Transgyral Approach

- Diffusion changes in minimally invasive parafascicular approach for deep-seated tumours: impact on clinical outcomes
- Eloquent noneloquence: redefinition of cortical eloquence based on outcomes of superficial cerebral cavernous malformation resection
- A taxonomy for superficial cerebral cavernous malformations: subtypes of cortical and subcortical lesions
- Quantifying sulcal and gyral topography in relation to deep seated and ventricular lesions: cadaveric study for basing surgical approaches and review of literature
- Purely subcortical tumors in eloquent areas: awake surgery and cortical and subcortical electrical stimulation (CSES) ensure safe and effective surgery
- Supratentorial cavernomas in eloquent brain areas: application of neuronavigation and functional MRI in operative planning

The **transgyral (TG) approach** is a surgical technique that involves creating an access route through the gyri (ridges) of the brain to reach deep-seated lesions. It is an alternative to the **transsulcal approach** in minimally invasive procedures and is particularly useful in cases where navigating sulci poses a higher risk or is anatomically unsuitable.

Key Features

1. **Direct Access Through Gyri**:
    - Involves dissecting through the brain's gyri to establish a pathway to the lesion.
    - Preferred when sulci are not viable or accessible for surgical entry.
2. **Surgical Tools**:
    - Utilizes tubular retractors for controlled and safe displacement of tissue.
3. **Visualization**:
    - Incorporates high-resolution endoscopy or exoscopic systems for enhanced visualization.
4. **Navigation**:
    - Advanced neuronavigation ensures accurate targeting of the lesion.

Advantages

1. **Suitability for Temporal Lobe Lesions**:
    - Safer for temporal lobe surgeries due to lower susceptibility to ischemic changes in critical areas like the superior temporal sulcus.
2. **Flexibility**:
    - Can be adapted to various brain regions where sulcal anatomy is not favorable for a transsulcal approach.
3. **Controlled Tissue Displacement**:
    - Use of retractors minimizes collateral damage while providing a clear surgical corridor.

Applications

The transgyral approach is particularly suited for:

1. **Temporal Lobe Tumors**:
    - Especially when the superior temporal sulcus is at risk of ischemic changes.
2. **Deep-Seated Tumors**:
    - When sulci-based corridors are not optimal.
3. **Complex Brain Anatomy**:
    - Lesions in regions where sulci are not well-defined or are obstructed by tumor growth.

Challenges

1. **Increased Cortical Disruption**:
    - Greater potential for tissue damage compared to the transsulcal approach.
2. **Longer Recovery Time**:
    - Due to higher tissue disruption, recovery may take longer.
3. **Patient Selection**:
    - Careful consideration of tumor location and surrounding anatomy is essential.
4. **Limited Use in Functional Areas**:
    - Not ideal for lesions near eloquent areas due to increased risk of neurological deficits.

Comparison with Transsulcal Approach

Aspect	**Transsulcal Approach**	**Transgyral Approach**
Access Route	Natural sulci	Through gyri
Tissue Disruption	Minimal	Moderate to high
Motor Outcomes	Better in specific regions (e.g., parietal lobe)	Adequate, but slightly inferior
Hospital Stay	Shorter	Longer
Temporal Lobe	Higher ischemic risk in superior temporal sulcus	Safer option for temporal lesions

Conclusion

The **transgyral approach** serves as a valuable alternative in cases where the transsulcal approach is not feasible or poses a higher risk. It is particularly advantageous for temporal lobe lesions and offers flexibility in accessing deep-seated pathologies. However, careful patient selection and surgical planning are critical to optimize outcomes and minimize complications.

Single-center retrospective cohort studies

The impact of surgical approach-transsulcal approach (TS) versus transgyral approach (TG) - and respective entry points in clinical and imaging outcomes was assessed. 82 patients (35 male; 47 female, average age 43.94 ± 22.85 years) were included. 84% presented with neurological deficit and glioblastoma was the commonest diagnosis (38.24%). Surgical approach was not relevant for the number of patients that showed postoperative peritubular injury (TS: 20 (37.74%) versus TG: 8 (27.59%), p = 0.354) or its volume (TS: 0.95 ± 1.82 cc versus TG: 0.43 ± 1.32 cc, p = 0.1435). When adjusted for preoperative volume and depth of tumour, TS approach was associated with less diffusion restriction (p = 0.030). Temporal lobe access points had the highest volume of diffusion restriction (temporal lobe-2.50 ± 3.54 cc versus frontal lobe - 1.15 ± 1.53 versus parietal lobe-0.51 ± 0.91 cc, p = 0.0096), particularly in the TS approach (p = 0.0152). Superior motor outcomes were demonstrated in the TS versus the TG approach (postoperative improvement: TS: 14.63% versus TG: 6.9%, p = 0.015), especially for parietal approaches (p = 0.039). TS approach was related with a significantly decreased length of stay (TS-11.67 ± 14.19 days versus TG - 23.97 ± 18.01 days, p = 0.001). Transsulcal approach demonstrated a better motor outcome profile, particularly in parietal lobe, and shorter length of stay. The superior temporal sulcus was more susceptible to ischaemic changes. Therefore, transgyral route can be considered in temporal lobe MIPS [1)]

The study demonstrates the advantages of the transsulcal approach in specific contexts, particularly in improving motor outcomes and reducing hospital stay. However, the findings on temporal lobe ischemia caution against its indiscriminate use. While the TS approach appears to be superior for parietal and frontal lobe surgeries, the TG approach might still have a role in temporal lobe cases. Future research should address the study's limitations by including larger, more balanced cohorts, long-term outcomes, and a broader range of pathologies. Furthermore, functional assessments should accompany imaging findings to better understand their clinical significance.

1)
Awan M, Elshalakany A, Kalaitzoglou D, Kalyal N, Sinha S, Perera A, Wroe Wright O, Gallagher MJ, Richardson D, Elhag A, Marchi F, Abougamil A, Silva M, Oviedova A, Patel S, Mirallave-Pescador A, Diaz-Baamonde A, Bleil C, Zebian B, Gullan R, Ashkan K, Vergani F, Bhangoo R, Lavrador JP. Diffusion changes in minimally invasive parafascicular approach for deep-seated tumours: impact on clinical outcomes. Neurosurg Rev. 2025 Jan 18;48(1):63. doi: 10.1007/s10143-024-03160-y. PMID: 39826028.