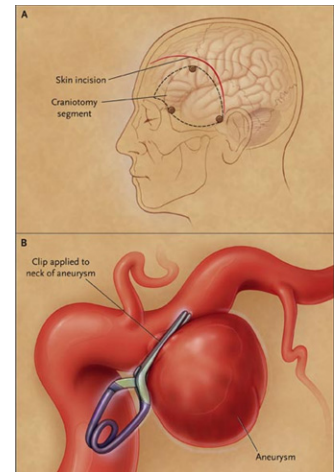


ANTERIOR CIRCULATION ANEURYSMS AND SURGICAL CONSIDERATIONS



INTRODUCTION

- Incidence of aneurysm difficult to estimate
- Prevalence 0.2-7.9 %
- Half of the aneurysms ruptures
- Incidence of aneurysmal rupture is 6-12 / 100,000

van Gijn J, Rinkel GJ. Subarachnoid hemorrhage: diagnosis, causes and management.

Brain 2001;124(Pt 2):249–78.



INTRODUCTION

- Overall mortality at 6 months: 40% - 50%
- 15% of patients expire before reaching the hospital
- 25% die within 24 hours
- Only one third of those who survive have functional independent lives.

Hop JW, Rinkel GJ, Algra A, et al. Case-fatality rates and functional outcome after subarachnoid hemorrhage: a systematic review. Stroke 1997;28: 660–4.

- Rebleed has a catastrophic morbidity : 48% to 78%
- **Treatment of a ruptured aneurysm: imperative.**

Jane JA, Winn HR, Richardson AE. The natural history of intracranial aneurysms: rebleeding rates during the acute and long term period and implication for surgical management. Clin Neurosurg 1977; 24:176–84.



ANTERIOR CIRCULATION ANEURYSMS

- 86.5%
 - Acom (30%)
 - Pcom(25%)
 - MCA bifurcation (20%).
 - ICA bifurcation (7.5%)
 - Pericallosal / callosomarginal artery bifurcation (4%)



CLINICAL PRESENTATION

- Major rupture
 - SAH
 - ICH
 - IVH
 - Subdural blood
- Mass effect- cranial nerve palsy:
 - 3rd nerve in PCOM
 - Chiasmal syndrome - ophthalmic, Acom
- Cranial neuropathy- giant aneurysm compressing brainstem
- Endocrine disturbance: sellar and suprasellar



CLINICAL PRESENTATION

- Worst headache of life
- Meningeal irritation
- LOC at the ictus
- Seizures in acute phase
- Focal neurologic abnormalities (25%) :
hemiparesis, aphasia, hemineglect, cranial nerve palsies, memory loss



CLINICAL PRESENTATION

- Ocular haemorrhages (20-40%)
- Hypertension
- Temperature elevation
- Tachycardia



SAH WORK-UP : CT SCAN

- Sensitivity decreases with respect to increased time from ictus:
 - 95% within the first 48 hours
 - 80% at 72 hours
 - 50% at 1 week
- **Intraparenchymal hemorrhage** may occur with MCA and PCOM aneurysms
- **Interhemispheric and intraventricular hemorrhages** may occur with ACOM aneurysms
- Outcome is worse for patients with extensive clots in basal cisterns than for those with a thin diffuse hemorrhage
- Helps rule out HCP
- Falsely negative
 - Small hemorrhages
 - Severe anemia



SAH WORK-UP : DSA

- **Gold standard** :80-85% sensitivity
- Surgical information:
 - Cerebrovascular anatomy, aneurysm location & source of bleeding
 - Aneurysm size/shape/orientation of dome and neck
 - Relation to the parent/perforating arteries
- If negative (10-20%): repeat test 3-4 weeks later
- May be useful to evaluate for possible cerebral vasospasm
- 3-D reconstruction: invaluable-
 - dome-to-neck ratio
 - parent artery or branch orientation to neck
 - enhances surgical view for clip placement and vessel reconstruction



SAH WORK-UP : CTA

- Reported to detect aneurysms larger than 3 mm
- Sensitivity of 95% and 83% specificity.
- Provide sufficient anatomic detail especially **relation to nearby bony structure.**



SAH WORK-UP: MRA

- Can detect aneurysms >3 mm with 86% sensitivity
- Useful
 - Monitoring the status of small, un ruptured aneurysms
 - Evaluate the degree of **intramural thrombus** in giant aneurysms
 - Screening high risk patients: including 1st degree relative of patients with IC aneurysm
- False +ve 16%



UN-RUPTURED ANEURYSMS: WHY TREATMENT

- Risk of SAH is 0.05-6 % each year
- 50 % rupture : fatal
- Increase in size >1 cm increases the risk 11 fold

ISUIA trial. N Engl J Med 1998;339:1725-33



TIMING OF SURGERY

- Anterior circulation: **early surgery has good results.**

Haley EC jr et al the international cooperative study on the timing of aneurysm surgery; the north American experience.

Stroke 23:205-214;1992



ISAT TRIAL (LANCET 2005;360:1267-75)

- Prospective, randomized, controlled trial
- N = 2143 (ruptured intracranial aneurysms)
- The safety of endovascular coiling compared with clipping
- Mortality or disability was 30.6 Vs 23.7 in surgical and endovascular group at one year (p=0.0019)
 - survival free of disability at 1 year is significantly better with coiling
- Relative and absolute risk reduction in dependency or death is 22.6 vs 6.9 % in surgical and endovascular group
 - coiling is more likely to result in independent survival at 1 year than clipping; the benefit continues for at least 7 years
- Risk of rebleed was higher in endovascular group at one year



SURGICAL APPROACHES (ACA AND ACOM)

- Pterional craniotomy
 - usual approach
- Subfrontal approach
 - useful for superiorly pointing aneurysm when there is a large amount of frontal blood clot
- Anterior interhemispheric approach
 - contraindicated for anteriorly pointing aneurysms as the dome is approached first
- Trancallosal approach



PTERIONAL CRANIOTOMY (GOLD STANDARD)

Disadvantages:

- Temporalis muscle wasting
- Significant retraction on frontal lobe
- Need to open the sylvian fissure, which may be difficult in some case (Fischer grade III & IV)



CHOICE OF SIDE OF THE CRANIOTOMY

- A right Pterional craniotomy is used with the following **exceptions**:
 - Large ACom aneurysm pointing to the right
 - Dominant left A1 feeder to aneurysm (with no filling from the right A1)
 - Additional left sided aneurysm



OPERATIVE APPROACH (DACA)

- Right anterior frontal Parasagittal craniotomy for the interhemispheric approach



OPERATIVE APPROACH (MCA)

Lateral trans-sylvian approach

- For the **unruptured and uncomplicated MCA bifurcation aneurysm**
- Exposes the dome first

Medial trans-sylvian approach

- For patients with **short M1 segment, aneurysm arises from the proximal M1 trunk or have a complicated configuration with increased risk of rupture**

Superior temporal Gyrus approach

- Advocated by Heros;
- For **aneurysms A/W ICH**
- The aneurysm is exposed through the hematoma cavity in the sup temporal gyrus



INTRACAVERNOUS AND PARACLINOID ANEURYSM

3 types:

- Cavernous segment
- Clinoidal segment
- Ophthalmic segment

- Female : male = 9:1
- 5-6 th decade
- incidental lesions/
mass effect
- multiplicity

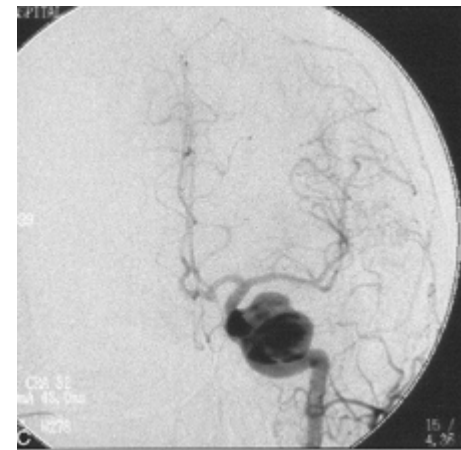
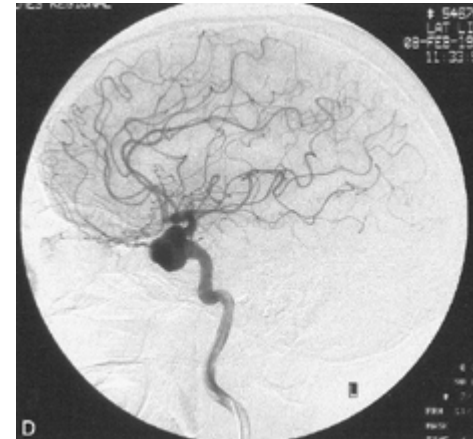


Anterior circulation aneurysm



CAVERNOUS SEGMENT ANEURYSM:

- Most clinically significant aneurysms arise from the horizontal segment and project forward and laterally toward the SOF below the ACP
- cavernous sinus syndrome
- Life threatening risks are rare



Anterior circulation aneurysm



CLINOIDAL SEGMENT ANEURYSM:

Anterolateral variant (can resemble ophthalmic artery aneurysm):

- erode ACP
- **Monocular visual loss**
- Large ones can compress optic chiasm

Medial variant (can resemble superior Hypophyseal artery aneurysm):

- Enlargement into the pituitary fossa **Hypopituitarism**, may simulate Pituitary apoplexy, epistaxis.



OPHTHALMIC SEGMENT ANEURYSM:

Ophthalmic artery aneurysm

- Project dorsally compressing the Optic nerve
- **Monocular nasal field defect** is produced due to superolateral compression of ON against falciform ligament

Superior Hypophyseal artery aneurysm

- Arise from the inferomedial surface, burrow inferiorly below the diaphragm sella, expanding the carotid cave k/a parasellar variant
- Suprasellar variant has secondary suprasellar extension

Dorsal variant

- Ophthalmic segment aneurysm



OPERATIVE TECHNIQUES

- Proximal control is obtained at the cervical ICA before craniotomy for the giant or complicated aneurysms or for ruptured clinoid segment lesions.



COMPLICATIONS OF PARACLINOID ANEURYSM SURGERY

- Delayed ICA stenosis or thrombosis
- Visual deterioration
- III,IV, VI and miosis
- CSF rhinorrhea



PCOM ANEURYSM

- 50% of the ICA aneurysm
- Females
- SAH with a lateral suprasellar and ambient cistern pattern
- Intraparenchymal haemorrhage into the uncus of the temporal lobe, intraventricular haemorrhage into the temporal horn or haemorrhage into the subdural space can also occur
- Non pupil sparing oculomotor palsy



ICA BIFURCATION ANEURYSM

- SAH
- May present with intraparenchymal haemorrhage into the basal ganglia **simulating the hypertensive bleed**
- May enlarge to giant size and compress the optic apparatus



THANK YOU

