Operative approaches to lateral and third ventricular tumors

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Velum interpositum

- Located in the roof of third ventricle

- Formed by two membranous layers

- Contains two paired internal cerebral veins and its tributaries
Lateral ventricular tumors

• Confined to ventricles
  – Neurocytoma
  – Colloid cyst
  – Choroid plexus papilloma

• Extending into the parenchyma
  – Astrocytoma
  – Ependymoma
  – ODG
Key features

• Craniotomy flap placed so as to minimize brain retraction.

• Self retaining rather than handheld retractor

• Minimum Neural incision
• Internal debulking of tumor before separation.

• Preservation of arteries

• Minimal sacrifice of veins

• CSF diversion
Frontal horn tumors

• Interhemispheric transcallosal approach

• Transcortical approach
Transcallosal approach

• Indications:

  – Frontal horn tumors located mainly in the ventricle.

  – Minimal hydrocephalus

  – Tumor extending to both frontal horns and to third ventricle
Positioning and craniotomy

• Supine position

• Lateral position
  – Ipsilateral approach
  – Contralateral approach

• Craniotomy
  – Cross midline
  – 2/3rd anterior and 1/3rd posterior to coronal suture
Surgical technique

• Reflect dura based on sinus

• Identify bridging veins and preserve

• Identify corpus callosum and ACAs

• Callosotomy
Intraventricular orientation

• Choroid plexus and thalamostriate veins

• Foramen of monro

• Tumor identification

• Resection of tumor as internal debulking followed by dissection.
Complications

• Vascular injury
  – Arachanoid granulations
  – Bridging veins
  – ACAs

• Corpus callosal syndrome
  – Reduced spontaneity of speech to frank mutism.
  – Interhemispheric transfer syndromes
Advantages

• Less chances of Neural injury

• Access to both ventricles

• Less chances of epilepsy (?)

• Entry to third ventricle easy if required
Disadvantages

• More chances of Vascular injury

• Theoretical risks of callosotomy

• Superiorly located tumors are generally can not be tackled.
Transcortical approach

• Indication:
  – Tumor growing outside the ventricle
  – Tumor located mainly in anterio-superiorly in frontal horn
  – Non-dominant hemisphere
  – Surgeons preference
Positioning and craniotomy

- Principles followed are same
- Corticectomy in middle frontal gyrus
- Entry in ventricle
- Tumor debulking and dissection
Complications

• Epilepsy
  – Direct cortical incision and damage

• Memory loss
  – Retraction of caudate nucleus.

• Hemiplegia
  – Retraction of centralis semiovalis
Disadvantages

• More chances of epilepsy and porencephalic cysts

• Limited entry to opposite ventricles

• Small ventricles- chances of missing
Tumors involving the body

• Transcallosal approach is better

• Combined transcallosal and transcortical approach is needed for large tumors involving both ventricles
Atrial tumors

• Transcortical approach is favored.

• Lateral decubitus position with face turned towards the floor

• Superior lobule is identified

• 1-2 cm corticectomy
Why transcortical approach preferred?

• Ventricles diverge posteriorly

• Splenium sacrifice has physiological risks

• PCA injury is more common
Complications

• Speech problems
  – Acalculia, apraxia

• Visual field deficits
  – Homonymous hemianopia
  – Visual spatial processing

• Splenium syndrome
  – Interhemisphere disconnection syndrome
Additional approaches

• Approach through occipital pole incision

• Occipital lobectomy
  – Cortical incision placed in sup. occipital gyrus
  – Invariably lead to visual field deficits
Temporal horn tumors

- Supine with head turned almost laterally.
- Small temporal craniotomy
- Dura opened based on base
Entry corridors to ventricle

- Middle gyrus approach
- Temporal tip resection
- Occipitotemporal gyrus resection
- Temporo-parietal junction
Complications

– Visual field deficits
  • Superior quadrantanopia

– Language deficits

– Others
  • Dyslexia
  • Agraphia
  • Acalculia
Third ventricular tumors

- Tumors growing inside out
- Tumors growing outside in
Approach to Ant. TV tumors

- Subfrontal
- Frontotemporal
- Anterior transcallosal
- Anterior transcortical
- Transsphenoidal
Subfrontal approach

• Supine position with head extension
• Coronal flap incision
• Quadrangular craniotomy flush with orbital margins
• Frontal sinus exteriorized and packed
• Olfactory nerve divided if necessary
Corridors

- Interoptic
- Opticocarotid
- Lamina terminalis
- Transfrontal- transsphenoidal
- Lamina terminalis-rostrum of callosum approach
Frontotemporal or subtemporal approach

- Frontotemporal craniotomy

- Dura reflected on sphenoid ridge

- Tumor approached through corridor between third nerve and carotid.

- Temporal pole can be elevated or resected.
Anterior transcallosal approach

- Advantages
  - Short trajectory to third ventricle
  - Can access posterior and basal TV
  - Bilateral exposure of foramina of monro
  - No requirement of ventriculomegaly
Maneuvers for TV entry

• transforaminal

• Transchoroidal

• Transfornicial
Transforaminal

• Gives access to anterior TV

• Foramen of monro identified

• Initial dilatation can be tried

• Incision is made through one column of fornix at anteriosuperior edge.
Transchoroidal

• Entry into the middle of TV

• Opening through the velum interpositum

• Two approaches:
  – Suprachoroidal
    • Incision in tinea fornia
  – Subchoroidal
    • Incision in teniea choroidea
Transfornicial

• Identify the septum pellucidum

• Develop a plane between septa.

• Incision is given in the body of fornix not exceeding 2 cm behind the FM.
• In both the approaches velum interpositum is opened.

• The interval between two internal cerebral veins is separated and entered.

• Minor veins can be sacrificed.
• Tumors can be decompressed as stated earlier

• Complete hemostasis is mandatory

• Post operative cavity drain can be kept
Complications

• Fornicial injury
  – Recent memory disturbances

• Vascular compromise
  – Basal ganglia infarcts
  – Thalamic infarcts
  – Limbic system ischemia

• Hippocampal syndrome
Approaches to the post TV tumors

• Transventricular

• Interhemispheric transcallosal

• Occipital transtentorial

• Infratentorial suprarcerebellar
Indications

• Transventricular (Wegen’s)
  – Tumors arising in corpus callosum and extending to third ventricle

• Transcallosal (Dandy’s)
  – Tumor extending to splenium
• Occipital- transtentorial (Popen’s)
  – Tumor extending to medial wall of ventricle and in occipital lobe

• Supracerebellar infratentorial (krause’s)
  – Pineal region tumors
Endoscopy

• Treatment of choice for malignant third ventricular tumors

• Biopsy of lesion

• Post operative radiotherapy
Technique

• Selection of burr hole point

• Advancement of scope

• Biopsy using endoscopic instrument
Disadvantages

• Two dimensional vision

• Less freedom of movements
Complications

• Inadequacy of hemostasis

• Conversion of procedure to open
Image guidance

• Recent development

• Useful for biopsy

• Anatomical orientation
Thank you