

# Transsulcal Approach

The **transsulcal (TS) approach** is a surgical technique that utilizes the natural sulci (grooves) of the brain to access deep-seated lesions. It is particularly employed in minimally invasive procedures, such as **Minimally Invasive Parafascicular Surgery (MIPS)**, to reduce brain tissue damage by navigating along anatomical pathways instead of traversing through gyri (ridges).

## Key Features

- 1. Natural Pathway Access:**
  - Utilizes sulci as natural corridors to minimize disruption to white matter tracts and cortical regions.
  - Reduces the need for large craniotomies and extensive brain retraction.
- 2. Surgical Tools:**
  - Incorporates tubular retractors (e.g., **BrainPath® system**) to create controlled access paths.
- 3. Visualization:**
  - High-resolution endoscopy or exoscopic systems for enhanced field visualization.
- 4. Navigation:**
  - Advanced neuronavigation ensures precise targeting of deep-seated lesions.

## Advantages

- 1. Minimized Cortical Damage:**
  - Reduces unnecessary disruption to functional brain tissue.
- 2. Reduced Risk of Neurological Deficits:**
  - Preservation of critical brain areas results in better motor and sensory outcomes.
- 3. Shorter Recovery Time:**
  - Reduced surgical trauma often translates to quicker recovery and shorter hospital stays.
- 4. Improved Motor Outcomes:**
  - Studies indicate superior postoperative motor improvement with the transsulcal approach compared to alternatives like the transgyral approach.

## Applications

The transsulcal approach is particularly suited for:

- 1. Tumor Resection:**
  - Deep-seated gliomas, metastases, and other neoplasms.
- 2. Intracerebral Hemorrhage (ICH):**
  - Evacuation of hematomas in locations such as the thalamus or basal ganglia.
- 3. Cyst Drainage:**
  - For symptomatic relief or biopsy of deep cystic lesions.
- 4. Functional Neurosurgery:**

- Access to deep brain structures for electrode placement or biopsies.

## Challenges

1. **Steep Learning Curve:**
  - Requires advanced training in imaging, navigation, and use of tubular retractors.
2. **Limited Visualization in Narrow Corridors:**
  - The narrow surgical pathway can restrict the field of view and maneuverability.
3. **Patient Selection:**
  - Suitability depends on lesion size, location, and preoperative condition.

## Comparison with Transgyral Approach

Aspect	Transsulcal Approach	Transgyral Approach
Access Route	Natural sulci	Through gyri
Tissue Disruption	Minimal	Moderate
Motor Outcomes	Better in specific locations (e.g., parietal lobe)	Slightly inferior
Hospital Stay	Shorter	Longer
Temporal Lobe	Higher risk of ischemic changes	Safer for this region

## Conclusion

The **transsulcal approach** is a cornerstone of minimally invasive neurosurgery, offering safer and more efficient outcomes for deep brain lesions when applied correctly. It represents a significant advancement in reducing surgical morbidity while maintaining effective lesion resection.

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