

Subpial Dissection

□ Definition

Subpial dissection is a microsurgical technique in which the surgeon operates beneath the pia mater, maintaining it as a protective membrane between the surgical field and the underlying brain cortex. This approach allows lesion removal or exposure of deep structures while minimizing cortical injury and preserving vascular integrity.

⚙ Surgical Technique

- Identify the **pial surface** under high magnification.
- Incise the **pia mater sharply** using a microknife or fine bipolar forceps.
- Continue dissection **beneath the pia**, using gentle suction and blunt dissection tools.
- The pia is kept **intact over the brain parenchyma**, and the dissection proceeds **between the pia and the lesion or arachnoid**.
- Achieve meticulous **hemostasis** using bipolar coagulation at the pial edge, avoiding direct cortical coagulation.

□ Indications and Applications

- **Tumor surgery**: low-grade gliomas, meningiomas invading the cortex
- **Vascular lesions**: AVMs, cortical aneurysms
- **Access to deep structures**:
 - Transsylvian approach
 - Transcortical approach
 - Transplanum-transpolfar approaches (endonasal)
- **Epilepsy surgery**: selective amygdalohippocampectomy, disconnections

□ Advantages

- Preserves **cortical and vascular integrity**
- Reduces risk of **neurological deficits**
- Minimizes **postoperative seizures**
- Allows **safe retraction and exposure** of eloquent areas

⚠ Risks and Considerations

- Risk of damaging **subpial vessels** (possible infarcts)
- Infiltrative or inflammatory lesions may **obscure the subpial plane**
- Requires **microsurgical precision** and excellent visualization

□ Key Anatomical Notes

- The **pia mater** contains pial vessels and marks the outermost layer of the cortex.
- Subpial dissection preserves **arachnoid and vascular layers** while accessing lesions directly beneath the cortical surface.

□ References

- Yasargil MG. Microneurosurgery. Volumes I-IV. Thieme.
- Berger MS, Hadjipanayis CG. Surgical techniques for infiltrating gliomas. Surg Neurol. 2007.
- Spetzler RF, et al. Use of subpial planes in eloquent cortex surgery. Neurosurgery. 1992.

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