Neuronavigation

- How to find a lesion?
- How to avoid or cause minimal trauma to normal structures?
- How radical was the lesion removed?
- What kind of lesion?
Neuronavigation

How to avoid or cause minimal trauma to normal structures?

How radical was the lesion removed?

Neuronavigation

• How to find a lesion?
• How to avoid or cause minimal trauma to normal structures?
• How radical was the lesion removed?

• What kind of lesion?
Neuronavigation
How to find a lesion?
Anatomical landmarks

- On the outside of the skull
- On the inside of the skull
- On the surface of the brain
- Deep structures
Neuronavigation
How to find a lesion?

Anatomical landmarks
- On the outside of the skull
- On the inside of the skull
- On the surface of the brain
- Deep structures

Foramen of Monroi
Thalamostriate vein
Neuronavigation
How to find a lesion?

Live guidance
• fluoroscopy
• ultrasound
Neuronavigation
How to find a lesion?
Peroperative guidance
• Intraoperative  x-ray
   ultrasound
   CT-scan
   MRI
• Stereotaxy
Neuronavigation
How to find a lesion?

Peroperative guidance
• Intraoperative x-ray
  ultrasound
  CT-scan
  MRI

• Stereotaxy
Neuronavigation

• Stereotactic frame
  – Ventriculogram (air, contrast)
  – CT
  – MRI

Neuronavigation

Frameless stereotaxy – image guided neurosurgery
  – Armsystem
  – Camerasytem
Frameless stereotaxy Camerasyystem

Optical tracking arrangement

- Ultrasound probe
- Head fixed in a holder
- Pointer or surgical instrument
- Patient reference frame (fixed to the patient)

All relevant devices are tracked simultaneously by the optical tracking system.
Frameless stereotaxy Camerasytem

Neuronavigation
Frameless stereotaxy - microscope
Neuronavigation
Frameless stereotaxy - Problems

Brainshift due to
Decreased volume of brain (ventilation and medication)
Loss of cerebrospinal fluid
Loss of tumor mass

Brainshift after opening dura 5-2 cm
Depending on age, size of ventricular system, tumor location and size

Sonowand
Mixture of frameless stereotaxy and ultrasound

Trackable ultrasound probe
Tumor resection control

SonoWand enables you to follow the progression of the resection, and identify and localize residual tumor tissue.

Possible future

*Performing ‘Robotic Laser Brain Surgery’ With The Oblique Angle Intraoperative MRI*