

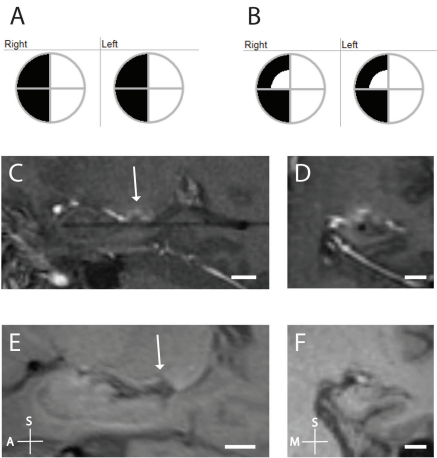
Homonymous Hemianopsia as a Complication From Laser Interstitial Thermal Therapy for Mesiotemporal Epilepsy

Walter J Jermakowicz MD PhD; Michael E. Ivan MD MBS; Ramses Ribot MD; Bruno Wieckowski; Naymee Velez-Ruiz MD; Enrique Serrano MD; Andres Kanner MD; Jonathan R. Jagid MD
University of Miami Miller School of Medicine

Introduction

Laser interstitial thermal therapy (LITT) is a novel tool that is quickly emerging as a mainstream therapy for temporal lobe epilepsy (TLE). We present the case of a 24-year-old male who developed homonymous hemianopsia as a result of LITT for TLE. Detailed anatomical comparisons are provided between this patient and 17 prior TLE patients treated with LITT at our institution in an attempt to better-understand this complication.

Homonymous hemianopsia after LITT for TLE.

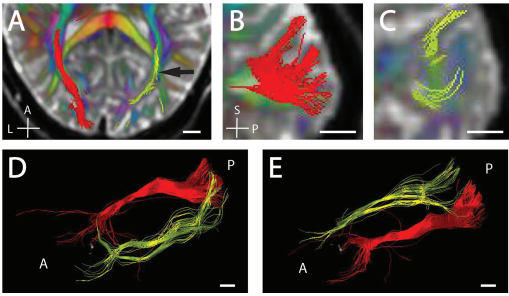


Visual fields measured by an ophthalmologist at two weeks (A) and five months (B) post-op showing improvement of visual function in the central right superior quadrant. (C and D) Sagittal and Axial contrasted T1 MRI sequences, respectively, with 2 mm cuts obtained at end of procedure, prior to removal of the laser catheter. (E and F) two months post-op MRIs

Methods

This is a retrospective chart review of all patients that have undergone LITT for TLE at our institution. Detailed volumetric tracings of mesial temporal lobe structures were performed for all patients using high-resolution pre- and post-op MRI scans. For all patients, volumes of hippocampus, amygdala, ablation zone and CSF dorsal to the hippocampus were calculated.

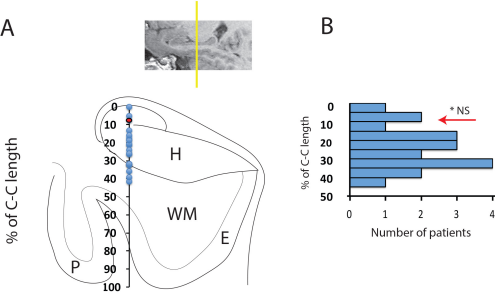
Diffusion tensor imaging (DTI) obtained at two months post-op



Results

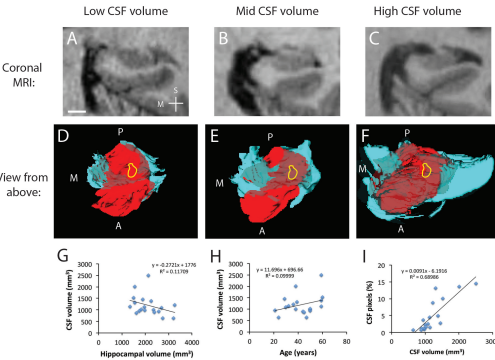
The 24-year old male woke up with a complete right-sided homonymous hemianopsia after LITT of left mesial temporal structures. By five months post-op he had partial recovery of vision in the central superior quadrant. MRI suggested inadvertent ablation of the lateral geniculate nucleus. The patient’s laser catheter was not positioned significantly higher on the cranio-caudal axis than in the prior patients. Similarly, ablation number, energy delivered and size were not significantly greater for this patient. However, the subject did have significantly choroidal fissure CSF volume compared to the prior patients.

Craniocaudal location of laser catheter at hippocampal body



(A) Scatter plot showing relative location of all 18 patients’ laser catheters along the craniocaudal axis. (B) Frequency histogram from (A).

Varying volumes of hippocampal formation and surrounding CSF

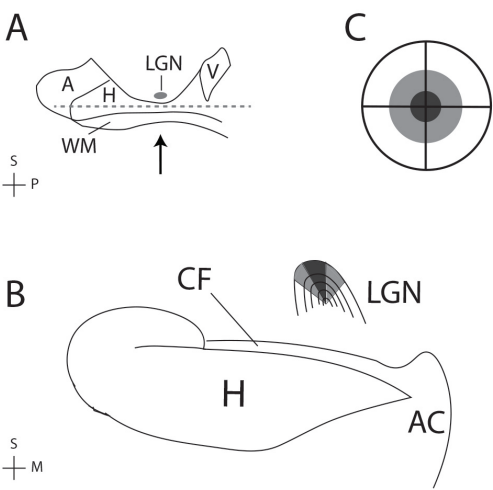


Typical coronal MP-RAGE slices at the hippocampal body for representative patients with low (A), middle (B) and high (C) CSF volumes, as determined from manual tracings of pre-op images. (D – F) Volumetric renderings from an antero-superior perspective of the hippocampus and CSF spaces above for the same low, mid, and high CSF volume patients.

Conclusions

Homonymous hemianopsia is a complication of LITT for TLE that patients with small CSF spaces dorsal to the hippocampus may be susceptible to. Our data suggest that inspection of these structures on pre-op MRI scans may help identify this subset of patients. When such anatomy is identified we recommend lowering laser catheter trajectory and decreasing ablation power through the hippocampal body and using additional temperature set points at the lower thalamic border.

Avoiding thalamic ablation in another patient with small choroidal fissure



Learning Objectives

- 1) Describe the relevance of surrounding CSF spaces during LITT
- 2) Know which patients are susceptible to visual deficits after LITT
- 3) Describe precautions that can be taken to avoid visual deficits