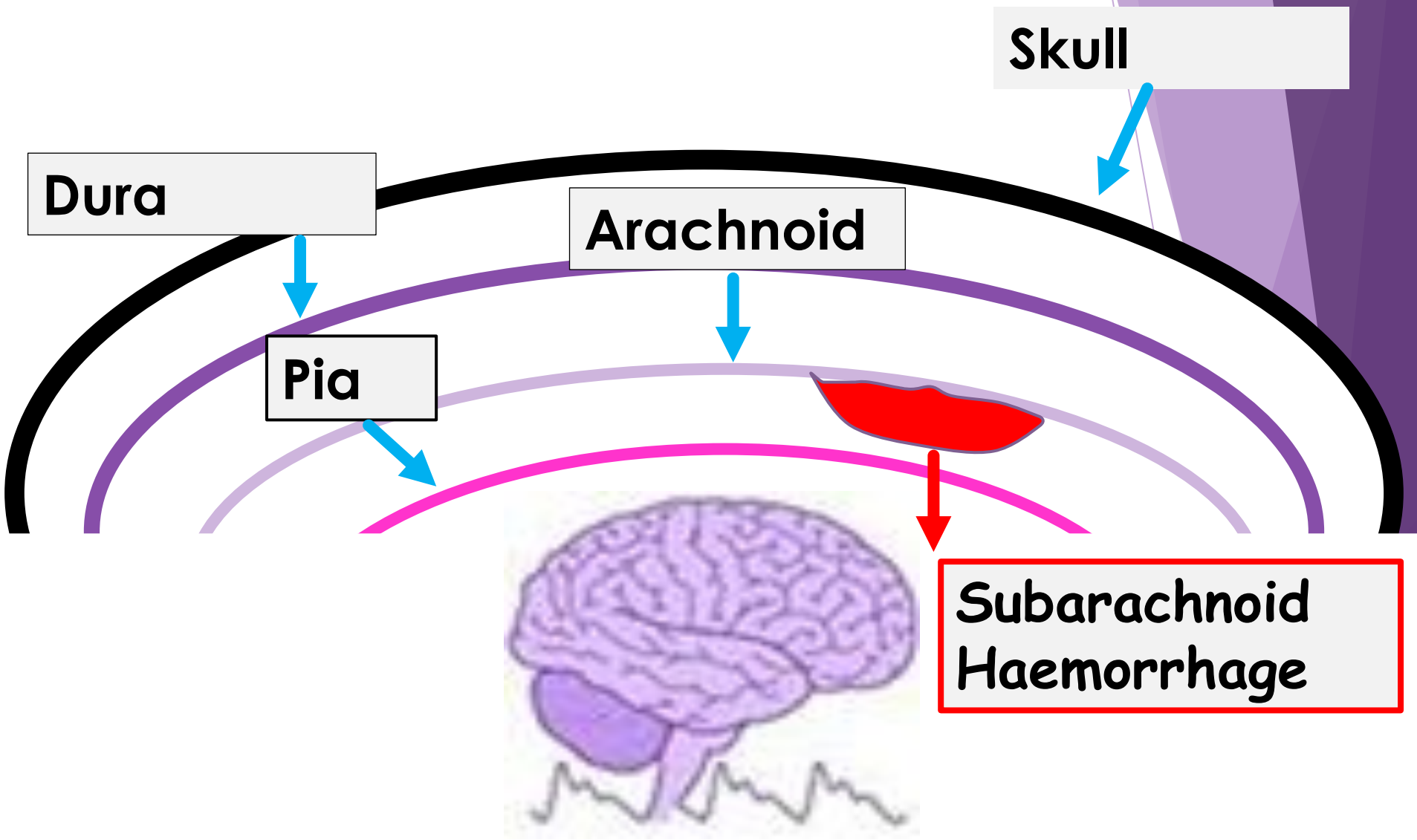
Subarachnoid Haemorrhage

Neuro ICU

Aims and Objectives

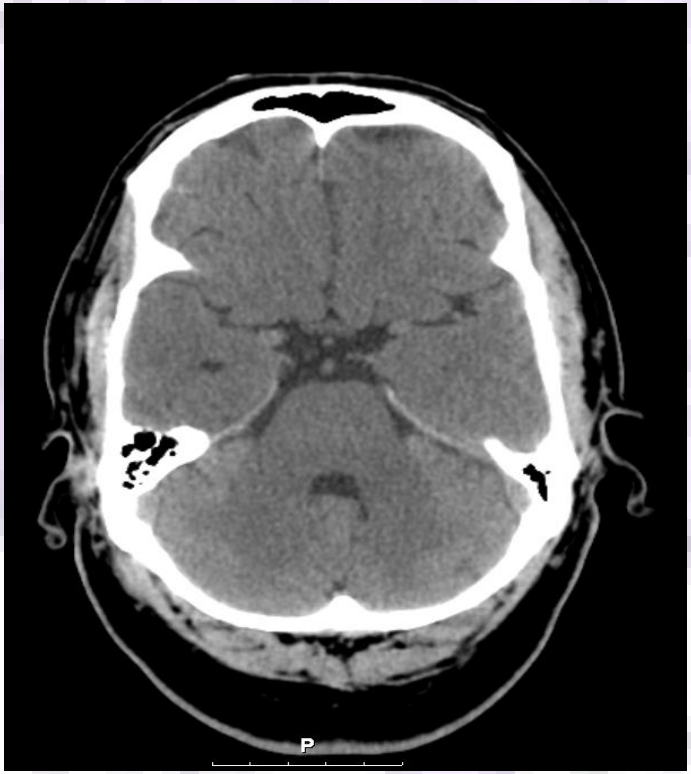
- An understanding of the pathology of a SAH
- A toolkit for Management of SAH
- Enhanced knowledge of Vasospasm and Delayed Cerebral Ischaemia
- An Awareness of Complications

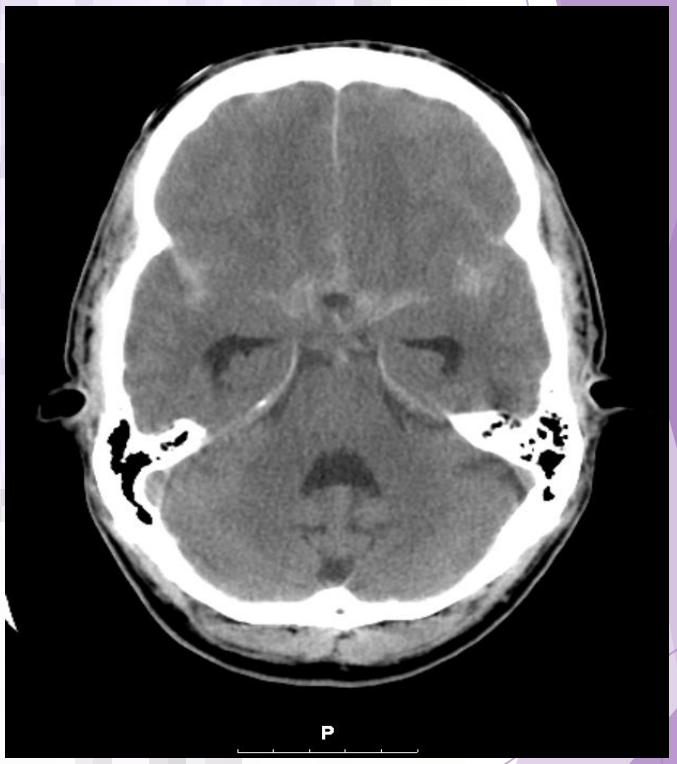
Subarachnoid Haematoma



Subarachnoid haemorrhage

Normal scan on the left, abnormal on the right

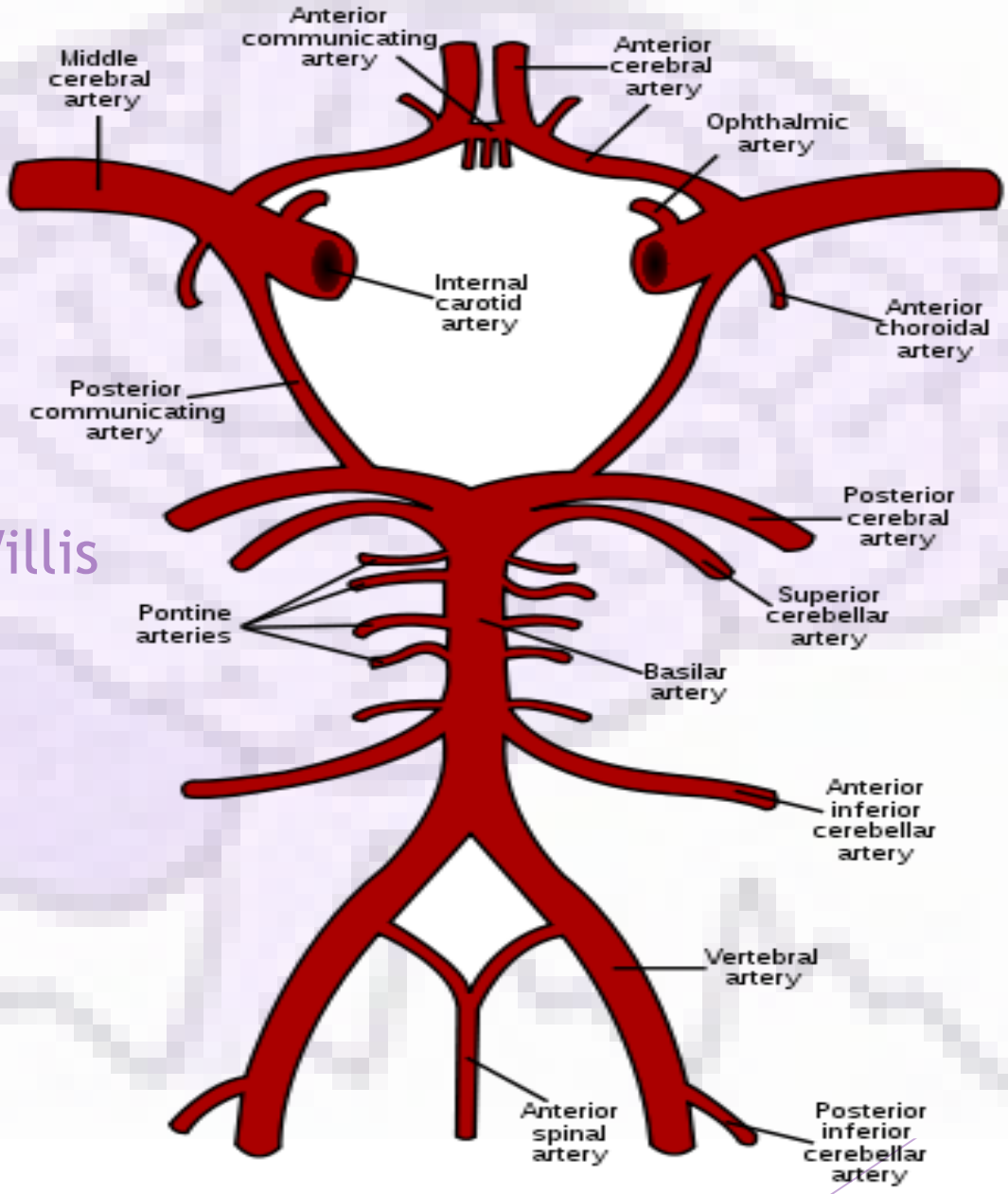




Demographics

- Accounts for 2-5% of all strokes.
- Peak age is between 40-60 years.
- Female: male = 3:2
- Under 40 years, more common in men
- Sites
  - Anterior Circulation 35-40%
  - Multiple aneurysms 20-30%

Circle of Willis



SAH Scoring Systems

	GCS	Clinical Deficit	SAH
Grade 1	15	No motor	Absent
Grade 2	13-14	No motor	Minimal
Grade 3	13-14	Present	Minimal
Grade 4	7-12	+/- motor	Thick
Grade 5	3-6	+/- motor	Thick

- Hunter and Hess
- World Federation of Neurological Surgeons

Outcomes

- 50% case fatality
- 25% die in first 24hrs
- 46% have cognitive impairment
- 66% do not return to same quality of life
- 30% of survivors require long-term care

Presentation

Typical: Severe headache, nausea, vomiting, meningism, decreased GCS,

focal neurological signs

Atypical: seizures, sentinel headache

SAH complications

- Rebleed (7%)
- Vasospasm (46%)
- Hydrocephalus (20%)
- Seizures (30%)
- Pulmonary Oedema (cardiogenic, neurogenic) (23%)
- Hyponatraemia (28%)
- Femoral Pseudo-aneurysm (10-15%)

Mr A Neuron

Previously fit and well 50 year old gentleman with only medical history of tonsillectomy aged 7. Recently started on antihypertensive medication by GP.

Admitted following grade 2 SAH

GCS 7 on admission to NICU (E2, V1(T), M4)

Immediately to theatre for EVD insertion

Now GCS 10 (E3, V1(T), M6)

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Mr A Neuron

1) Why did he have an EVD Inserted

2) What are our aims of treatment

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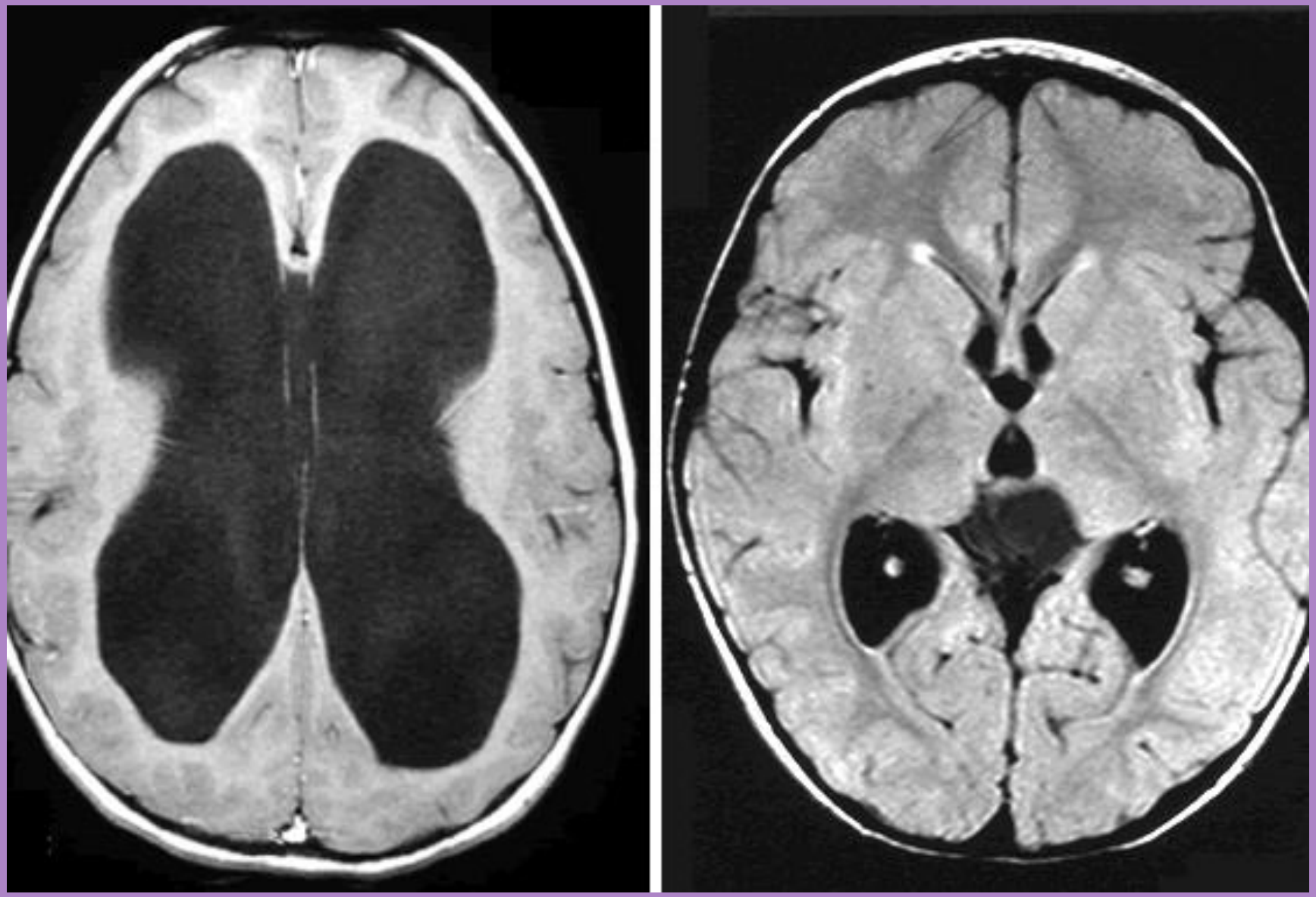
Reasons why an EVD was Inserted

- To Reduce Pressure in the Head (Hydrocephalus)
- Blood is thicker than CSF so doesn't flow as well (To Prevent obstruction)
- To clear the heavy blood
- To Measure the pressure in the head
- To prevent coning

Aims of Treatment

- Prevention of rebleed
- Monitoring and Prevention of Vasospasm (Delayed Neurological Defacit)
- Detection of deterioration
- Pain relief
- Reassurance
- Monitor for Cerebral Salt Wasting



Immediate Management and care

A

B PO2 >10KPa

C normovolaemic, normotensive

- BP 120-160mmHG
- Stop other Ca++ antagonists, diuretics and ß blockers
- 2-2.5l/24 hour fluid intake, normovolaemia
- Correct hyperthermia
- Admission ECG
- Troponin blood test on admission
- Daily NT-pro BNP bloods
- Hb 90-100

FloTrac

- For ALL SAH patients
- ECG changes/Arrhythmias
- Pulmonary Oedema
- Consider Echocardiogram if requiring inotropes
- Polyuria with concerns over fluid balance

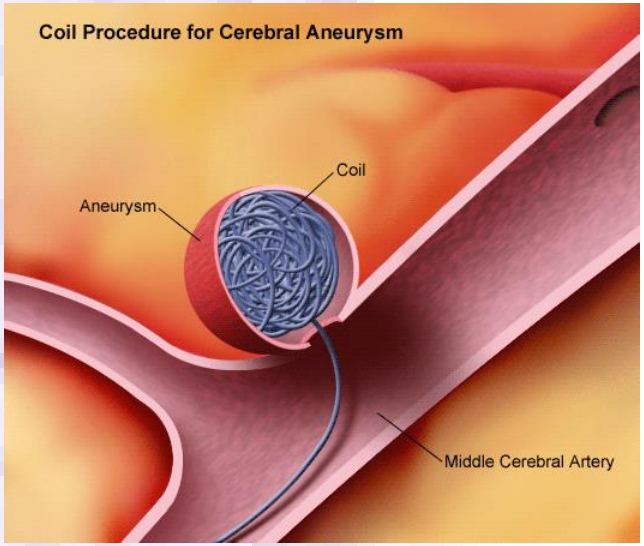
Immediate Management and care

D neuro observations at least 2 hourly

- DVT prophylaxis
- Control blood glucose
- Nimodipine and statins

E EVD care plus

- Reassurance
- Pain relief
- Anti-emetics
- Avoid pyrexia


Coil Procedure for Cerebral Aneurysm
Coil
Aneurysm
Middle Cerebral Artery

Coil or clip ?

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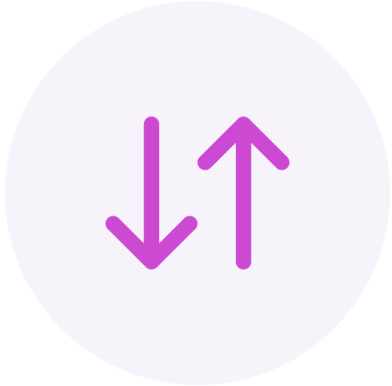

Coil or Clip ?

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Mr A Neuron

SAH 10 days ago and insertion of EVD

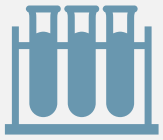
R MCA aneurysm coiled 3 days ago

Was GCS 13 (E3,V4,M6) now GCS 12 (E2,V4,M6) and he has developed L arm weakness which is new.

EVD remains in situ

What does this suggest?

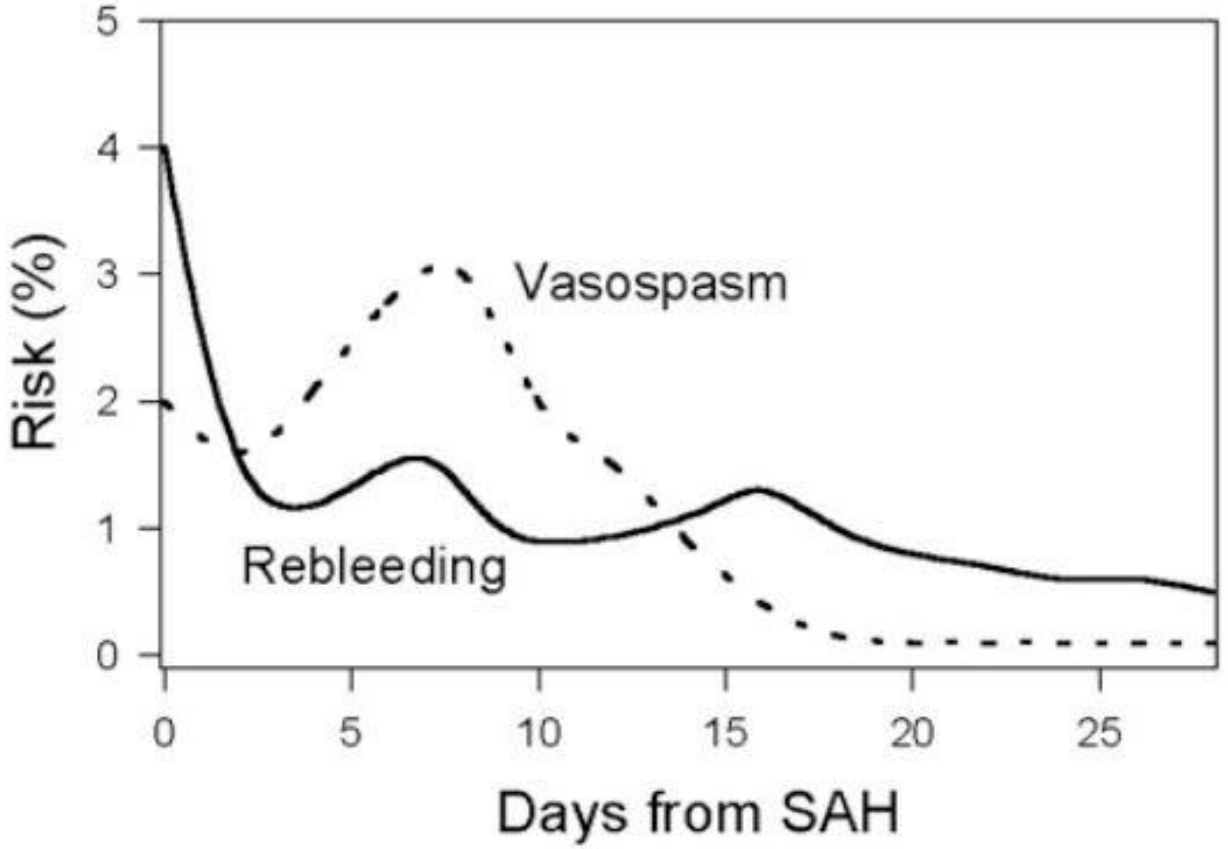
What other information, observations would you like?



What tests may be ordered?

Delayed Cerebral Ischemia

Delayed Ischaemic Neurological Deficit (DIND)	**Delayed cerebral ischaemia (DCI)**	Presents clinically as a deterioration in neurology
Onset 3 –21 days	Peak incidence 3-12 days	46% of SAH patients develop vasospasm
Up to 57% have asymptomatic ischaemic lesions	30% of patients die • (9% of all SAH patients)	50% have permanent deficits



Risk of Rebleeding and Vasospasm

Prevention of DCI - is it possible?

Fluids – no evidence prophylactic hypervolemia improves outcome

Ca^{++} antagonist

- Nimodipine 60mg 4 hourly 21 days
- Time sensitive, needs to be given regularly
- Must not miss more than 2 doses
- Decreases incidence of cerebral infarction by 34%

Mg Sulphate – hypo in 50% of SAH admissions and in patients with DIND

Medical Management of DCI

Only in secured aneurysms

Once other causes of deterioration ruled out

Ensure patient well oxygenated preferably paO_2>10 KPa

Medical Management of DCI

- Systolic augmentation 20% of normal
- up to 200mmHg
- Aim for euvolemia
- CT angiogram +/- intervention

Mr A Neuron Scenario 1

- After 3 days on Noradrenaline his weakness has resolved with a target systolic of 180mmHg (day 13 post SAH)
- What would be the next plan of care.

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Mr A Neuron

After 3 days on Noradrenaline his weakness has resolved with a target systolic of 180mmHg (day 13 post SAH)

What would be the next plan of care?

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What would be the next plan of care?

Reduce support of BP and watch neurological status

If remained well then wean and stop inotropes and plan to tolerate lower BP

Ensure not to try and raise EVD to see if EVD required at the same time as reducing inotropes, ? Know which came first in that situation.

References

- Rees, G et al (2002): Subarachnoid haemorrhage: a clinical overview. *Nursing Standard* 16, 42; 47-54
- Dooling E and Winkelman C (2004): Hyponatraemia in the patient with Subarachnoid haemorrhage. Journal of Neuroscience Nursing 36(3) 130-135