Unruptured Brain AVMs: To Treat or Not?
Aim of AVM management

The goal of treatment of arteriovenous malformations is to eliminate risk of intracerebral haemorrhage and to preserve functional status.
18 Y/O ataxia
hemiparesis
Lower cranial nerves
dysfunctions
headache
18 Y/O
Ataxic gait
headache
42 Y/O
Epilepsy
headache
37 Y/O
Uncontrolled epilepsy
Headache
Field defect
Surgical Management of Unruptured Intracranial AVM

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AVM

Vascular abnormality constituted by a complex, tangled web of afferent arteries and draining veins linked by an abnormal dysplastic intervening capillary bed
AVM-Presentations

- Hemorrhage (50%)
- Seizure
- Mass effect
- Ischemia; steal phenomenon
- Headache
- Asymptomatic
AVM-Hemorrhage

- Peak age: 15-20 y/o
- 10 % mortality; 30-50% morbidity
- ICH(80%)/IVH/SAH
- Risk of hemorrhage:
  - High feeding a. pressure/V. outflow obstruction/
  - AVM Size/Location/Aneurysm/ Pregnancy
Annual & Lifetime risk of Hemorrhage

• Lifelong risk of bleeding: 2-4% per yr
• A study of 166 symptomatic AVMs with 24 year follow-up found the risk of major bleeding was constant at 4% per year, independent of whether the AVM presented with or without hemorrhage
  1
• The AVM Study Group:
  Annual rate of rehemorrhage was 18% among pt who had hemorrhage at presentation; 2% among pt with no history of bleeding (306 cases)
• Rebleeding rate significantly lower than aneurysm

Treatment

• Multidisciplinary approach
• Primary goal: decrease the risk of bleeding

1) Surgery: Definitive
2) Stereotactastic Radiosurgery (SRS):
   high-risk for surgery
3) Embolization: Definitive or adjunct to 1) & 2)
American Stroke Association recommends:

• Low grade ( I & II )- surgery alone
• Higher grade(>III)- Embolization before surgery

• Eliminates risk of bleeding immediately, seizure controls improves
• Invasive, risk of surgery
Surgical principles

- Wide Craniotomy
- Dural opening
- Identify the borders
- Cautery of feeding arteries
- Deep dissection of the nidus
- Securing the ventricle
- Obliterate the draining veins
- Final removal of AVM
- Post-resection BP challenge (Hemostasis/ Residual nidus/ Areas prone to NPPB)
- Immediate post-op/ Peri-op angiography
Intraoperative monitoring

- **ICG-VA** (Indocyanine Green-Video Angiography).
- Intraoperative Angiogram
- Neuronavigation
- SSEP, MEP, EEG
- Dopplar flowmetry
- Intraoperative thermography
- Intraoperative cerebral blood flow measurement
- Intraoperative MRI and MRI
- Intraoperative CTA
Post-op Deterioration and prevention

- Normal Perfusion Pressure Breakthrough
  post-op swelling or hemorrhage
  loss of autoregulation?
  Prevention: prevent post-op hypertension

- Occlusive Hyperemia
  immediate: obstruction of venous outflow
  delayed: venous or sinus thrombosis
  Prevention: adequate post-op hydration

- Rebleeding from a retained nidus

- Seizures
KFMC Experience

• 210 AVM patients (8 years)
• 100 unruptured
• 70 surgeries (25 for unruptured AVMs).
• One death after emolization of unruptured posterior fossa AVM
• Still continuing the study
Case 1:

- 18 Y/O
- Ataxic gait
- headache
- Management??
18 Y/O
Ataxic gait
headache
Case 2:

• 37 Y/O
• Uncontrolled epilepsy
• Headache
• Field defect
• Management??
37 Y/O
Uncontrolled epilepsy
Headache
Field defect
Conclusions

• AVM management needs Multidisciplinary team approach and centralization of care.

• Surgery of AVM requires:
  • Risk-benefit analysis (natural history, surgical risks and complications)
  • Careful preoperative planning
  • Meticulous surgical techniques
  • Vigilant postoperative care
Thank You