Transorbital Transsylvian Selective Amygdalohippocampectomy

- Transorbital Transsylvian Selective Amygdalohippocampectomy: A Feasibility Anatomic Investigation

Definition: A targeted removal of the amygdala and hippocampus using a minimal-access route through the orbit and Sylvian fissure, avoiding wide cortical resections. Typically performed for drug-resistant medial temporal lobe epilepsy.

Components of the Term

- **Transorbital**:
  1. “Trans-” = through or across
  2. “Orbital” = related to the orbit (eye socket)
  3. → Refers to using a minimal orbital route or superior orbital surface for access.
- **Transsylvian**:

1. “Trans-” = through
2. “Sylvian” = Sylvian fissure (separating frontal and temporal lobes)
3. → Microsurgical corridor through the Sylvian fissure to reach the medial temporal lobe.

- **Selective Amygdalohippocampectomy**:
  1. “Selective” = targeting only specific parts (not whole lobe removal)
  2. “Amygdala + Hippocampus” = medial temporal structures
  3. → Removes only the amygdala and hippocampus to preserve surrounding cortex.

Summary

- Minimal cortical disruption
- Preservation of language and memory functions
- Technically demanding
- Applied mainly for medial temporal lobe epilepsy

Compared to Traditional Approaches

Feature	Traditional Temporal Lobectomy	Transorbital Transsylvian Selective Amygdalohippocampectomy
Extent of Resection	Wide (neocortex + mesial structures)	Focused (only amygdala and hippocampus)
Approach	Lateral temporal cortex resection	Through Sylvian fissure, minimal cortical incision
Cognitive outcomes	Higher risk of deficits	Better preservation of function (potentially)

Feature	Traditional Temporal Lobectomy	Transorbital Transsylvian Selective Amygdalohippocampectomy
Surgical complexity	Moderate	High (requires advanced microsurgical skills)

Several neurosurgical techniques have been developed to treat mesial temporal lobe epilepsy, the most common form of drug-resistant epilepsy. Although surgical treatment for mesial temporal lobe epilepsy has proven to be highly effective in controlling seizures and improving patients' quality of life, it carries potential risk to critical neurovascular structures, which can result in significant complications. With the advent of endoscopic techniques, the transorbital route has emerged as a potential alternative for mesial temporal lobe surgery. This study aims to assess the feasibility, potential advantages, and disadvantages of the transorbital transsylvian selective amygdalohippocampectomy (TTSA) and to provide a step-by-step anatomic description of this approach.

A TTSA was performed on three injected cadaveric specimens (six sides). Computer tomography and MRI scans were performed before and after each dissection to demonstrate the extent of amygdalohippocampectomy. Neuronavigation was used to identify the optimal trajectory and the position of intra-axial structures, including the amygdala and hippocampus. For each side, a TTSA was performed and all the anatomic landmarks verified from the standard transcranial perspective through a frontotemporal craniotomy.

The dissection procedure was organized into four sequential steps: (1) the extradural approach, (2) identification and opening of the sylvian fissure, (3) identification and removal of the amygdala, and (4) identification and removal of the hippocampus and parahippocampal gyrus. The intradural steps were performed by the technique described by Yasargil. Furthermore, a unique and educational comparison between the transorbital anatomic view and the related standard transcranial perspective was provided.

The described technique represents an innovative and feasible approach for amygdalohippocampectomy, achieving comparable surgical resection with traditional open surgery in cadaveric specimens, with potential advantages for neurological and neuropsychological outcomes. However, clinical series and further studies are imperative to validate these findings [1)].

This study by Jiang et al. provides a thought-provoking and technically sophisticated exploration of a new route for selective amygdalohippocampectomy, demonstrating its anatomic feasibility. The potential benefits of reduced cortical disruption and better functional outcomes are compelling, but the lack of clinical validation is a significant limitation. Future prospective clinical trials are essential to evaluate the safety, efficacy, and neuropsychological impact of the TTSA approach before it can be recommended in routine practice.

1)

Jiang T, Manfrellotti R, Tafuto R, Roldan P, Fava A, di Russo P, Villa B, de Notaris M, Esposito V, Prats-Galino A, Di Somma A, Enseñat J. Transorbital Transsylvian Selective Amygdalohippocampectomy: A Feasibility Anatomic Investigation. Oper Neurosurg (Hagerstown). 2025 Apr 28. doi: 10.1227/ons.0000000000001600. Epub ahead of print. PMID: 40293836.