Tumor Debulking

Definition

Tumor debulking is a surgical technique that involves partial removal of a tumor mass to reduce intracranial pressure, relieve symptoms, or facilitate further treatment (e.g., radiotherapy, chemotherapy). It is typically employed when complete resection is unsafe or impossible due to tumor infiltration of critical neurovascular structures.

Objectives

- **Reduce tumor volume**
- **Improve neurological function**
- Facilitate **adjuvant therapies**
- Minimize **mass effect** and **edema**
- Allow better access for future staged resections

⚙ Technique Overview

- Exposure of tumor via appropriate surgical approach (e.g., pterional_craniotomy, midline_suboccipital).
- **Capsulotomy**: opening the tumor capsule with sharp or bipolar dissection.
- **Internal decompression**:
  - Debulking begins at the tumor center.
  - Use of **ultrasonic aspirator** (e.g., CUSA), suction, and microdissectors.
- **Subcapsular or subpial dissection** at the margins if safe.
- Preservation of adjacent **eloquent cortex**, **cranial nerves**, and **vessels**.

Indications

- High-grade gliomas (e.g., glioblastoma multiforme)
- Large meningiomas with dural sinus involvement
- Vestibular schwannomas encasing the facial nerve
- Craniopharyngiomas with hypothalamic adherence
- Any tumor in eloquent areas where gross-total resection is unsafe

⚠ Considerations

- Debulking must be **strategic**, avoiding uncontrolled collapse of residual capsule (risk of vascular injury)
- Beware of **infiltrative margins** (e.g., gliomas)
- Hemostasis should be meticulous, especially in vascular tumors (e.g., hemangioblastomas)

- Consider **preoperative embolization** in hypervascular tumors

Advantages

- Symptom relief without high morbidity
- Shortens postoperative recovery
- Preserves neurological function
- Enables multimodal treatment planning

Limitations

- Residual tumor may regrow
- Requires **accurate intraoperative judgment**
- May lead to overestimation of resection on imaging if cavity collapses

References

- Yasargil MG. `Microneurosurgery`. Volumes I–IV. Thieme.
- Berger MS. `Surgical management of gliomas in eloquent cortex`. Clin Neurosurg, 2001.
- Duffau H. `Surgery of low-grade gliomas: towards a 'functional neurooncology'`. Curr Opin Oncol. 2009.