

Keyhole Temporal Lobectomy: Minimally Invasive Surgery for Medically Refractory Temporal Lobe Epilepsy

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Abstract

Introduction: Temporal lobe epilepsy (TLE) remains the most common form of focal epilepsy in adults. While traditional anterior temporal lobectomy (ATL) is effective, it often involves larger craniotomies and associated morbidity. Minimally invasive alternatives, such as keyhole temporal lobectomy (KTL), aim to reduce operative trauma while maintaining seizure control rates. This study evaluates the safety, efficacy, and functional outcomes of KTL in comparison to standard ATL.

Method: We conducted a prospective analysis of 100 patients undergoing KTL for drug-resistant TLE between 2017–2025. All surgeries were performed via a 2 cm mini-temporal approach, using microroscopic visualization. Preoperative evaluation included video-EEG, MRI, and neuropsychological testing. Primary outcomes included seizure freedom (Engel classification), cognitive function, operative time, hospital stay, and complication rates.

Results: Seizure outcomes: At 12 months, 85 % of patients achieved Engel Class I outcomes, comparable to traditional ATL series.

Discussion: Our findings suggest that KTL provides seizure outcomes comparable to standard ATL, with notable advantages in terms of recovery time, cosmetic satisfaction, and neurocognitive preservation. The use of neuronavigation allows for precise mesial resection through a limited corridor. This approach may be particularly valuable in young or professionally active patients, where minimizing neuropsychological sequelae and downtime is critical. Further randomized comparisons with open approaches are warranted to validate these findings across larger cohorts.

Conclusions: Keyhole temporal lobectomy is a safe and effective alternative to traditional ATL in selected patients

with TLE. It offers comparable seizure outcomes with reduced hospital stay, minimal cognitive morbidity, and improved cosmetic and recovery profiles. KTL represents a valuable addition to the minimally invasive epilepsy surgery armamentarium.

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