Can Less Achieve More?
Selective Approaches to MTLE Surgery
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Learning Objectives

• To understand the surgical anatomy of the temporal lobe, with particular emphasis on white matter pathways.

• To understand the potential advantages of selective mesial temporal resection strategies over “standard” anterior temporal lobectomy.
Evolution of the Multidisciplinary Team

- Neurosurgeon
- Neurologist
- Epilepsy Neurosurgeon
Epilepsy Surgery Goals: Balancing Risk and Benefit

• To remove the “epileptogenic zone”, maximizing the chance of seizure freedom, while minimizing risk to the patient.
Selective Mesial Temporal Surgery

• Patient must have mesial onset TLE
  – Hippocampal sclerosis, low grade tumor, ?FCD
• Patient must not have neocortical/lateral TLE
• ? Dominant TLE more favorable
• Can we preserve function yet retain seizure freedom?
• Functions at risk:
  – Visual fields (Meyer’s Loop)
  – Memory
  – Language: Visual and Auditory
Overview

• Temporal lobe surgical anatomy
  – Cortical vs. white matter/connectivity
• “Standard” resection versus SAH
• SAH techniques
• Future directions

Network disruption, high frequency oscillations, EOR hippocampus
Surgery: Above all else, do no harm

- A fool with a tool is still a fool!
- Brain anatomy: the key to safe surgery
Meyer’s Loop
Auditory versus visual naming in dominant TLE

-May explain naming decline following “standard” anterior temporal lobectomy

Hamberger et al., Neurology 2001
“Standard” Anteromesial Temporal Resection

Maximal medial temporal resection and minimal lateral temporal resection

Robert Goodman, CUMC/NYPH
Selective Amygdalo-Hippocampectomy (SAH)

- Linear incision
- Minimal hair shave
- Split temporalis, not lifted
- Minimal corticectomy
Different techniques for SAH
Subtemporal Approach

Hori et al, Neurosurgery, 2003

Courtesy A. Rhoton
Post-Op MRI Subtemporal Approach

Courtesy Kris Smith, BNI
Advantages of Selective Approach

• Cosmetics: linear incision, smaller opening
• Preservation of verbal memory (Smith, BNI; Miyamoto, NS, 2004)
• Less risk of Meyer’s Loop injury (Hori, NS, 2003; Thudium et al, NS 2010)
• Less risk to white matter connections
  – Particularly ILF; ? Language sparing
• Less risk to auditory, basal language sites
• No worsening of seizure outcome (in adults)
Engel Class I outcome (N=161)

Hemb, Palmini, et al, submitted
“Superselective” treatment: Gamma Knife
Lessons from Radiosurgery Pilot Trial

• Seizure-free rates are similar
• Potential benefits
  – Verbal memory in dominant hemisphere
  – Lower rate of psychological problems

Barbaro et al, Ann Neurol, 2009
Radiosurgery or Open Surgery for Epilepsy (ROSE Trial)

• Phase 3 trial comparing temporal lobectomy with radiosurgery – 13 sites in U.S.
• Randomized comparison of 234 cases
  – Avg 6 pts per yr per site
• Six years with primary aim seizure-freedom in third follow-up year
“Superselective” Treatment: Image Guided Laser Ablation

Courtesy Bob Gross, Emory; Visualase, Inc.
Ablation 1

Ablation 2

Pre-ablation T1

Combined Irreversible Damage Estimate

Post-ablation T1 with Contrast

Courtesy Bob Gross, Emory; Visualase, Inc.
Rebuttal
1. Just because we don’t know what the brain is doing does not mean we should remove it!

2. SAH is as effective and likely safer than ATL for MTLE/HS.

3. Subtemporal/basal SAH is technically more demanding.

4. Not all surgeons are equal. Results are only as good as your surgeon.
Known to be effective: why change?
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Impact on Clinical Care and Practice

• Better understanding of the surgical options for mesial onset temporal epilepsy.
• Better understanding of the surgical anatomy of the mesial temporal lobe.
• Better understanding of why selective mesial surgical approaches may be favorable in select patient populations.
• Better understanding of future surgical directions.