

Overview of Brain Tumor Treatment: SURGERY

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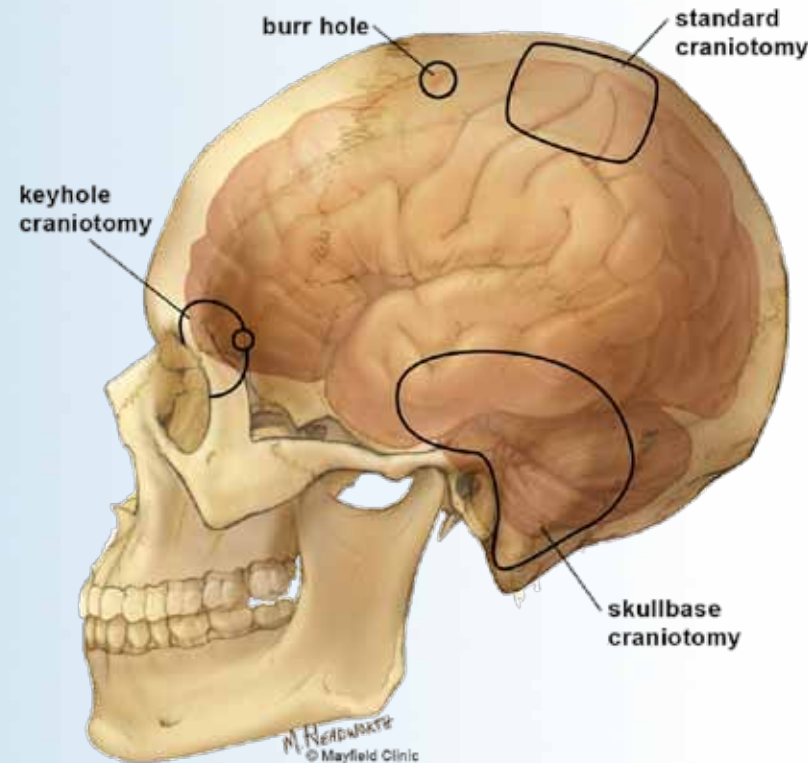
Goal of Brain Tumor Surgery

- § Obtain a diagnosis
- § Remove tumor (as much as possible)
- § Avoid loss of brain function
- § Avoid loss of quality of life

Accessing the Brain: Craniotomy

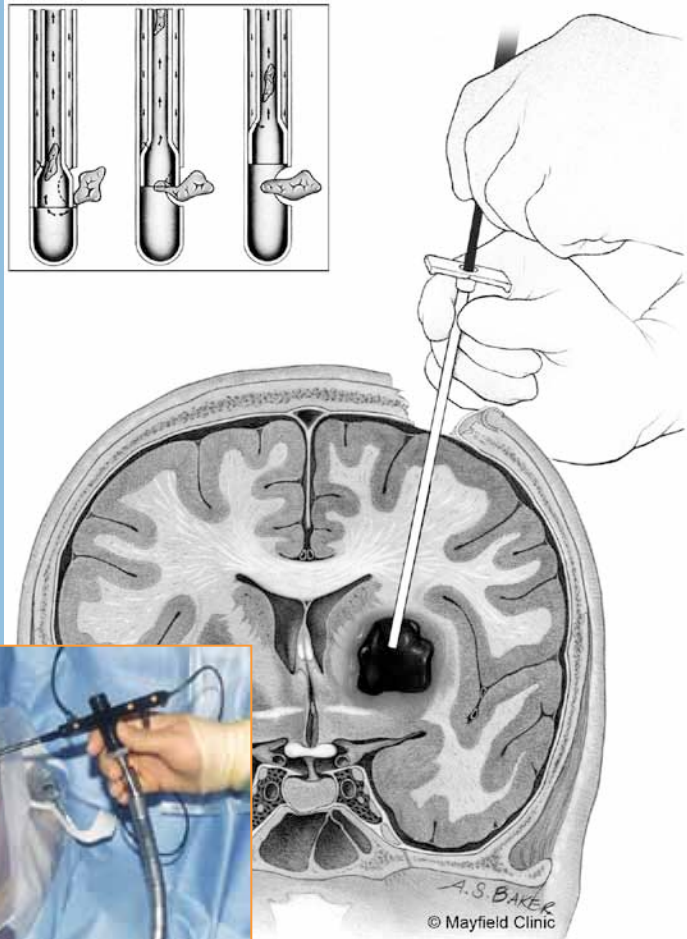
§ Craniotomy = bony opening cut into skull

- **Burr hole** - small dime-sized holes for biopsy or shunts
- **Keyhole** - minimally invasive
- **Standard craniotomy** - hole cut into the skull; bone flap is replaced and secured with plates
- **Skull base** - large or complex holes that remove bone from the bottom of the skull; may require reconstruction of the bony defect



Named according to area of skull, e.g., parietal craniotomy

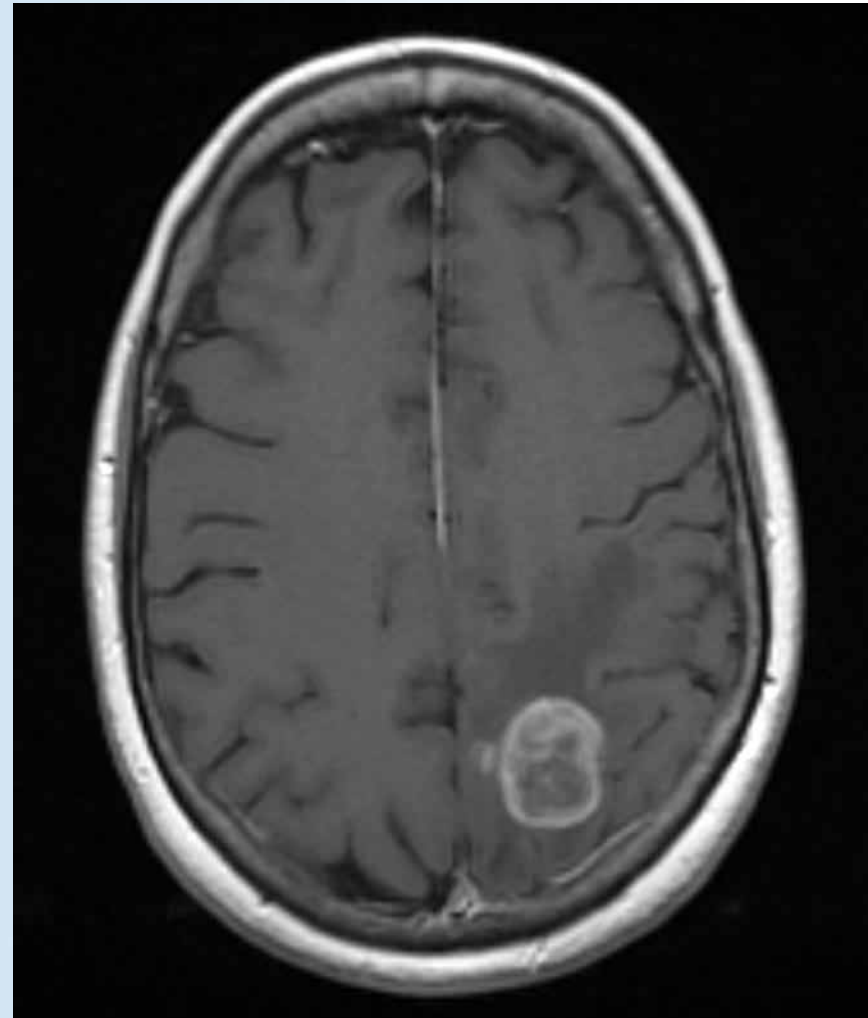
Obtain a Diagnosis



- § **Imaging (MRI / CT) is suggestive, not diagnostic**
- § **Diagnosis requires tissue**
- § **Stereotactic biopsy**
 - Small opening in skull
 - Needle into tumor
 - Image guidance

Brain Tumor Surgery

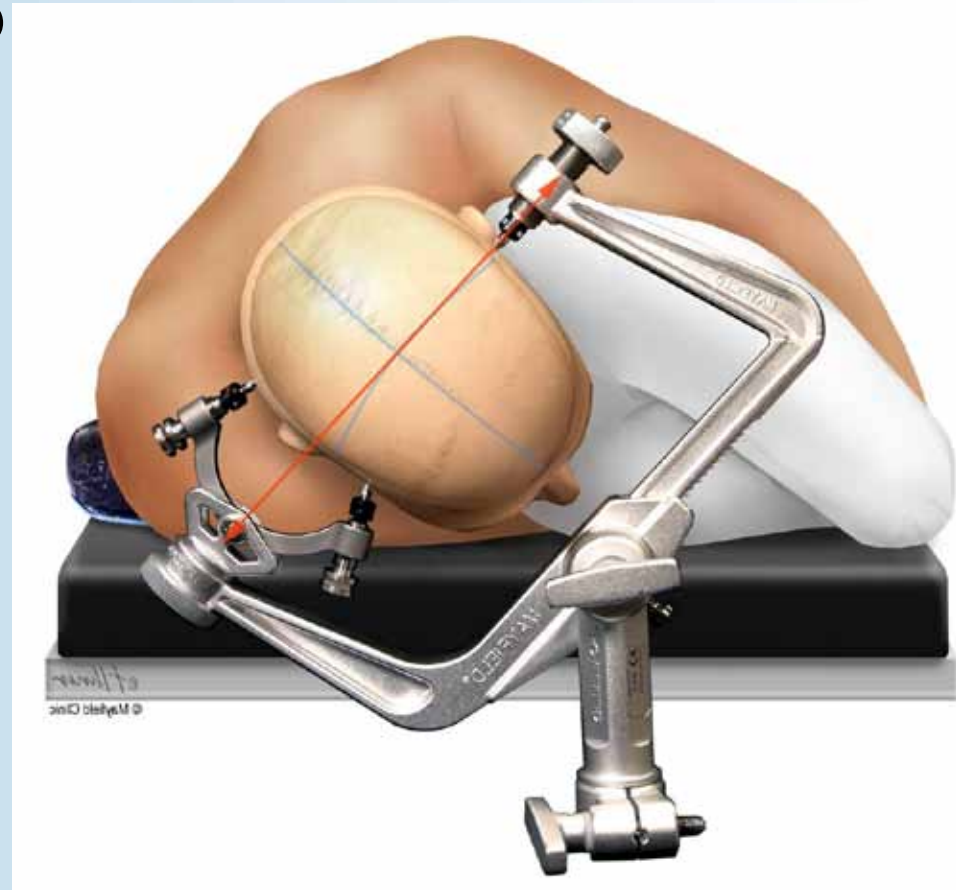
- § 61 year-old woman with a history of ovarian cancer diagnosed in 2006 presented with confusion and trouble with coordination
- § MRI – Left parietal mass consistent with Metastatic Tumor



Brain Tumor Surgery Positioning

§ Positioning

- Mayfield skull clamp
- Padding and protection



Brain Tumor Surgery Frameless Image Guidance

§ Register fiducials,
prepare image
guidance

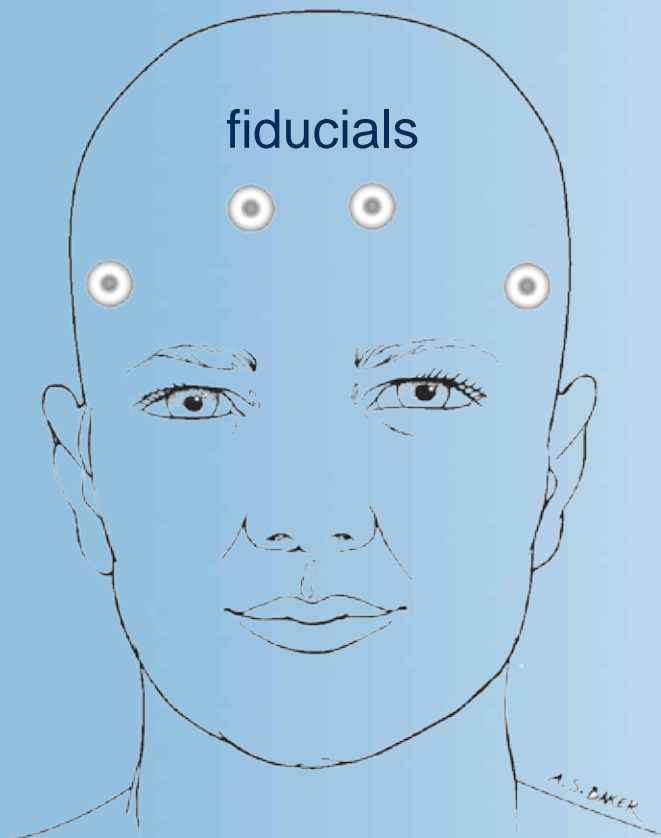


Image guidance
computer

camera



Brain Tumor Surgery Planning

- § Locate tumor with image guidance
- § Plan skin incision
- § Shave hair



Brain Tumor Surgery Opening

- § Skin incision
- § Drill a burr hole
- § Cut a craniotomy
- § Remove bone flap

Burr hole drill



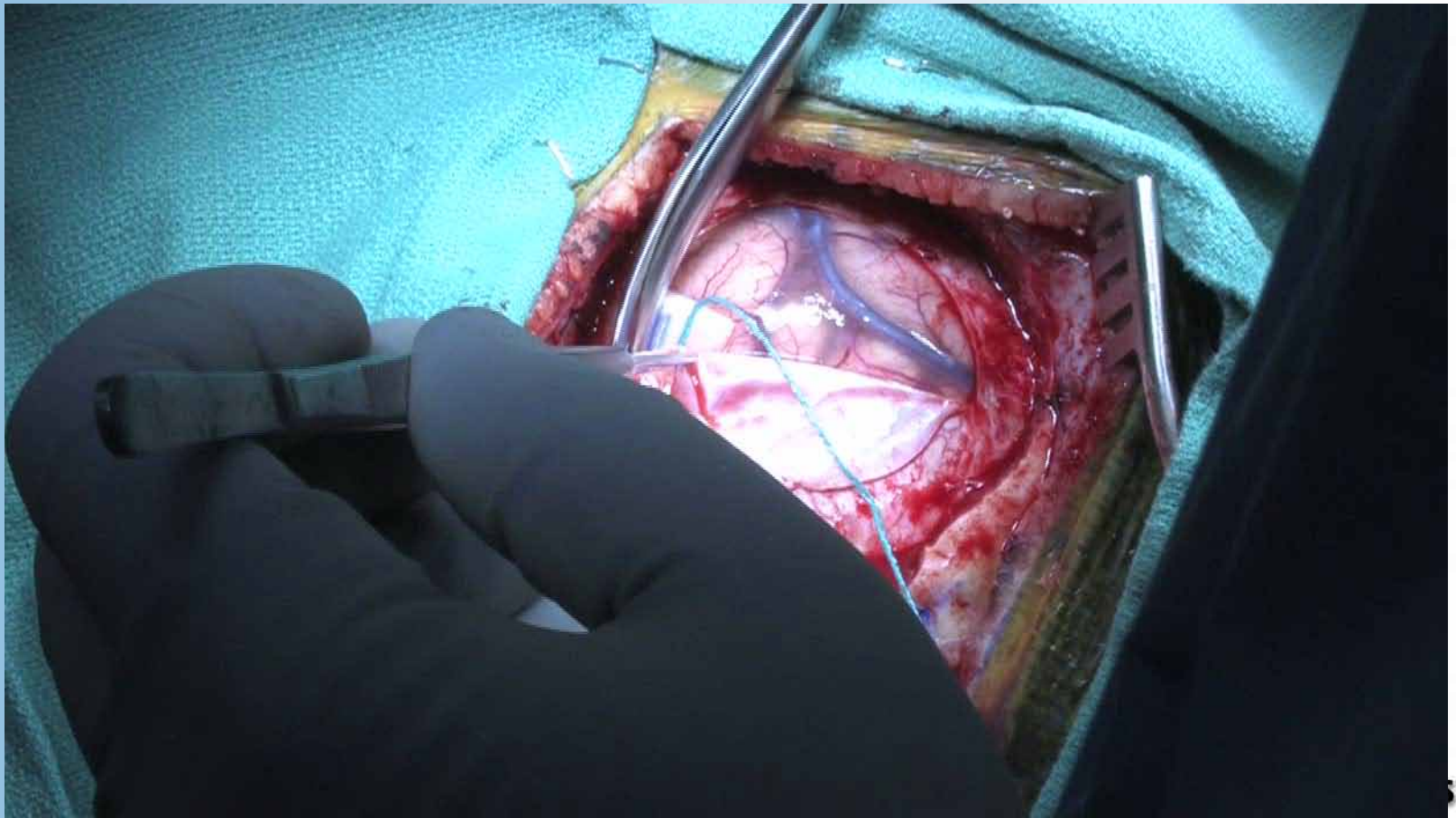
Craniotome



Brain Tumor Surgery

Tumor Resection

- § Open the dura
- § Remove the tumor



Brain Tumor Surgery Closure

§ Replace the bone flap

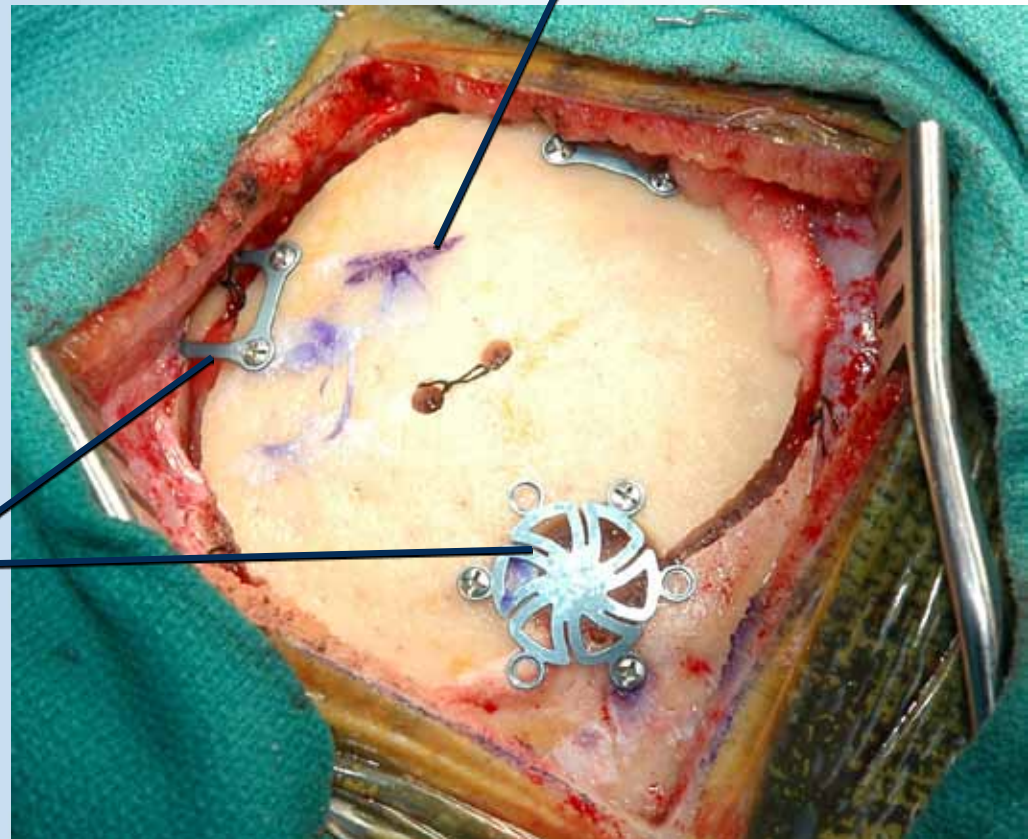
- Titanium plates
- MRI compatible
- Ok for airport security

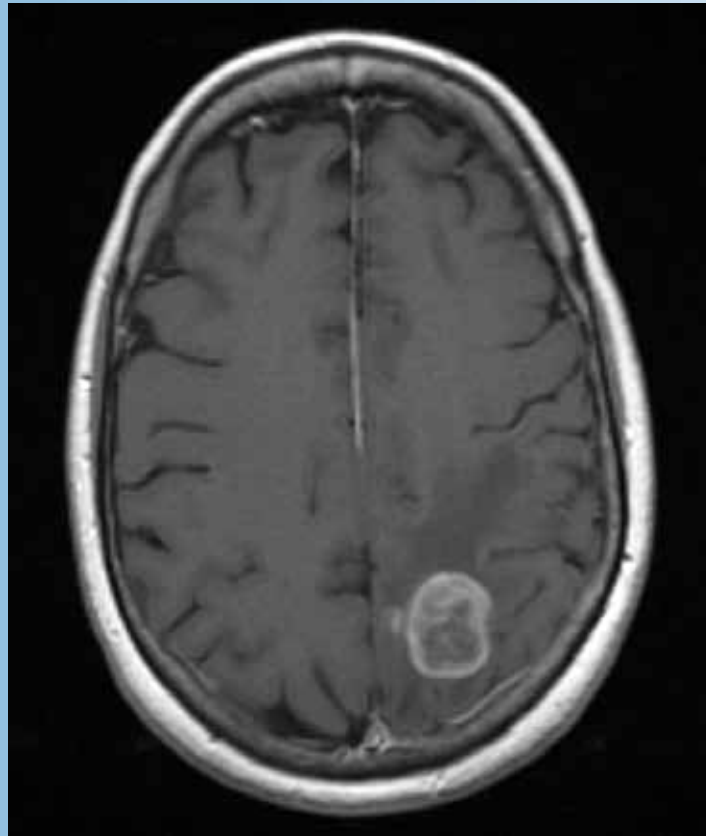
§ Skin closure

- Staples

titanium
plates

bone flap





pre-op



post-op

- § Patient did well with surgery
- § Discharge home 2 days after surgery

Post-Op Recovery

- § Pain = well controlled with mild analgesic
- § Time in hospital = 2-5 days
- § Possible rehabilitation time
- § Time to get back to normal = 2-6 weeks average
 - Driving
 - Return to work
 - Return to full activity

Potential Complications

§ Overall, risk from standard craniotomy is low*

- Mortality rate 1.7%
- Major complication rate 13%
- Neurologically worse after surgery 9%
- Neurologically improved after surgery 32%
- Factors associated with increased risk
 - Increased age
 - Proximity of tumor to functional areas of the brain
 - Pre-operative functional status

*Data from a modern series of 400 craniotomies performed at MD Anderson Cancer Center

Potential Complications

§ Seizures

- Anti-seizure medication before and at least 1 week after surgery

§ Infection / wound healing

- Control blood sugars

§ Deep Vein Thrombosis (blood clot in legs)

- SQ Heparin (mild blood thinner) in hospital
- Increase activity as much as possible

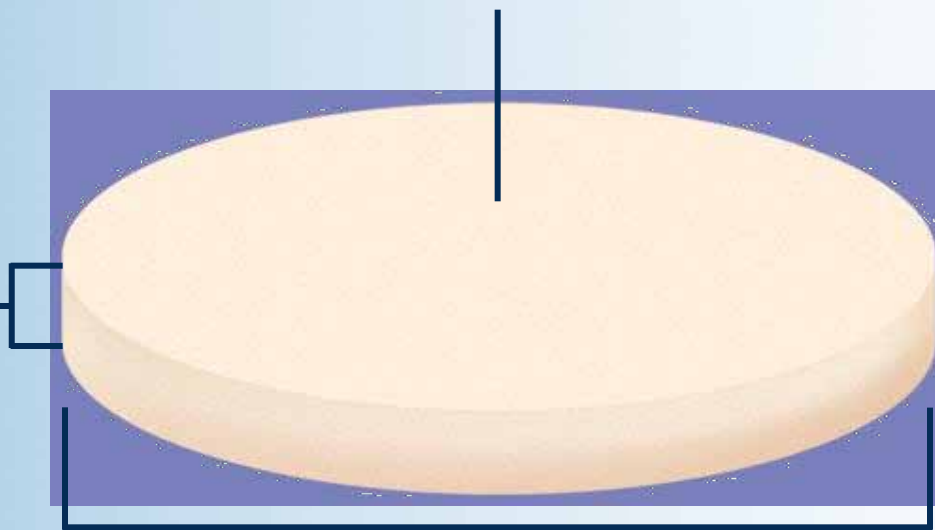
§ New or worse neurologic deficit (weakness, numbness, speech problem)

- 9% of patients overall
- Increased risk depending on age, location of tumor, pre-operative functional status

Brain Tumor Surgery Implants: Chemotherapy Wafers

Wafer soaked in chemotherapy drug BCNU

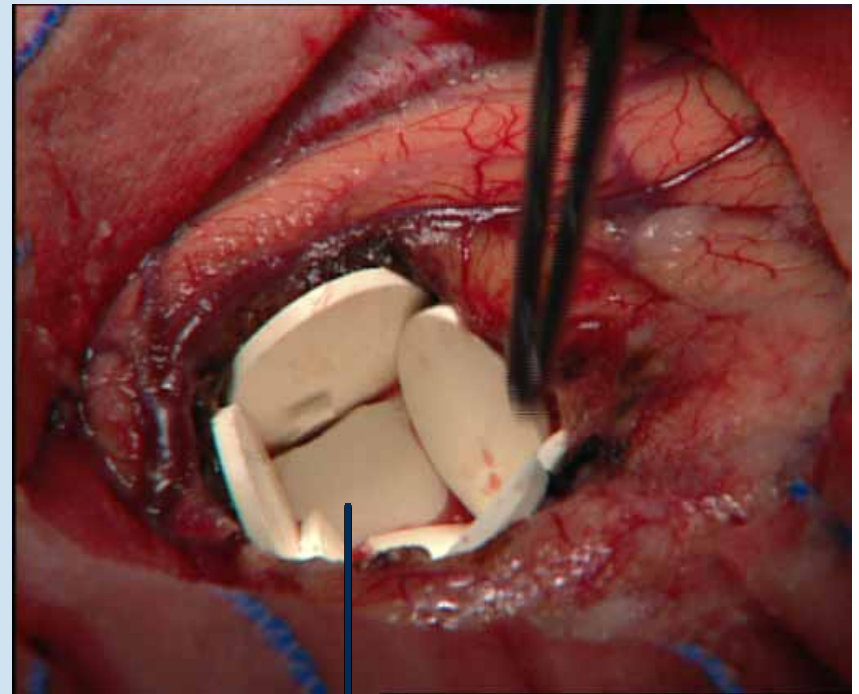
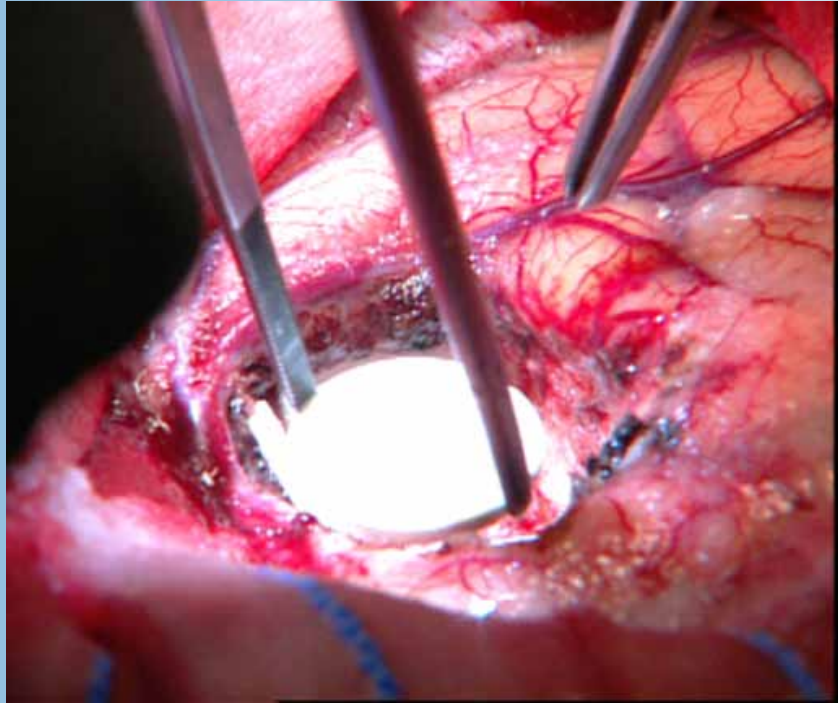
Thickness: 1 mm



Diameter: 1.45 cm

Source: Gliadel

Chemotherapy (BCNU) Wafers



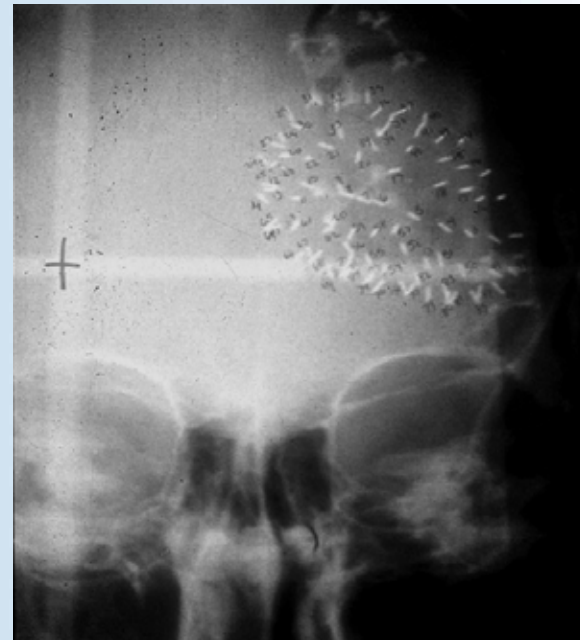
BCNU wafers line
tumor cavity

Chemotherapy (BCNU) Wafers

- § **Approved for use in malignant glioma**
- § **Recurrent and newly diagnosed**
- § **No systemic toxicity**
- § **Increased risks of wound infection, healing problems**

Brain Tumor Surgery Implants: Radiation Seeds

- § Used for recurrent malignant glioma and metastatic tumors
- § No radiation exposure beyond scalp
- § Risk of radiation necrosis

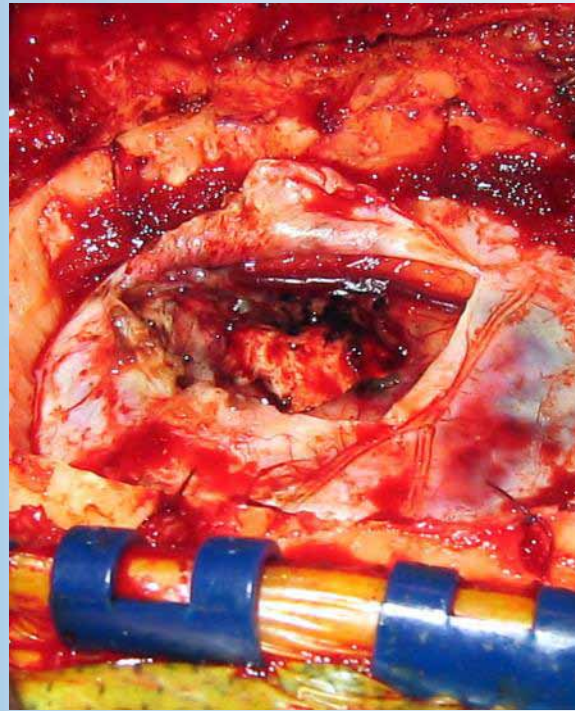


Radiation Seeds (I-125)

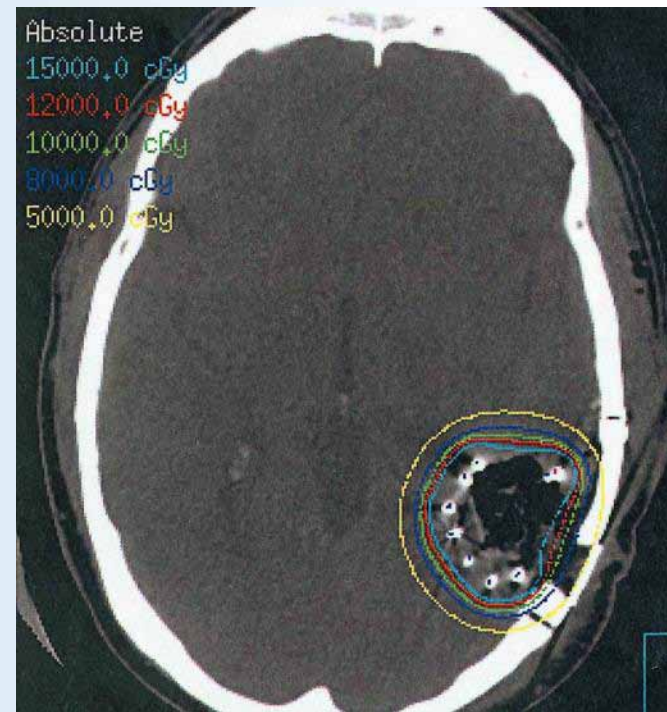
MRI of tumor



Seeds placed
in tumor cavity

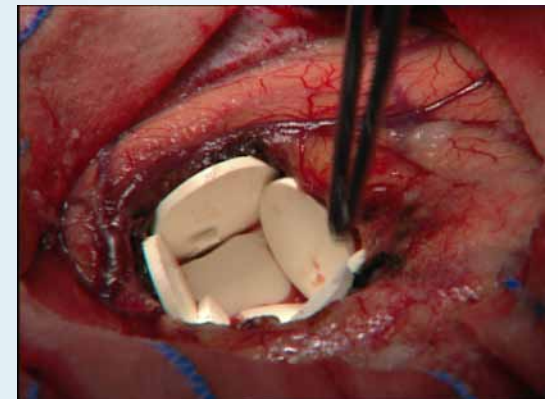
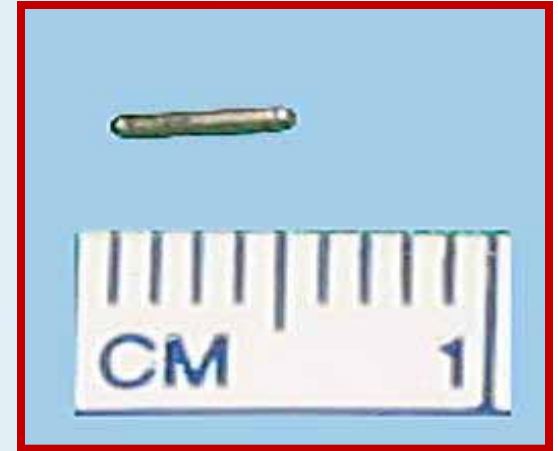


Radiation dosimetry



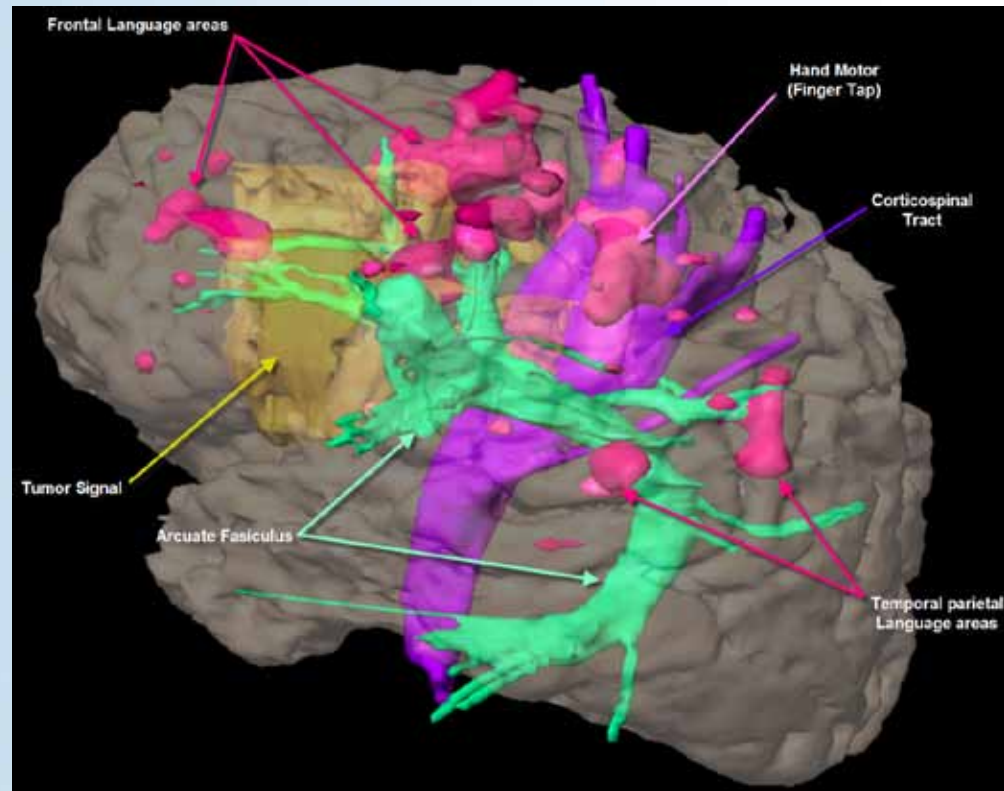
Why Combine Seeds & Wafers?

- § Combination of seeds and wafers effective for recurrent glioblastoma
- § More effective together than either treatment alone
- § Study results from UC Trial show not beneficial for newly diagnosed glioblastoma



Functional MRI

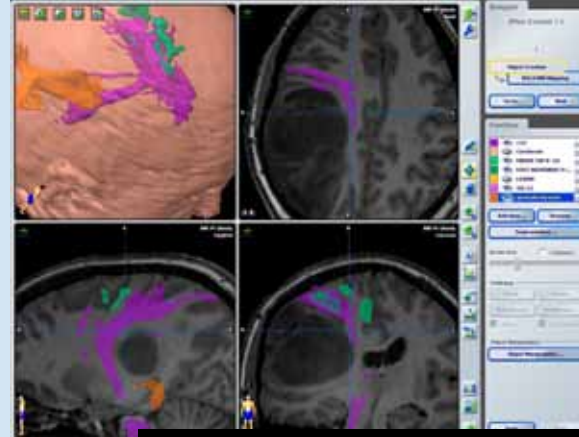
- § Gliomas can infiltrate functional areas of the brain
- § Goal of surgery is preserve function
- § In the past, this required awake surgery with mapping
- § Now we can map the brain with functional MRI and DTI (Diffusion Tensor Imaging)



What's New in Brain Tumor Surgery?

§ Minimally invasive

- Image guidance
- Smaller/keyhole craniotomy
- Endoscope



§ Advanced Imaging Techniques

- fMRI/DTI
- Vein Mapping

