

Anterior Temporal Lobectomy Compared with Laser Thermal Hippocampectomy for Mesial Temporal Epilepsy: A ThresholdAnalysis Study

Mark Attiah BA; Danika Paulo; Shabbar F. Danish MD; Sherman C. Stein MD; Ram Mani MD

Perelman School of Medicine and Department of Neurosurgery, University of Pennsylvania, Philadelphia PA

Rutgers – Robert Wood Johnson Medical School, Piscataway NJ

Introduction

Anterior temporal lobectomy (ATL) is the gold standard surgical treatment for refractory temporal lobe epilepsy.

ATL carries risks associated with invasiveness, including cognitive decline and damage to eloquent structures.

Laser thermal hippocampectomy (LTH) offers a less invasive alternative to the standard open approach.

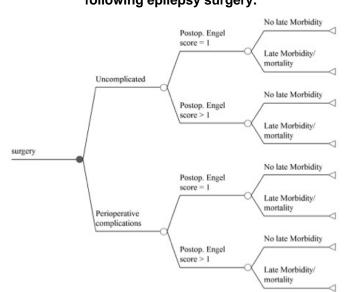
In this decision analysis, we determine the success rate at which LTH would be equivalent to ATL.

Methods

MEDLINE searches were performed for studies of ATL. Using complication and success rates from the literature, we constructed a decision analysis model for ATL and LTH. Utility values for the various outcomes & complications after ATL and LTH were extracted from literature examining patient preferences in similar clinical conditions.

We performed a sensitivity analysis in which major parameters were systematically varied wihin their 95% CIs.

Diagram of decision tree outlining possible outcomes following epilepsy surgery.



An operation may or may not be followed by perioperative complications. On follow-up, epilepsy may be well-controlled (Engel Class I), or scores > 1 may ensue. Finally, there may or may not be late onset morbidity or mortality.

Results

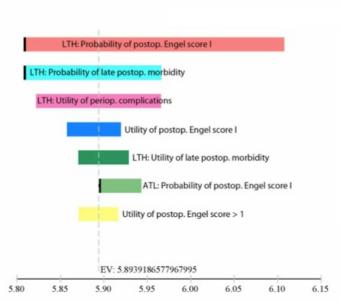
350 studies involving 25,144 cases of ATL were included. Outcomes of LTH were taken from a multicenter series of 68 cases

Late results (probability of seizure control and late morbidity) of LTH are most likely to affect outcomes relative to ATL.

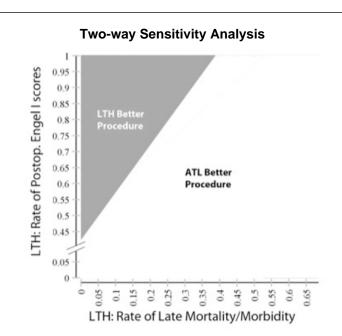
If LTH results in fewer than 43% of Engel class I outcomes, then it is inferior to ATL.

If LTH late mortality/morbidity is greater than 40% then it is inferior to ATL regardless of seizure control.

One-way Sensitivity Analysis



One-way sensitivity analysis. Each parameter is systematically varied within reasonable extremes to gauge its impact on the outcome of LTH. The expected value (EV) of LTH under baseline parameter values is approximately 5.894 QALYs (vertical dashed line). Parameters are placed in the diagram in descending order of impact, giving the diagram the appearance of a tornado.



The two parameters with the greatest impact on outcome, probabilities of LTH success and late morbidity, are varied simultaneously. Under circumstances where both values fall within the gray area, LTH can be said to be the superior procedure. On the other hand, values intersecting within the white area suggest ATL to be the superior operation. As shown, if LTH results in fewer than 43% of cases in Engel Class I, it cannot compete with ATL. Similarly, if LTH late mortality/morbidity exceeds 40%, it cannot compete with ATL, regardless of its success in controlling seizures.

Conclusions

Our results suggest that LTH has a similar utility to ATL. LTH is a promising and less invasive alternative to ATL in refractory temporal lobe epilepsy.

LTH utility may remain comparable to ATL even if long-term seizure control is less than that of ATL.