

Minimally Invasive Surgery for Brain Tumors

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CEDARS-SINAI MEDICAL CENTER.

Department of Neurosurgery

Goals of Brain Tumor Surgery



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- Tissue Diagnosis
- Alleviate Mass effect
- Reduce Swelling
- Restore CSF pathways
- "Cure"

Disadvantages of Traditional BT surgery CEDARS-SINAI MEDICAL CENTER.

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- Large exposures of cortex
 - Higher risk non-involved brain injury
 - Higher risk subdural and epidural hematoma
 - Higher risk osteomyelitis
 - More disfiguring
 - Greater blood loss
 - Longer recovery times

Goals of MIS Surgery for Brain Tumors CEDARS-SINAI MEDICAL CENTER.

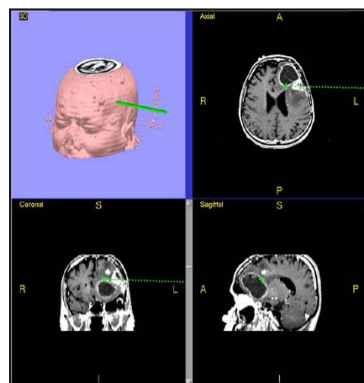
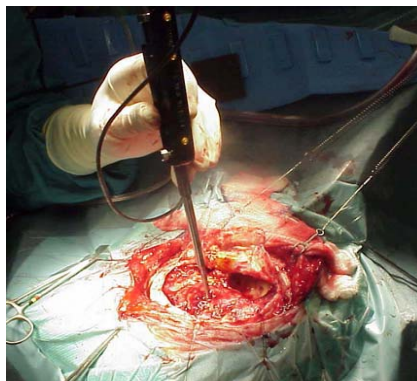
Department of Neurosurgery

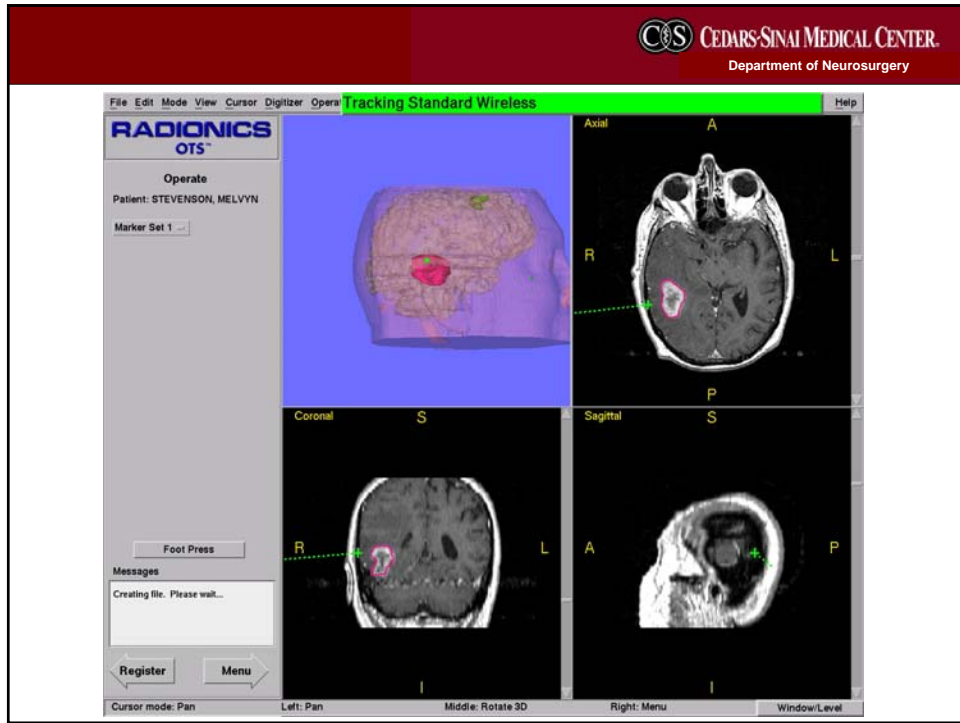
- Same end goals of traditional BT surgery PLUS:
 - Reduced morbidity from smaller openings
 - Reduced pain
 - Better cosmesis
 - Shorter hospital stays

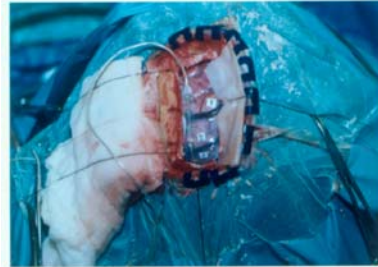
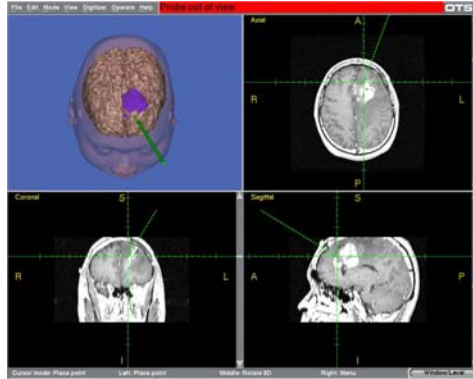
Guiding Principles of MIS

- Accurate localization
- “Keyhole” access
- Natural working space
 - Cisterns
 - CSF pathways
 - Bony caves
- MIS not applicable to every case

Accurate Localization: Image-Guided Neurosurgery

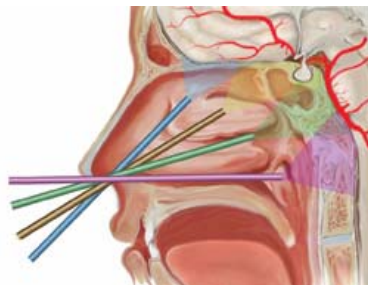


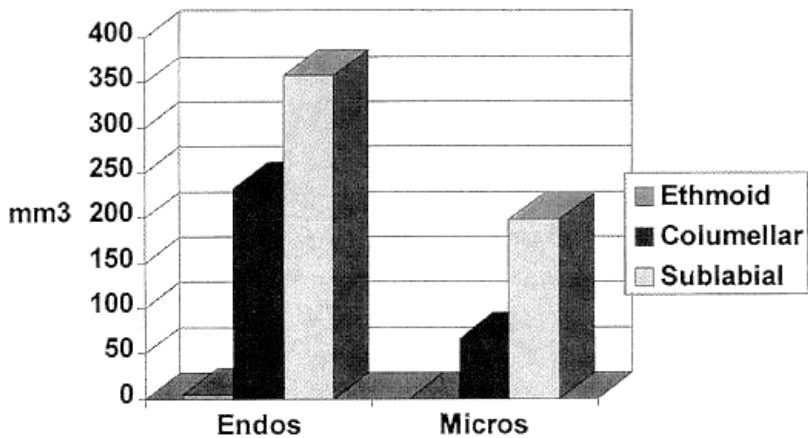




Results: Accurate localization so can rely on small craniotomy

**Endoscopy: Minimize the needed working space
and maximize field of view**





Spencer et al, Laryngoscope, 1999

A High-Definition Exoscope System for Neurosurgery and Other Microsurgical Disciplines: Preliminary Report

Adam N. Mamelak, MD, Moise Danielpour, MD,
Keith L. Black, MD, Masanobu Hagike, MD, and George Berci, MD

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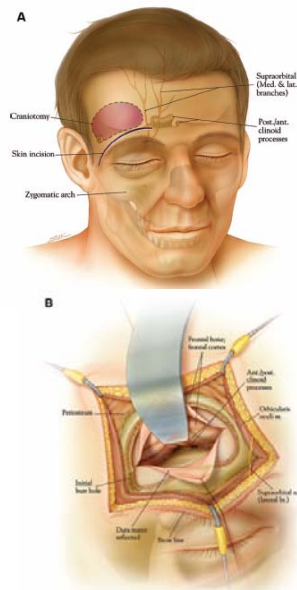


**Applications:
Common MIS Approaches**

- Supra-orbital eyebrow approach
- Intraventricular Endoscopy
- Endonasal Endoscopy

Supra-orbital Eyebrow Craniotomy

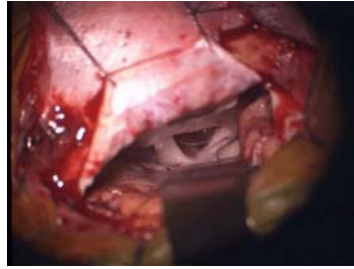
- Very small opening
- Eyebrow Incision
- Access to CSF cisterns
- Improved cosmesis
- Less post-op pain and craniotomy related complications
- Uses- Tumors of subfrontal and suprasellar area



Incision



Intraop



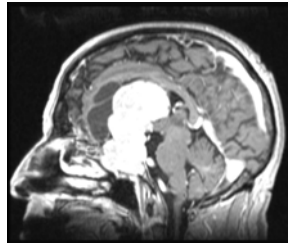
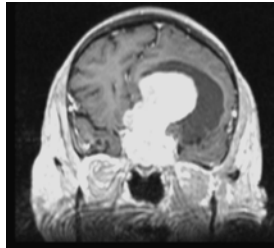
Craniotomy



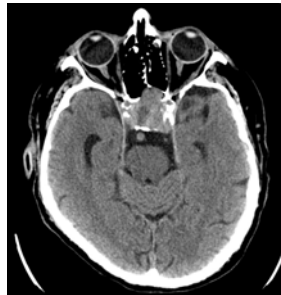
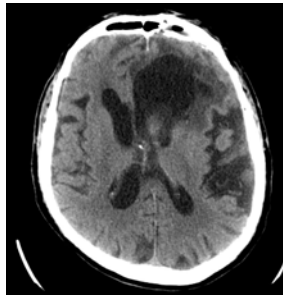
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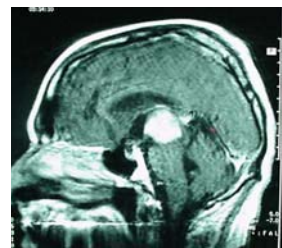
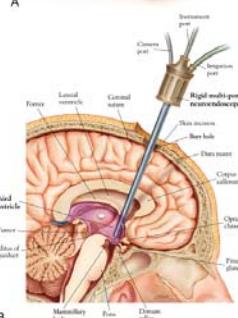
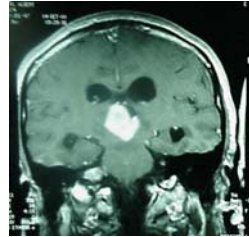
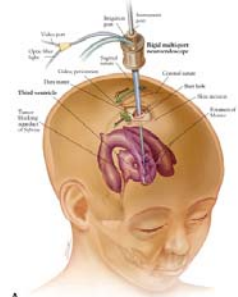


Pre-op



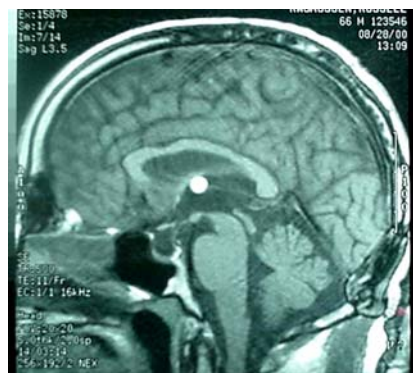
Post-op





- Hydrocephalus
- Intraventricular tumors
- Pineal gland biopsies

- Limits:
 - Bleeding
 - “In-line” instruments only
 - Limiting ability to angle



- Developed by ENT surgeons in 80s but not widely adapted by neurosurgeons
 - Lack of visualization
 - Fear of infection
 - Narrow working space
- Less tissue destruction
- Direct access
- Easier healing
- Less pain



- Utilize a rigid endoscope to illuminate and magnify in place of microscope
- Minimal disruption of nasal tissues
- Larger working room compared with traditional methods



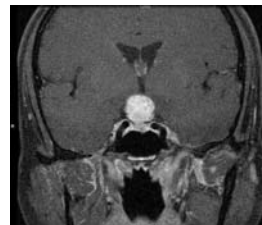
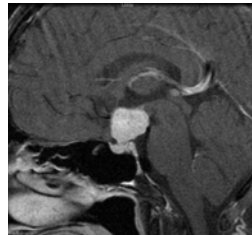
Endoscopic Endonasal Surgery

- Utilize a rigid endoscope in place of microscope
 - Minimal disruption of nasal tissues
 - Larger field of view
 - Shorter hospital stay
 - Greater patient comfort
 - Safe and maximal tumor removal
-
- Caveat: Requires comfort with endoscope

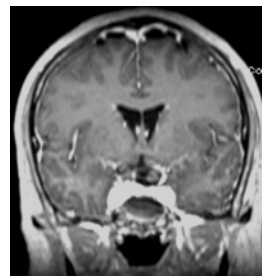
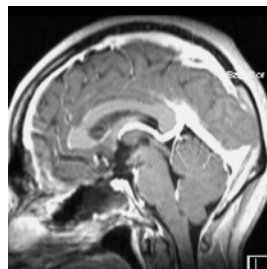


Extended Transsphenoidal Surgery: The Next Horizon

Pre-Op



Post-Op



Limits of MIS for the Brain

- Lack of Potential working Cavity
- Poor tolerance of brain to manipulation
- Functional Anatomy
- Limited number of “keyholes”
- Vascular control

Near Future Advances

- MRI Guided ablations
 - Visualase™
- 3D Endoscopy
 - VisionSense™
- Robotic Surgery
 - DaVinci™
- “Port” surgery via brain dialators

THANK YOU