CRANIOTOMY BASICS

PROF. V. G. RAMESH
MCh, DNB(GS), DNB(NS), FRCS(Glasg), FICS,
PROFESSOR OF NEUROSURGERY
CHETTINAD HOSPITAL & RESEARCH INSTITUTE
CHENNAI
• Principles of 3 point fixation
• Principles of Scalp flaps
• Basic craniotomy types
• Dural opening
• Closure
• Bicoronal/Souttar flap
• Frontal flap
• Temporal flap
• Pterional (fronto-temporal) flap
• Fronto-temporo-parietal (question mark) flap
• Horse shoe skin flap
• Occipital skin (Mitre) flap
• Midline suboccipital incision
• Retromastoid skin incision
PRINCIPLES OF 3 POINT FIXATION

• Proper and safe application of a three-point rigid cranial fixation device provides immobilization of the skull in a secure fashion without interfering with incision.

• It begins with firm placement of the two-point swivel arm before engaging a contralateral single pin.

• Avoid critical neurovascular structures (superficial temporal artery, supraorbital artery and nerve, occipital artery), areas of thin bone (temporal squamosa), and regions with underlying venous structures (transverse and sigmoid sinuses)
PRINCIPLES OF 3 POINT FIXATION

“Falling into the pins”
PRINCIPLES OF 3 POINT FIXATION

• Pin pressure for adults 60 to 80 lbs

• Pin pressure for children 30 to 40 lbs

• Avoid using pins in children less than 3 years of age
PRINCIPLES OF SCALP FLAPS

PLAN:

• Position of lesion
• Position of important structures
• Contingency plan for enlarging incision
• Obtain adequate closure
PRINCIPLES OF SCALP FLAPS

• Adequate exposure of the lesion
• Based on at least two named arteries
• Length not more than 1.5 times base of flap
• Good cosmetic result (Incisions within the hairline)
• No cross incisions
TAYLOR HAUGHTON LINES

- Central sulcus
- Sylvian fissure
- Frankfurt Plane
- Posterior ear line
- Condylar line

Measurements:
- 1/2 cm
- 2 cm
- 3/4 cm
BASIC CRANIOTOMY TYPES

• Flap craniotomy
  – Pedicled (Osteoplastic) flap
  – Free bone flap

• Trephine craniotomy
PRINCIPLES OF BONE FLAP

• Centred over/shortest access to the lesion
• Number of burr holes varies – whether Hudson brace/craniotome is used.
• Underlying dura carefully separated
• The flap should have beveling effect to avoid sinking of bone flap
PRINCIPLES OF BONE FLAP

• The cuts along / across venous sinuses should be done last

• Dural hitch/tack up stitches to control epidural bleeding (before dural opening)

• Air sinuses/air cells, when opened should be cored off the mucosa and packed with gelfoam and waxed and covered with pericranial flap.
DURAL OPENING

• Dural flap based towards venous sinuses.
• Opened with sharp hook and knife
• Further opening with dural scissors
• Lift up the dura well away from brain
• Place cottonoid before opening
• Leave a cuff of dura along the bone edges for suturing
CLOSURE

• Watertight but lax dural closure. Use pericranial/fascial graft if required.
• Dural hitch stitches
• Bone flap replacement and fixation
• Two layer skin closure
BICORONAL/SOUTTAR FLAP
BICORONAL/SOUTTAR FLAP

• Large exposures of anterior cranial fossa and sella.
• Fronto-temporal lesions and cranial base.
• Superior to zygomatic arch, 1 cm anterior to tragus—extends over the bregma to the corresponding site on the opposite side.
• Reflect up to orbit rim.
• Supraorbital/trochlear vessels.
BICORONAL/SOUTTAR FLAP

- Holes placed on either sides of sagittal sinus and intervening bone is removed with ronguers or drill.
- Either removed as single piece or two separate frontal flaps
FRONTAL FLAP

• Exposes anterior frontal lobe
• Begins along coronal suture and curves anteriorly along the midline preferably ending at the hair line.
TEMPORAL FLAP
TEMPORAL FLAP

• For anterior temporal and subtemporal access.

• Based on zygoma, goes behind the ear, extends anteriorly just above the superior temporal line up to the hair line.
FRONTO-TEMPORAL (PTERIONAL) FLAP
FRONTO-TEMPORAL (PTERIONAL) BONE FLAP

- Temporalis muscle dissected or reflected.
- Bone flap centered over the pterion.
- Key burr hole, frontal burr hole, posterior burr hole, last burr hole just above the zygoma.
- Bone removed from the inferior temporal squama.
- Sphenoid ridge drilled.
- Dural flap based on the orbit.
QUESTION MARK SKIN FLAP
(TRAUMA FLAP)
QUESTION MARK SKIN FLAP (TRAUMA FLAP)

• Cranial trauma, malignant MCA infarct
• Exposes major part of the hemisphere.
• Based on zygoma.
• Blood supply from superficial temporal and supra orbital vessels.
• Curves around 3.5 cm posterior to external auditory meatus.
• Anterior limb extends to hair line.
HORSE SHOE SKIN FLAP
HORSE SHOE SKIN FLAP

• Can be used to expose any part of cerebral convexity

• Inverted ‘U’ shape with the base on the vascular supply
MITRE SKIN FLAP

![Diagram of the Mitre Skin Flap]

- Mitre flap
- U-shaped horseshoe incision
- Inion
- Hockey-stick incision
- Retromastoid curvilinear incision
MITRE SKIN FLAP

• Occipital lobe, posterior falx and superior tentorial surface.

• Vertical limb: Inion to vertex.

• Anterior limb falls over posterior parietal region towards the ear.

• Blood supply from the occipital artery.
MIDLINE SUBOCcipital CRANIECTOMY

- Midline cerebellar, fourth ventricular, brainstem lesions.
- Prone position.
- Incision: EOP to C2.
MIDLINE SUBOCCIPITAL CRANIECTOMY
RETROMASTOID CRANIECTOMY
RETROMASTOID CRANIECTOMY

- Vertical Incision 1 cm medial to mastoid.
- ‘Lazy S’ incision.
- Inverted ‘J’/Hockey stick incision.
CONCLUSION

• Craniotomy flap should be designed according to the site of lesion.
• Pre-operative planning with the images and the type of surgery and surgical approach is essential
• Knowledge about the position of normal anatomical structures in relation to the exposure is necessary.
THANK YOU!