCRASIAS	LEUKEMIAS, HEMOPHILIAS, THROMBOCYTOPENIAS
INFECTIONS	DENGUE, LEPTOSPIROSIS, BACTERIAL MENINGITIS
TOXINS	AMPHETAMINES, COCAINE, NICOTINE, ANTICOAGULANTS
NEOPLASMS	GLIOMAS, MENINGIOMAS, HEMANGIOBLASTOMA, ETC

Risk Factors

- **Hypertension**
- **Cigarette smoking**
- **Oral contraceptives**
- **Alcohol consumption (debatable)**
- **Diurnal variations in blood pressure**
- **Pregnancy and parturition**
- **Slight increased risk during lumbar puncture and/or cerebral angiography in patient with cerebral aneurysm**
- **Slight increased risk with advancing age**
- **Following cocaine abuse**

Grading SAH

Hunt and Hess Classification of SAH

Grade	Description
1	Asymptomatic or mild H/A and slight nuchal rigidity
2	CN palsy (III, VI), moderate to severe H/A, nuchal rigidity
3	Mild focal deficit, lethargy, confusion
4	Stupor, moderate to severe hemiparesis, early decerebrate rigidity
5	Deep coma, decerebrate rigidity, moribund appearance

Add one grade for serious systemic disease (HPN, DM, severe atherosclerosis, COPD), or severe vasospasm on arteriography.

Grade	Glasgow coma scale score	Motor deficit
I	15	Absent
II	14-13	Absent
III	14-13	Present
IV	12-7	Present or absent
V	6-3	Present or absent

WFNS = World Federation of Neurological Surgeons'

Classification of SAH

- Fisher grading system—based on degree and location of SAH
 - Grade I - No subarachnoid blood seen on CT
 - Grade II - Diffuse or vertical layers of SAH <1 mm thick
 - Grade III - Diffuse clot and/or vertical layer >1 mm thick
 - Grade IV - Intracerebral or intraventricular clot with diffuse or no subarachnoid blood

Work up

- History & Physical examination
- Lab tests(CBC,Electrolytes)
- Emergency room:

Stabilization (Intubation if needed)

CT brain :non-contrast

Lumbar puncture

CT-Angiogram

After admission

- **Conventional Angiogram**

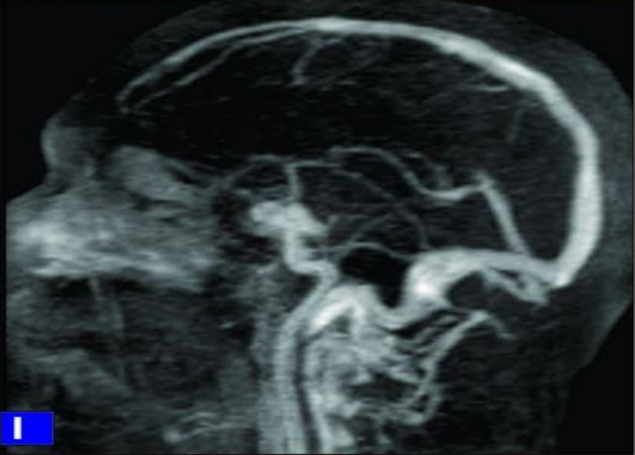
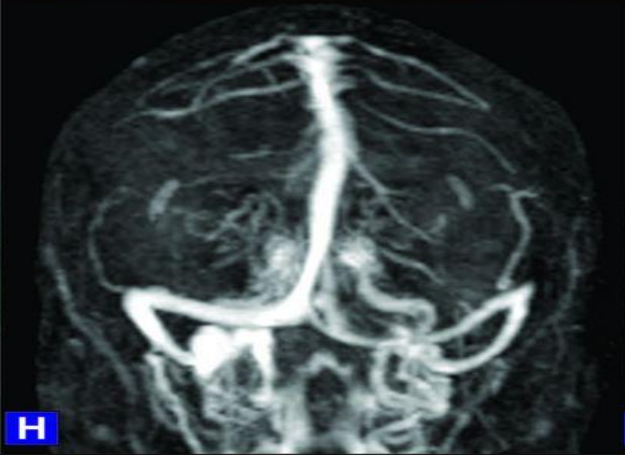
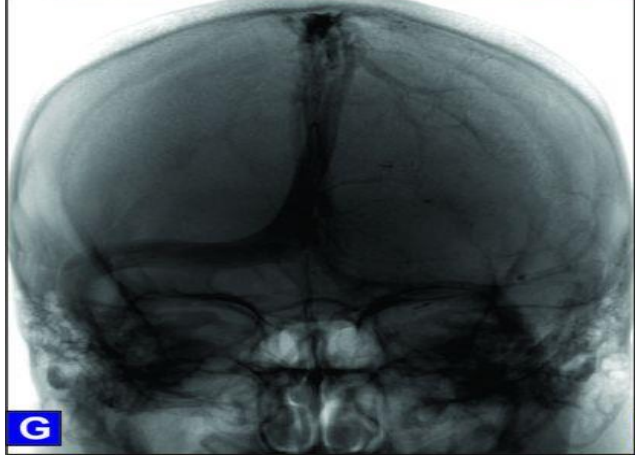
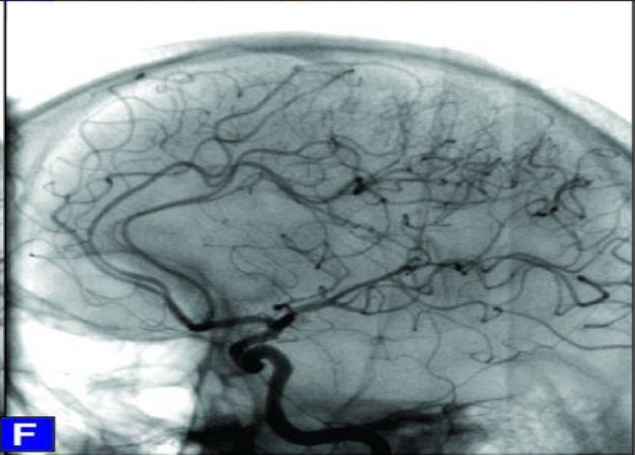
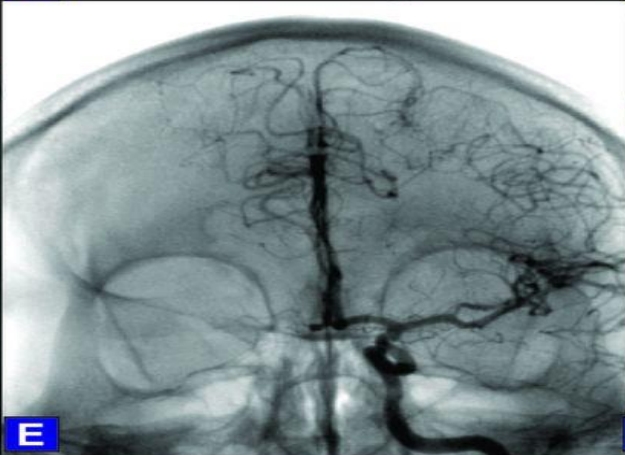
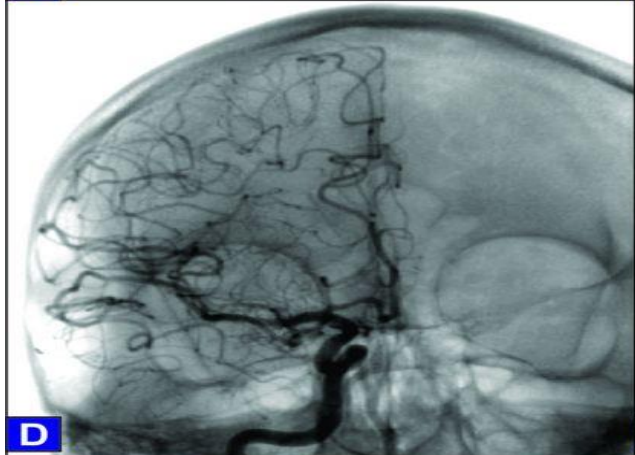
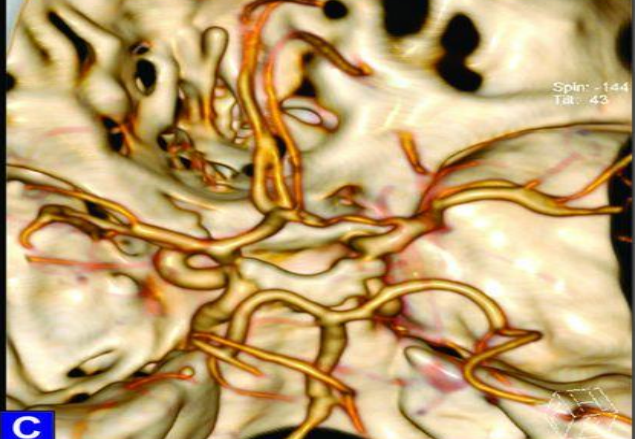
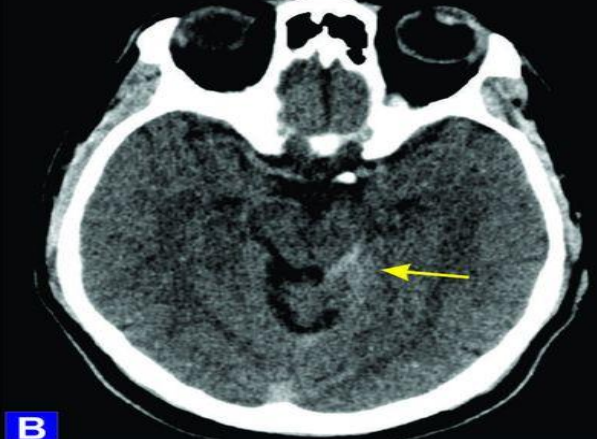
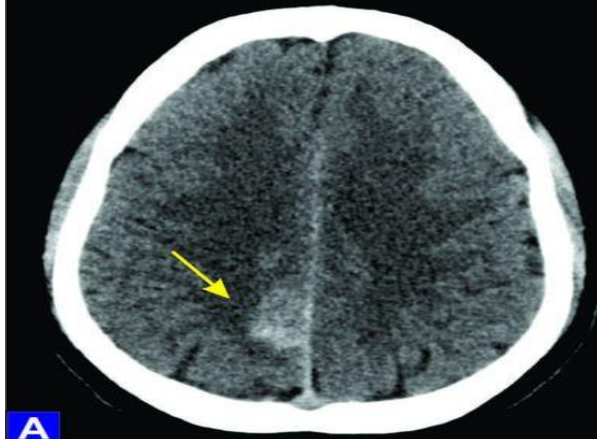
Golden standard Investigation to diagnose etiology

Can be repeated

Can show details of underlying

cause(site,size,multiplicity,direction,vasospasm)





SAH Treatment

- stabilize patient - monitor vitals, ECG for arrhythmias, analgesia
- Stop source of bleeding
 - ruptured aneurysm: endovascular coiling or surgical clipping
- Acute management
 - lower BP with IV labetalol
- Short term management
 - hospitalize 1-2 weeks for monitor, use supportive care
 - if new neurological symptoms, transcranial doppler or cerebral angio to monitor for vasospasm

Treatment- cont

- Because rebleeding is common, all patients who are not candidates for early aneurysm repair are put on **bed rest** in a quiet room and are given stool softeners to **prevent straining**.
- If **Headache or neck pain** is severe, mild **sedation** and **analgesia** are prescribed.
- **Extreme sedation is avoided** because it can obscure changes in neurologic status.
- **Adequate hydration** is necessary to avoid a decrease in blood volume predisposing to brain ischemia.

So adequate amount of fluid is administered so as to maintain above normal circulating blood volume & central venous pressure

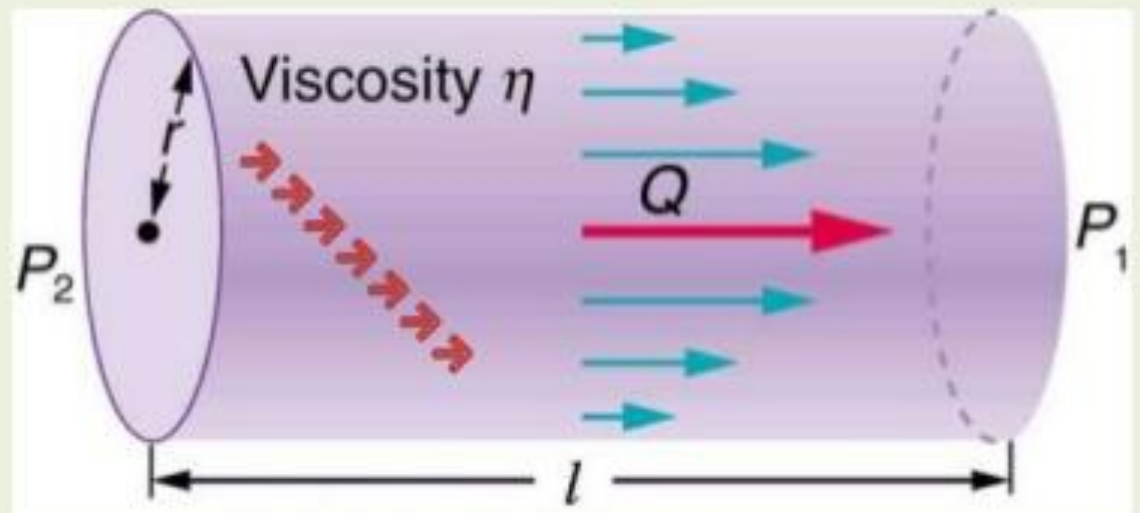
MANAGING VASOSPASM

- Vasospasm remains the leading cause of morbidity and mortality following aneurysmal SAH.
- Treatment with the calcium channel antagonist nimodipine (60 mg PO every 4 h) improves outcome, perhaps by preventing ischemic injury
- Nimodipine can cause significant hypotension in some patients, which may worsen cerebral ischemia in patients with vasospasm

3-H Therapy

- 3-H became the mainstay in the prevention and treatment of cerebral vasospasm

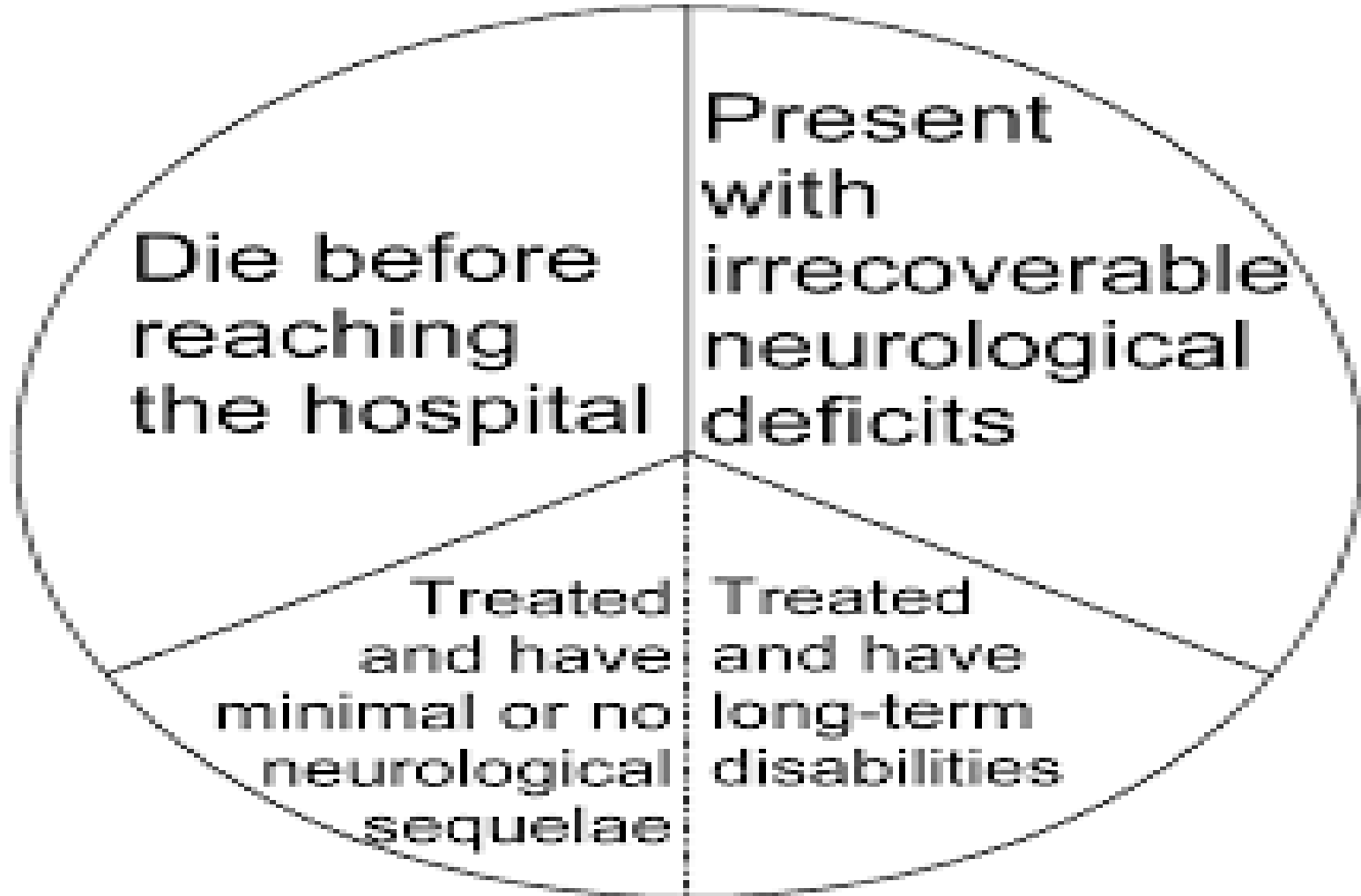
- Hypervolemia
- Hypertension
- Hemodilution



Complications

- Intracerebral hematoma:Evacuation
& treatment of the cause: Securing aneurysm or AVM
- Seizures:Prophylaxis anti-convulsants
- Hydrocephalus:Controlled drainage(EVD)
- Electrolyte disturbances:Correction

Outcome!!!



GOOD LUCK...

&

THANK YOU....