Intracranial Magnetic Resonance Guided Laser Induced Thermal Therapy (MRgLITT): Single Center Experience in Patients with Epilepsy

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Introduction

Magnetic Resonance Guided Laser Induced Thermal Therapy (MRgLITT) has been progressing to successfully treat a large and expanding number of neurosurgical conditions including pathologies such as epilepsy. We report our single-center experience in 21 patients with epilepsy.

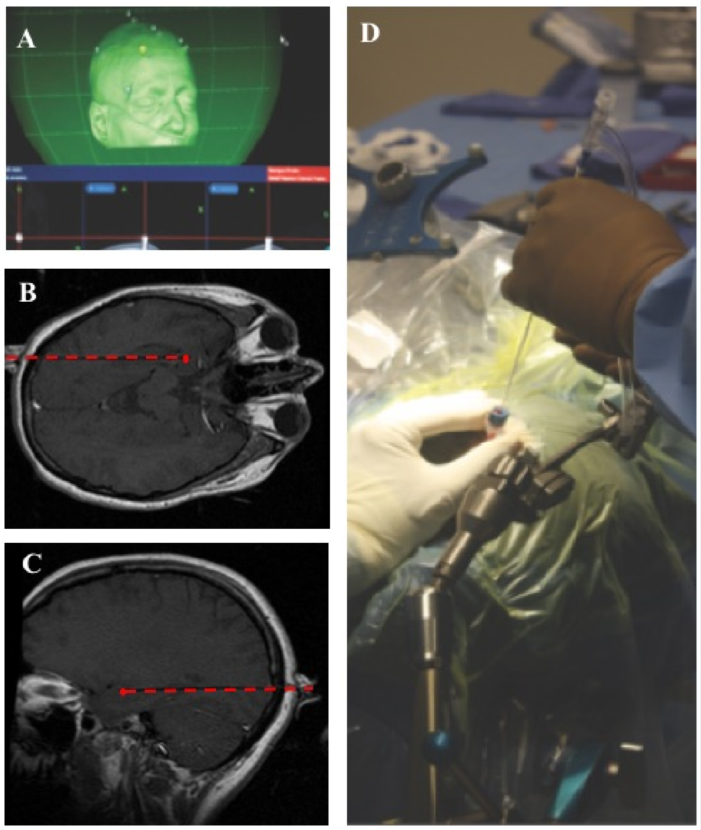

Figure 1. Stereotactic Planning and Laser Catheter Insertion
a. The surgical navigation system creates a three-dimensional view by fusing preoperative CT and MRI images. A trajectory is planned for laser ablation, while ensuring no blood vessels or major brain tissue are involved. The planned trajectory (in red) is shown from the site of insertion through the scalp to the ablation site in axial (b) and sagittal (c) views. d. With the Mayfield clamp placed in position and an incision made, a laser catheter is inserted through the planned trajectory.

Methods

A retrospective analysis was performed of all patients with epilepsy undergoing MRgLITT from 2011 to 2015. Pathologies included temporal lobe epilepsy with and without mesial temporal sclerosis, cavernoma, hamartoma, ganglioglioma and frontal epileptic focus. Laser catheters were stereotactically placed and ablation was performed in the MRI suite. Demographics, operative parameters, and hospital stay were recorded. Analysis also included review for any complications or readmissions following the procedure.

Table 1. Demographics of the 21 Patients

Age (years)		
Mean	35.3	
Range	2.8-62	
Gender		
Female	11	52.4%
Male	10	47.6%
Diagnosis		
Temporal Lobe Epilepsy with Mesial Temporal Sclerosis	5	23.8%
Temporal Lobe Epilepsy without Mesial Temporal Sclerosis	9	42.9%
Frontal Epileptic Focus	1	4.8%
Cavernoma	4	19.0%
Hamartoma	1	4.8%
Ganglioglioma	1	4.8%
Prior Therapies Attempted		
Pharmacotherapy	21	100%
Open resection	2	9.5%
Prior MRgLITT	2	9.5%

Table 2. Average Operative Parameters (in min)

Prep Time	37.5 ± 11.87 (20)
OR Time	35.5 ± 10.12 (20)
Transfer Time	41.5 ± 10.27 (20)
Time in MRI Suite	35.5 ± 10.25 (20)
Laser Ablation Time	5.9 ± 3.3 (22)
Total Operative Time	150 ± 25.8 (12)

Results

22 lasers were placed in 21 patients requiring intervention for epilepsy after other means of treatment had been exhausted. 100% of patients completed the procedure. Total procedural time was 150±25.8 min and laser on-time was 5.9 ±3.3 min. Average ICU and total hospital stay were 0.7 and 1.1 days, respectively, and the median stay for both ICU and hospital was 1 day. All patients were discharged home following procedure, none requiring discharge to rehabilitation facilities. There was a 0% complication rate. The 30-day readmission rate was 0%.

Conclusions

MRgLITT is a minimally invasive, safe procedure that can be used for the treatment of epilepsy. Our single center experience yielded no complications or readmissions secondary to the procedure and most patients were stable for discharge within 24 hours. MRgLITT's therapeutic role in epilepsy will require further, more extensive studies.

Learning Objectives

By the conclusion of this session, participants should be able to:
1) Understand the safety profile of MRgLITT in patients with epilepsy
2) Recognize MRgLITT as a potential treatment option for epilepsy

References

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