MRI–GUIDED LASER ABLATION

(MRgLITT-MR-guided laser induced thermotherapy)

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THERMAL THERAPY (SURGERY)

- Process of optimally defining a target volume using diagnostic imaging techniques and then destroying all the tissue cells within the target volume by inducing a localized temperature change in the target volume only
  - Heat
  - Freezing
    - US
    - MR
BACKGROUND

- Visualase
- Small 980 nm diode laser
  Integrated to MR
- Software: real-time
  thermometry, prediction
  model and control features
- Lase Applicator
- Saline cooled 1.65 mm in
diameter
- FDA approved 2010
ADVANTAGES

• Most procedures are completed in less time as compared to open procedures
• Most patients have little or no hair removed
• Minimal sutures required, typically a 1-stitch suture
• Most patients are discharged after a shorter stay as compared to open procedures
• Reduced scarring compared to open procedures
• Since the procedure is guided by MRI images, it can be more precise than conventional surgery.
• The small size of the applicator enables safe access to deep seated and surgically inoperable tumors.
ADVANTAGES

• Recovery times, hospital stays, and complications are typically reduced due to the minimally invasive nature of the procedure. It does not interfere with or disrupt other treatments.

• Because the laser procedure delivers no (ionizing) radiation, the procedure can be repeated multiple times - there are no dose limitations.

• Can be performed with patient wide awake.

• Entry site heals quickly with minimal scarring.

• Does not limit use of other treatment options.
• Thermal laser ablation is performed through a small "nick" scalp incision and hole in the skull — about the width of a coffee stir stick. A typical standard epilepsy surgery has an extensive scalp incision and large cranial opening. The treatment and recovery time with thermal laser ablation is also dramatically faster. The actual thermal laser ablation treatment time takes several minutes; set-up time and laser fiber placement can take three to four hours. The majority of patients spend one night in the hospital and are discharged the following day. In the event that the procedure fails to completely treat a patient’s epilepsy, repeated treatments are equally straightforward and well tolerated.
RISK

• Inaccurate placement of the laser is a potential risk and therefore injury to fragile or sensitive structures nearby is possible.
• Risks of bleeding and infection
• Laser knowledge
PROCEDURE

• Technique, a laser fiber is guided toward the source of a patient's seizures through a small hole in the skull. The laser heats and destroys the small, well-defined area of abnormal brain tissue, leaving the surrounding tissue unharmed. The entire procedure is viewed in real time on MR images that show thermal maps displaying the distribution of heat to ensure safety and successful target treatment.
PROCEDURE

• The actual laser ablation treatment time is on the order of minutes. Set-up time and laser fiber placement can be 3-4 hours.
• The majority of patients spend one night in the hospital and are discharged the following day.
VIDEO

• https://www.youtube.com/watch?v=okpWbBVhZVE
LASER ABLATION TREATMENT APPLICATIONS

• Laser Ablation Treatment Applications
• Epilepsy
• Brain tumors
  • Astrocytoma
  • Ependymoma
  • Glioblastoma
  • Meningioma
  • Schwannoma
  • Metastatic brain tumors
• Primary and metastatic spinal tumor
APPLICATION

• Seizure
BRAIN TUMORS
CONCLUSION

• Minimally invasive technique
• Opportunity for patients who can not undergo surgery
• Real time monitoring