

Pineal Region Meningioma Surgery

Pineal region meningiomas are rare, deep-seated tumors that present significant surgical challenges due to the surrounding critical neurovascular anatomy.

□ Anatomical Considerations

The pineal region is bordered by vital structures:

- Deep venous system:
 - Internal cerebral veins
 - Vein of Galen
 - Basal veins of Rosenthal
- Brainstem (especially the tectal plate - superior colliculi)
- Thalami and splenium of corpus callosum
- Aqueduct of Sylvius (obstructive hydrocephalus risk)
- Tentorial incisura and straight sinus

□ Indications for Surgery

Surgical intervention is indicated when:

- The tumor causes symptoms (e.g. hydrocephalus, Parinaud's syndrome, headaches, ataxia)
- There is progressive growth or mass effect
- Histological diagnosis is required
- The lesion is deemed operable with acceptable risk

□ Surgical Approaches

Main approaches depending on tumor location and venous anatomy:

- **Occipital transtentorial approach (OTA)**
 - Suitable for tumors above the vein of Galen
 - Wide surgical corridor
 - Risk: occipital lobe retraction → visual field deficits
- **Supracerebellar infratentorial approach (SCITA)**
 - Ideal for lesions below the vein of Galen
 - Less cortical manipulation
 - Patient usually in sitting or park-bench position
- **Interhemispheric transcallosal or parietal transventricular**
 - Less common
 - Used for tumors extending into lateral ventricles

⚠ Surgical Risks

- Injury to deep veins (especially vein of Galen or internal cerebral veins) → potentially fatal
- Persistent or worsened hydrocephalus
- Visual impairment from retraction or ischemia
- Brainstem injury → ataxia, gaze palsy

📋 Postoperative Management

- Monitor neurological status and signs of hydrocephalus
- Early postoperative MRI for resection control
- Temporary or permanent CSF diversion (EVD or VP shunt) if needed
- Histological diagnosis (typically WHO Grade I meningioma)

Tip: Detailed preoperative planning with venous imaging (MRV or DSA) is essential to avoid injuring the deep venous system.

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