

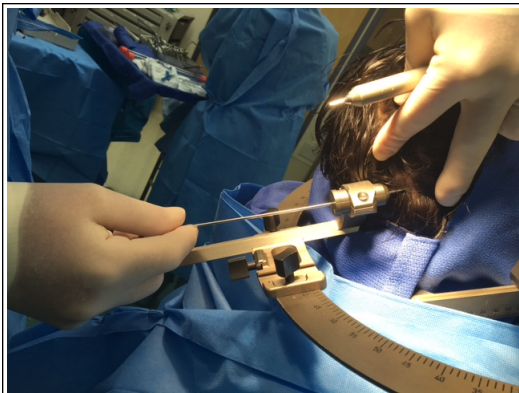
Insular Depth Electrode in Pediatric Frontotemporal Epilepsy

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Introduction

It has been increasingly recognized that the insular cortex plays an important role in fronto-temporal epilepsy (FTE) in children. The insula however cannot properly be monitored with conventional subdural grids, and open surgical resection of the insula is technically difficult and often associated with significant morbidity.

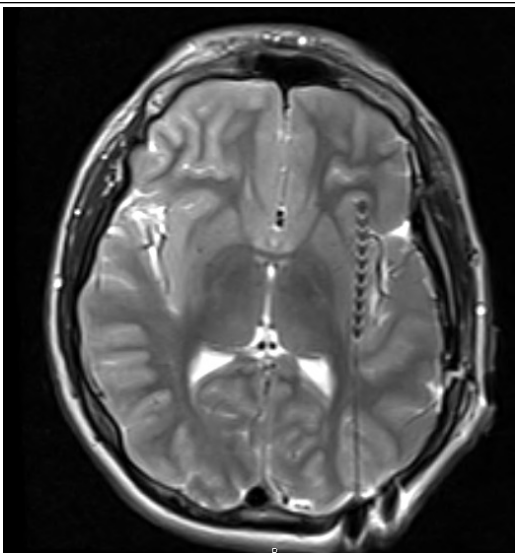
Stereotactically-placed insular depth electrodes allow direct and comprehensive monitoring of this region, and can easily be replaced with a laser applicator for minimally-invasive treatment via thermo-ablation.



Stereotactic, frame-guided creation of insular tract

Methods

We used CPT billing records dating from January 2010 to the present day to identify all the cases of depth electrode insertion performed at Dell Children's Medical Center (Austin, TX). Electronic medical records were then analyzed to specifically identify the cases in which insular depth electrodes were utilized and determine the indications for placement as well as the outcomes and complications.



Axial MRI after insertion of left-sided insular depth electrode



Sagittal MRI showing "double-barrel" insular depth electrodes for comprehensive coverage

Results

Of 140 depth electrodes placed in 81 patients, 73 depth electrodes were inserted into the insular cortex in 52 different patients. In 37/52 (71%) of these cases, insular involvement prompted thermoablation or surgical resection of some portion of the insula. There were no serious adverse effects or complications associated with the placement of insular depth electrodes. Indications for insular depth electrode insertion included subtle thickening of the insular cortex on imaging, suggestion of insular involvement based on EEG or semiology, and/or MEG dipole clustering in the insular region.

Conclusions

Given the low morbidity and comprehensive coverage attainable with two posteriorly placed depth electrodes, it is worth considering whether insular depth electrodes should be part of the standard presurgical evaluation in every pediatric patient with partial, non-lesional, fronto-temporal epilepsy.



Occipital entry site for placement of insular electrode.

Learning Objectives

- 1) Consider the various potential indications for insular depth electrode placement.
- 2) Consider the role of thermoablation for insular and fronto-temporal epilepsy.

References

- 1) Nguyen DK et al. Revisiting the role of the insula in refractory partial epilepsy. *Epilepsia* 2008.
- 2) Ryvlin P et al. Nocturnal hypermotor seizures suggesting frontal lobe epilepsy can arise in the insula. *Epilepsia* 2006