

Concise neurosurgery

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Lectures on neurosurgery within the frame of general surgery

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Subject of neurosurgery

- Surgical treatment of **organic** disorders of CNS
 - Developmental disorders (mostly pediatric)
 - CNS trauma (TBI and spinal)
 - Tumors
 - Vascular malformations
 - Degenerative pathologies
- Those **functional** disorders of CNS that can be localized
 - Certain types of epilepsy
 - Movement disorders
 - Chronic pain
 - Psychiatric disorders

Brief historical account



Das ist dz an-
der instrument / vil
das dyent mer ob-
en yff dz handt / das
sant darnebt / oder
binder. darumb dz
es mit heeyte gleych
hat / also dz nicht in
stremt hie vor ver-
zeyhnet. Das dyent
er auch / wann die
hirscheel jngel-
genist / das man hie
mit duff instrument
wider ruffstumb.



Sine qua non conditions of modern neurosurgery

- Development of neuroanatomy – evolution of neurology as speciality *per se* (symptomatology, pathology, localization)
 - Camillo Golgi (1843-1926), Santiago Ramón y Cajal (1852-1934), Lenhossék Mihály (1863-1937), Szentágothai János (1912-1994)
 - Jendrassik Ernő (1858-1921)
- Ability to suspend pain
 - Development of narcosis and anesthesia
- Antisepsis, asepsis
 - Semmelweis Ignác (1818-1865), Sir Joseph Lister (1827-1912)

Definition of pain

International Association for the Study of Pain (1994)

„An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”



UP



syringomyelia



Mucius Scaevola

CIP (congenital insensitivity to pain)



Medical science and pain

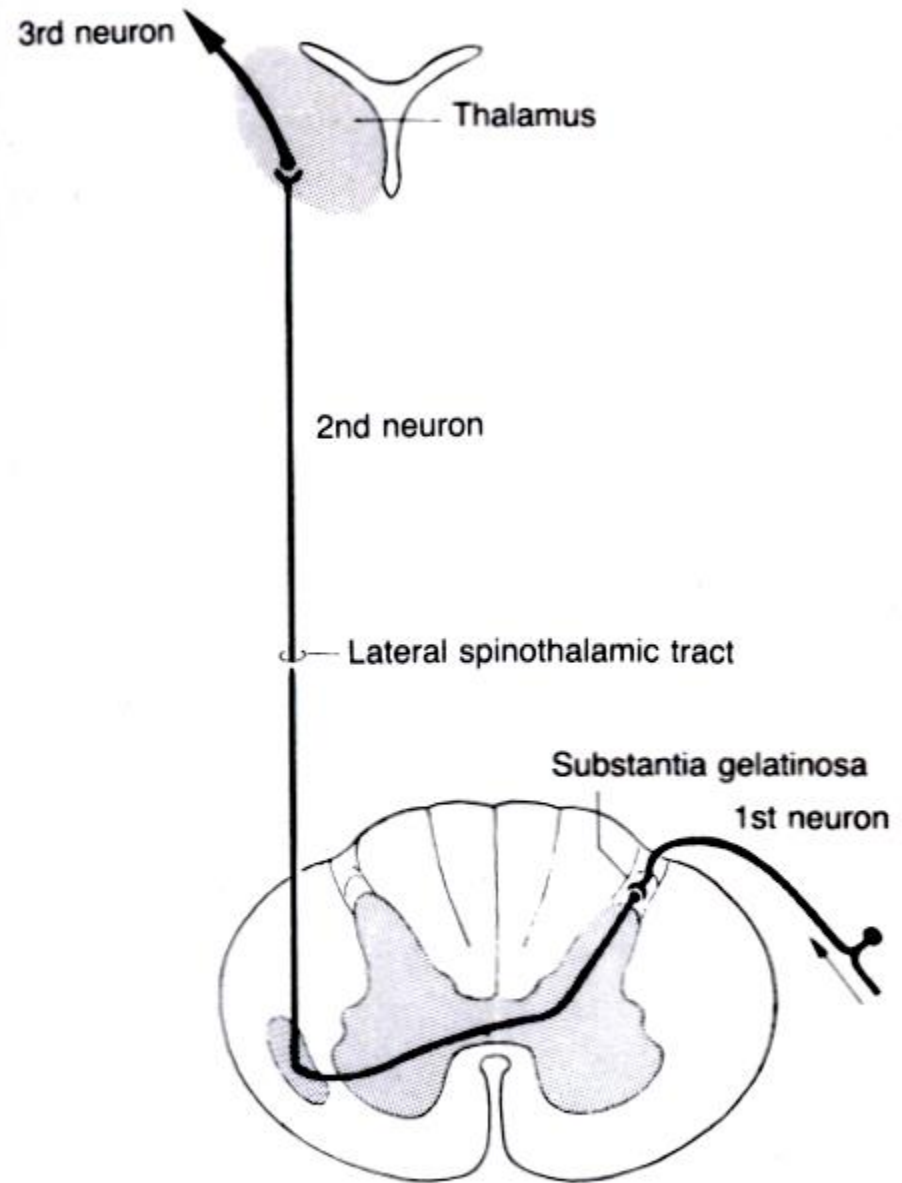
- Reversible suspension of pain
 - Beginning of modern surgery
- Treatment of painful chronic states
 - Medical
 - Surgical - neurosurgical
 - Other procedures

Anatomy of pain

Types of nociceptors

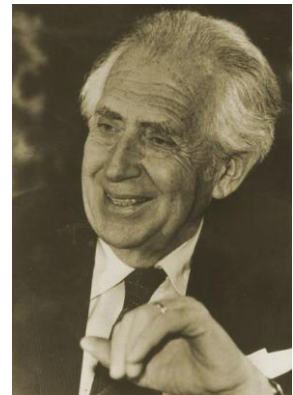
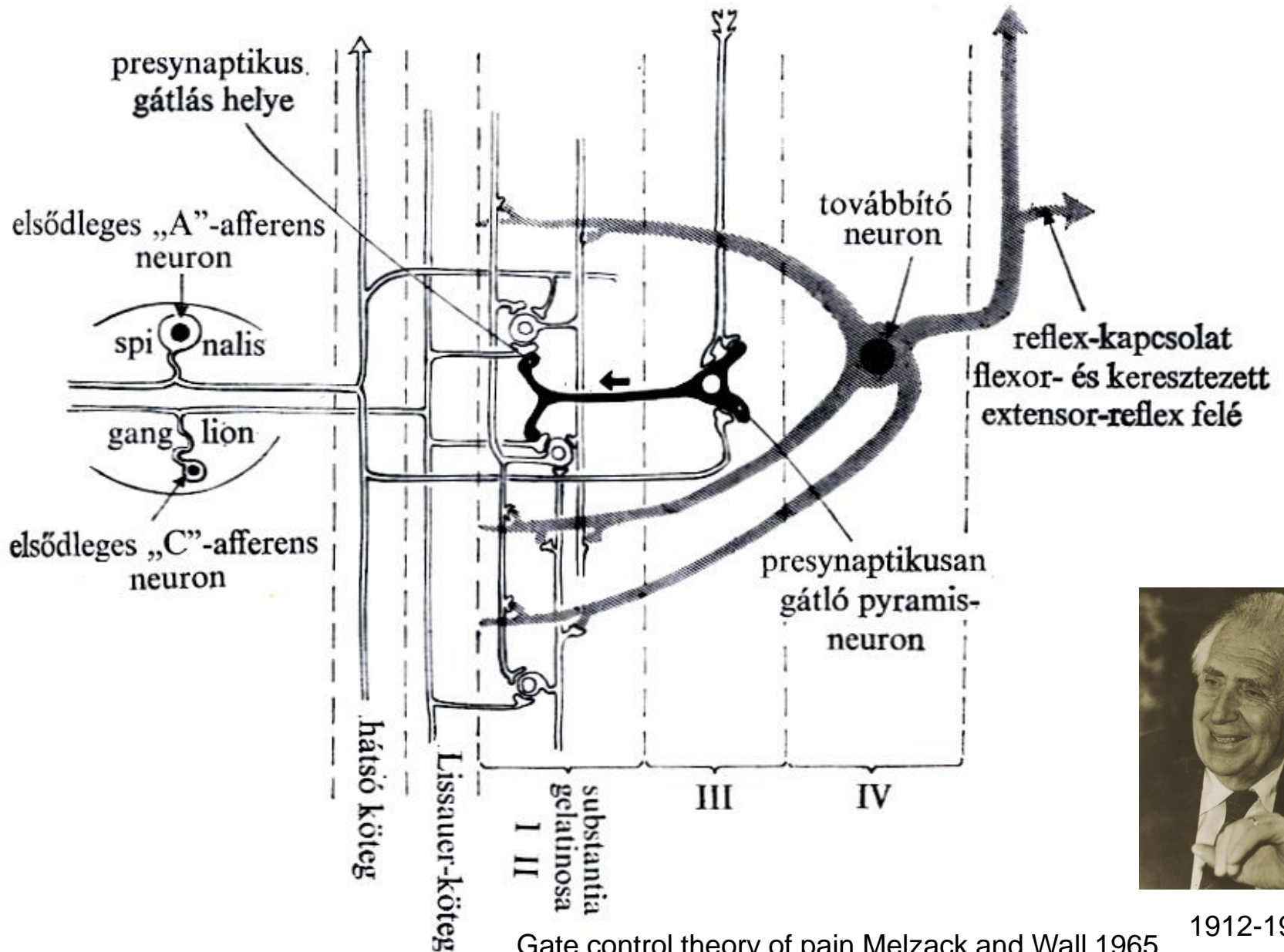
1. Mechanosensitive
2. Thermosensitive
3. Chemosensitive (histamin, bradykinin, prostaglandins, K-ion, acidic compounds, etc.)

Coupling of a nociceptive peripheral nerve to the central pathways



Pain, temperature
(tickling, itching,
sexual sensations)

leszálló rendszer

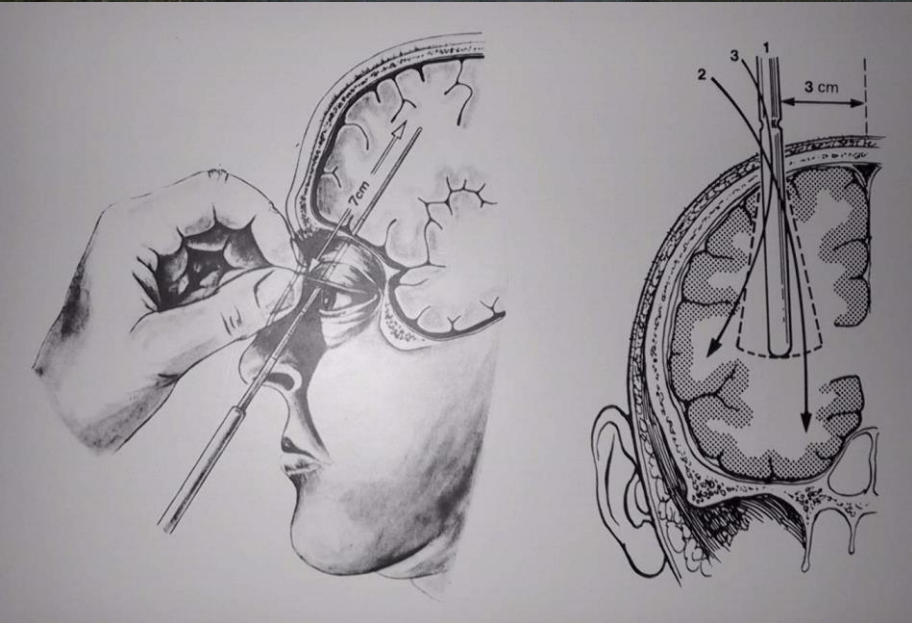


Gate control theory of pain Melzack and Wall 1965

1912-1994



Walter Freeman demonstrerar tekniken vid lobotomi. Western State Hospital, Washington, 1949.



Egas Moniz
1874-1955



LIVING MADE EASY.



PRESCRIPTION FOR SCOLDING WIVES.

London. Pub^d by T. M^cLean, 26, Haymarket, Jan. 1, 1830.





George Berkeley
1685-1753

ESSE EST PERCIPI...

Neurosurgical parallel of this theorem

ESSE EST VIDERI...

visualize

and

localize

Any pathology within the CNS that can be visualized may also be subject of neurosurgical procedure

X-ray – X-ray pictures

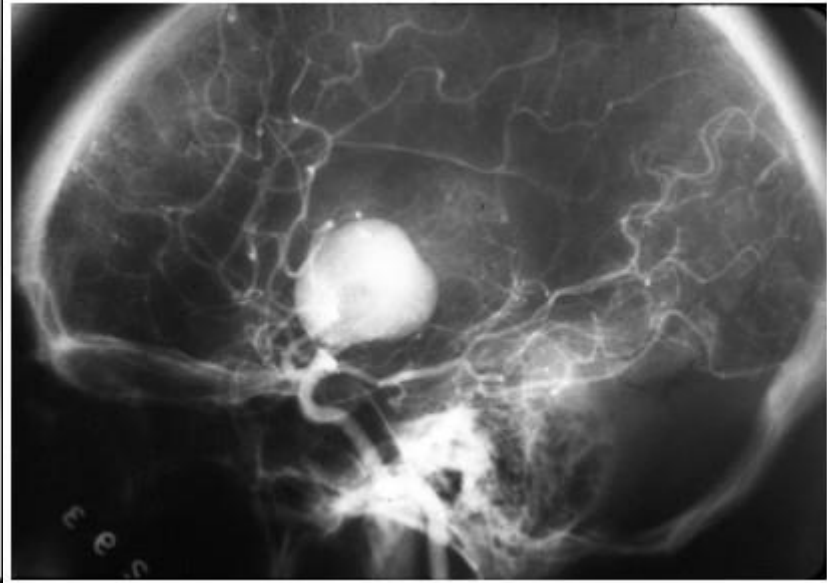


Angiography since 1927



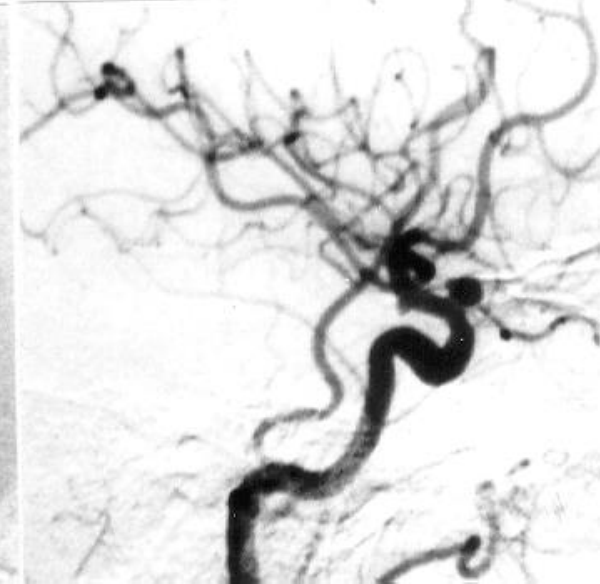
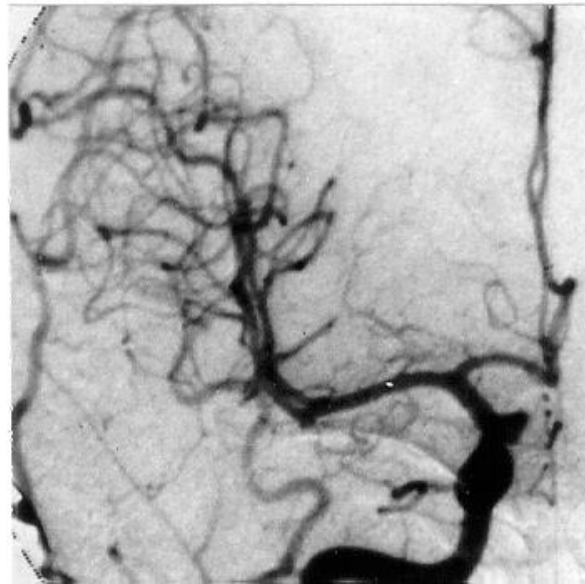
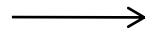
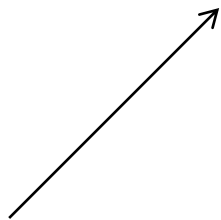
António Caetano de Abreu Freire Egas Moniz

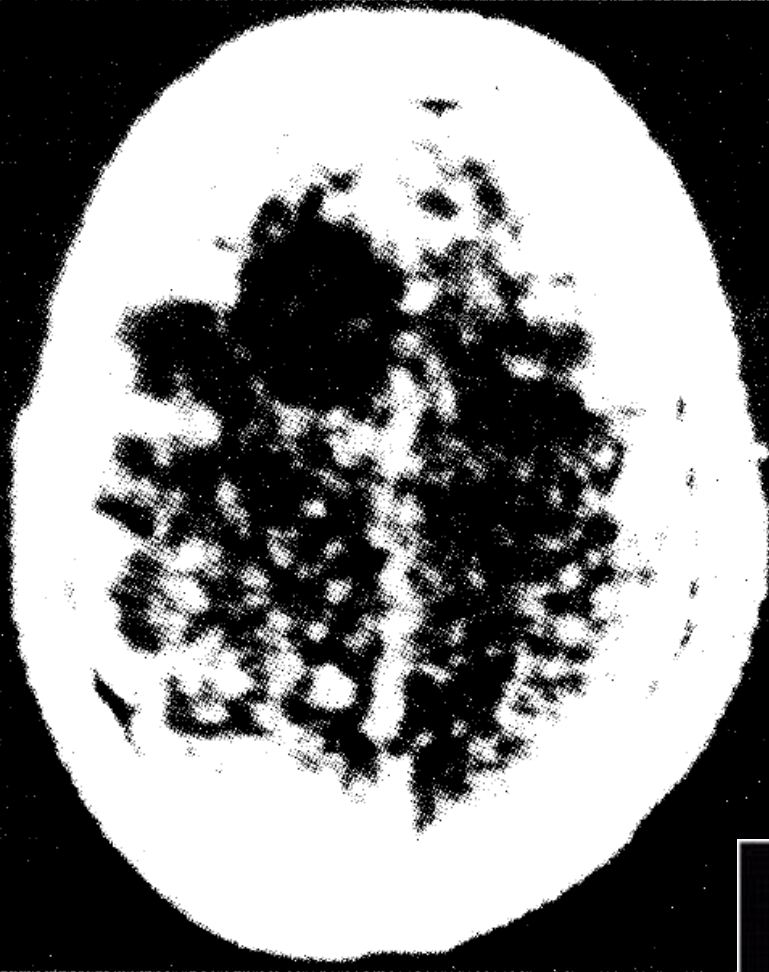
1874-1955



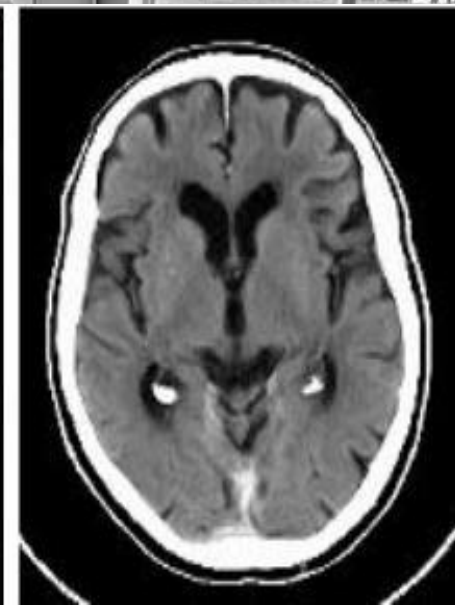
Conventional

DSA angiography





Sir Godfrey Newbold Hounsfield
1919 - 2004



Computerized image reconstruction

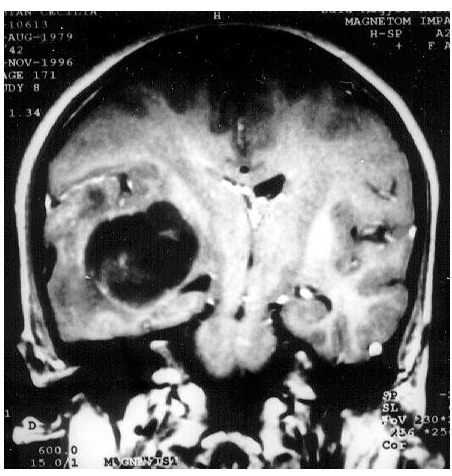
High resolution visualization in 3D



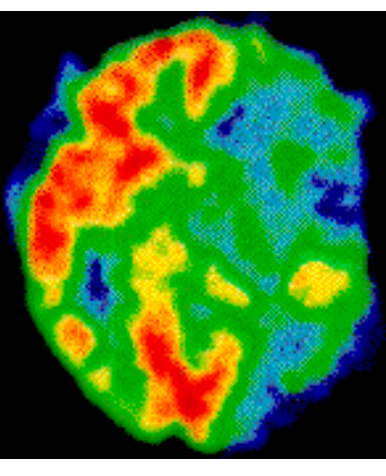
DSA



CT

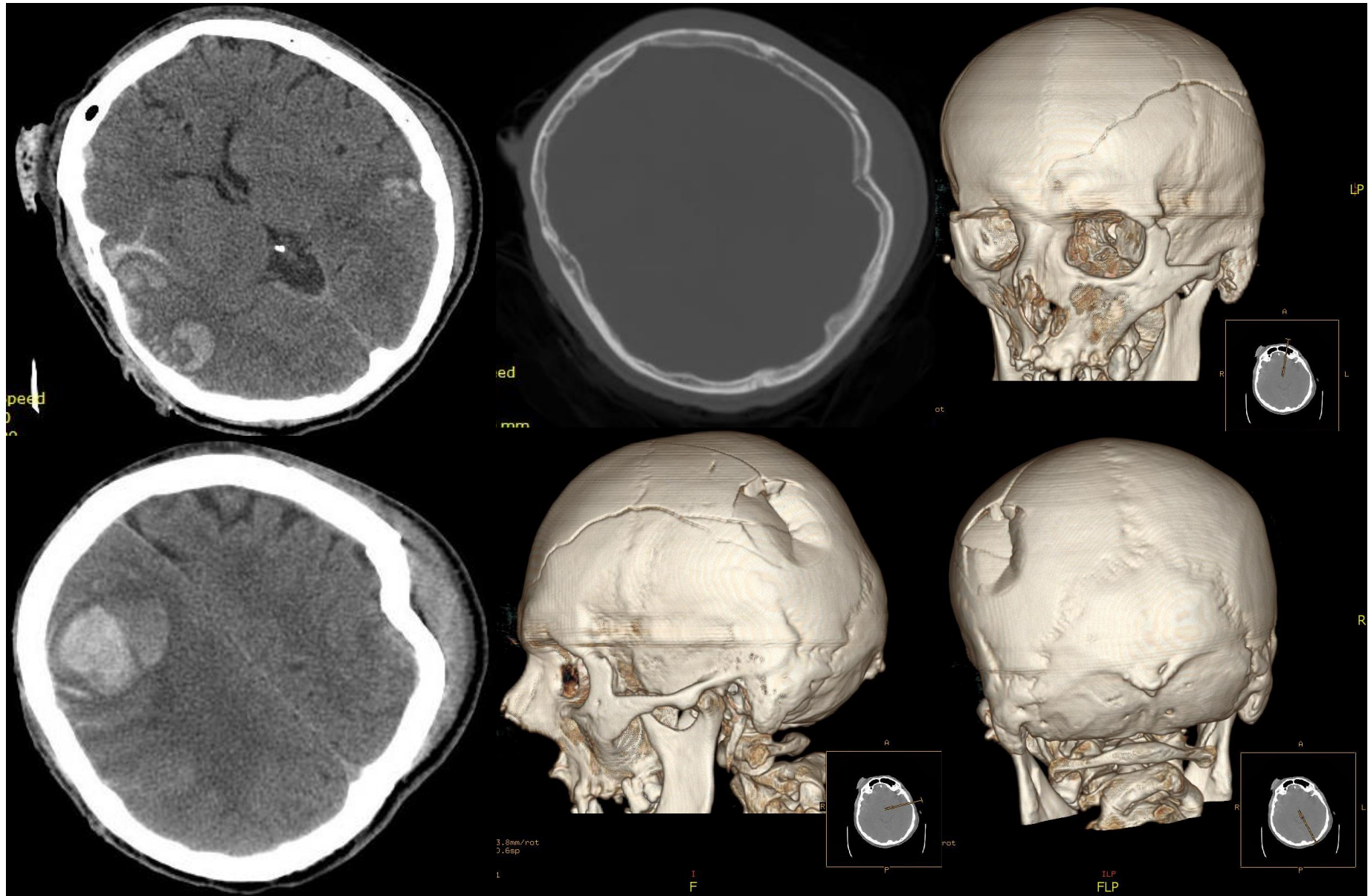


MRI

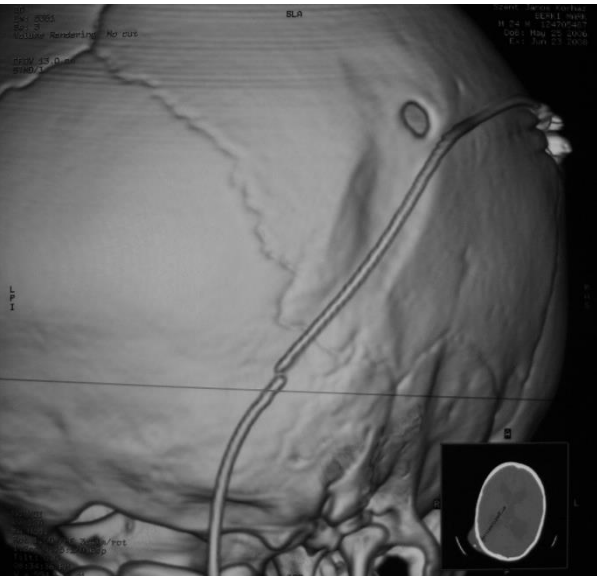


PET

What is the use of modern imaging technology?

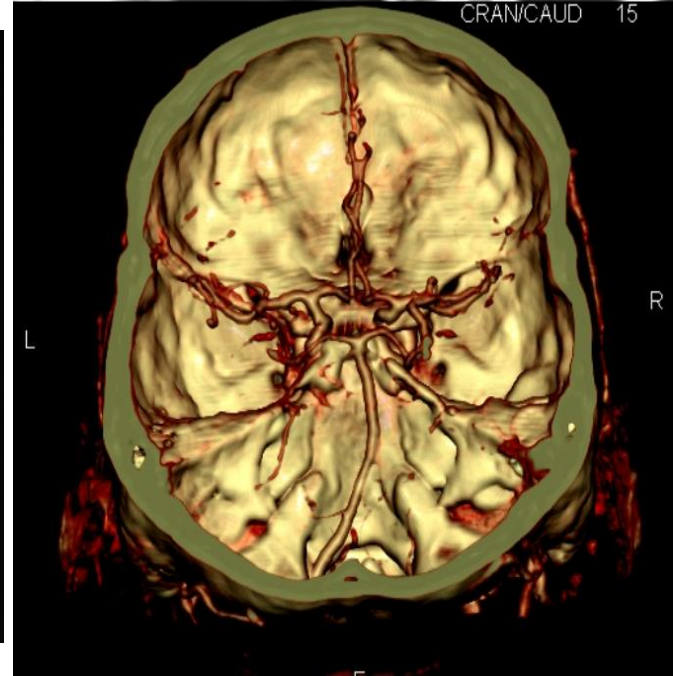
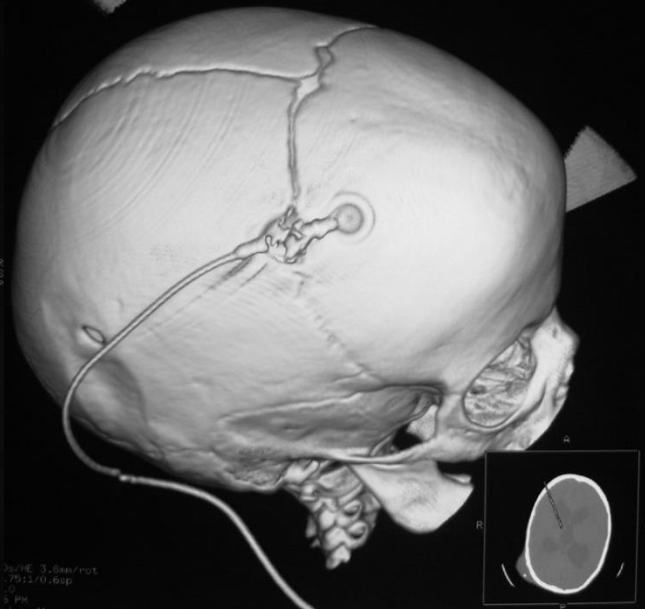
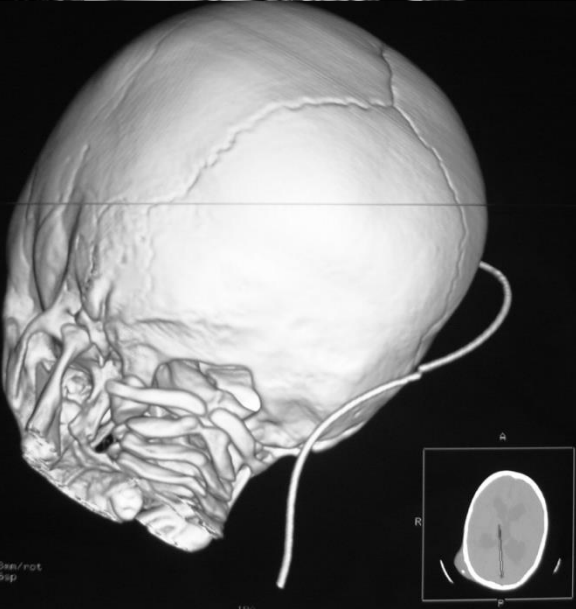
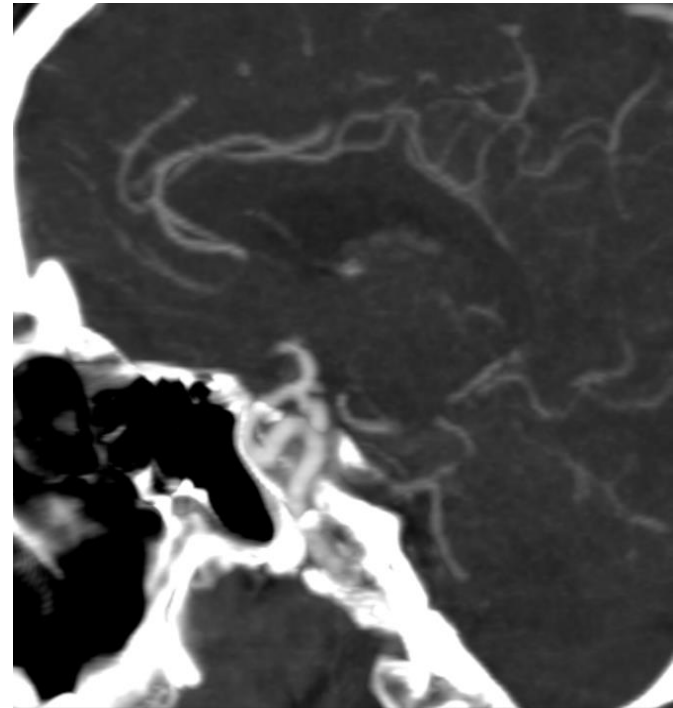


CT pictures



← Disruption of a shunt line

Carotid aneurysm →



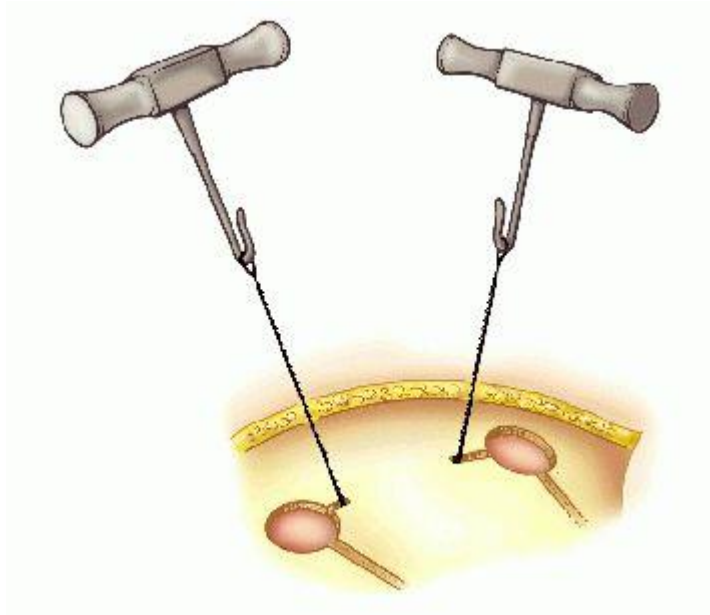


Surgical approach

???

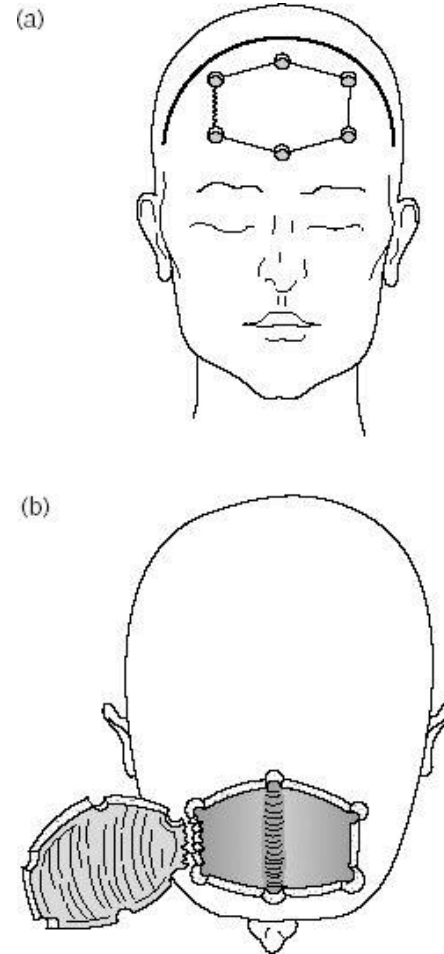


Craniotomy

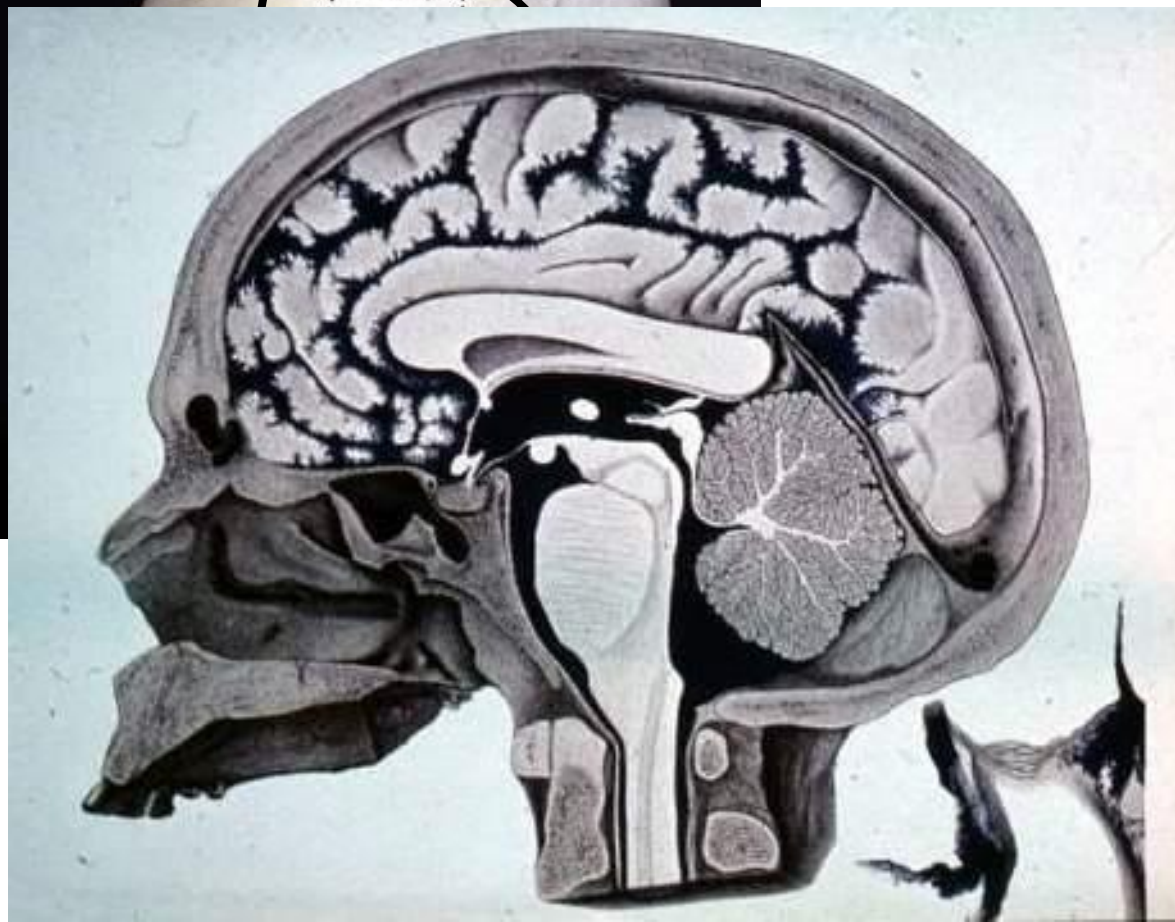


Gigli saw

Leonardo Gigli (1863-1908)

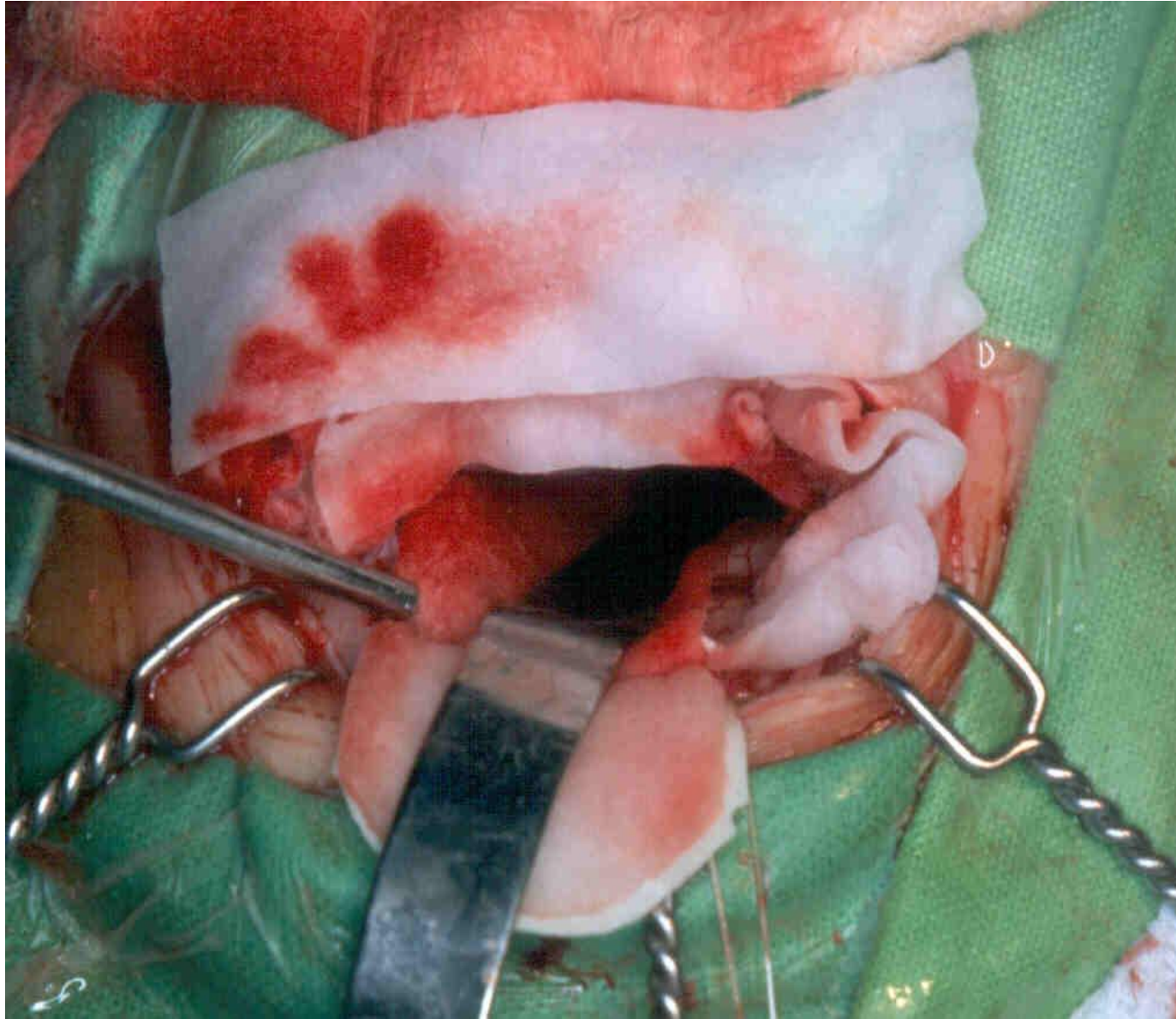


Microsurgical approach



Neurosurgical approach

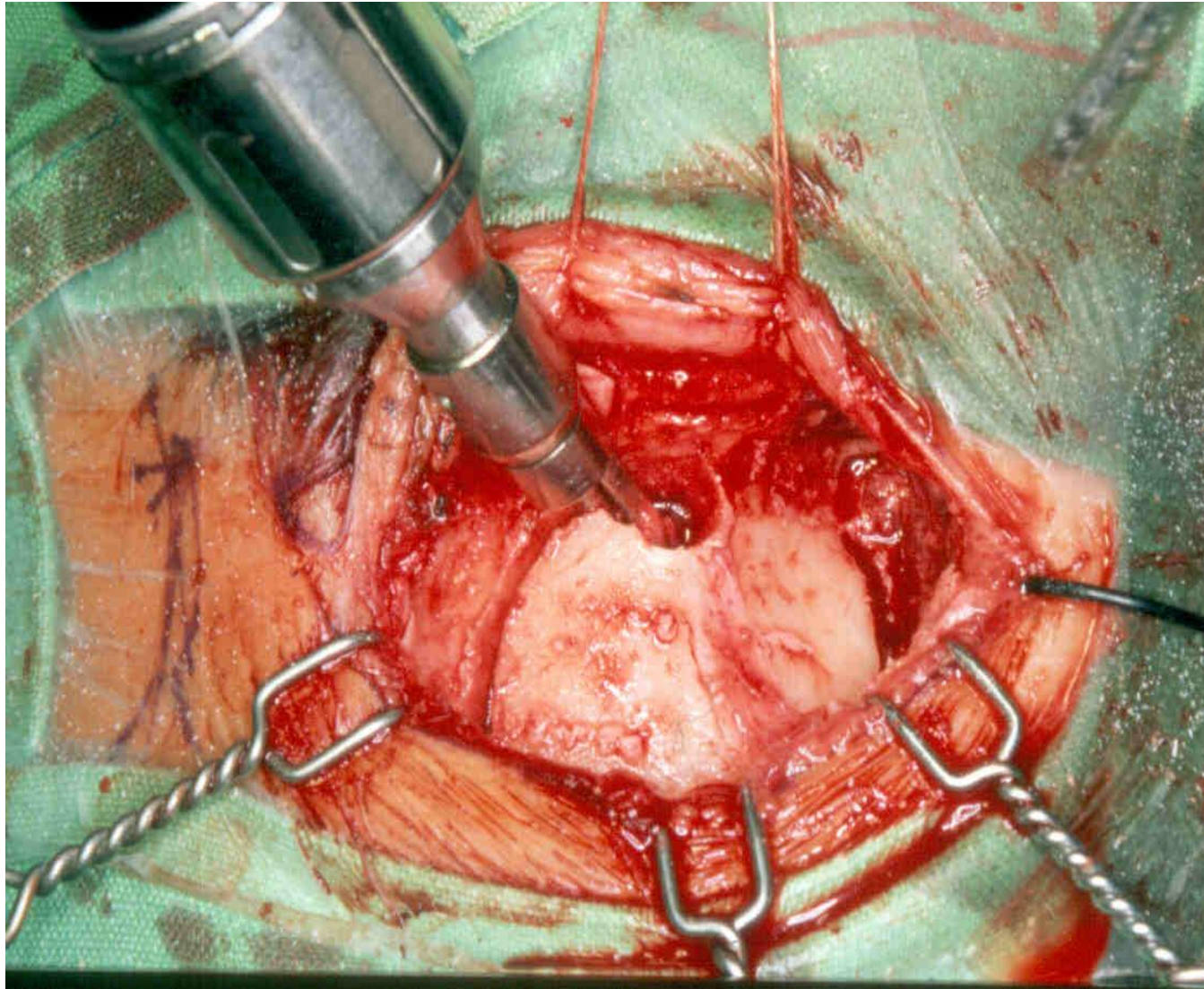
fronto-lateral, supraorbital, osteoplastic craniotomy, superciliar cut



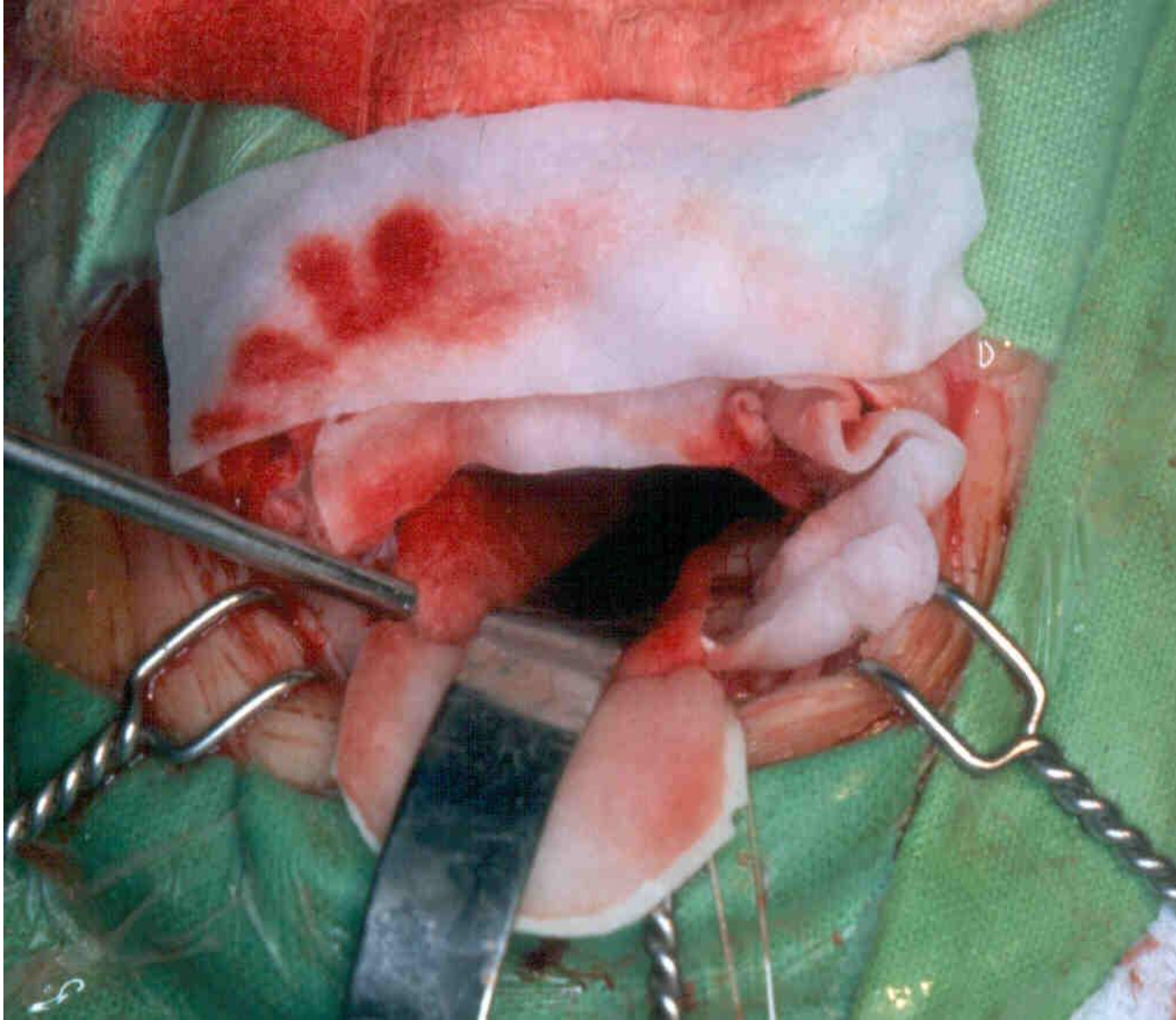
Supraorbital (superciliar) skin-incision



Small (keyhole) craniotomy



Dural exposure



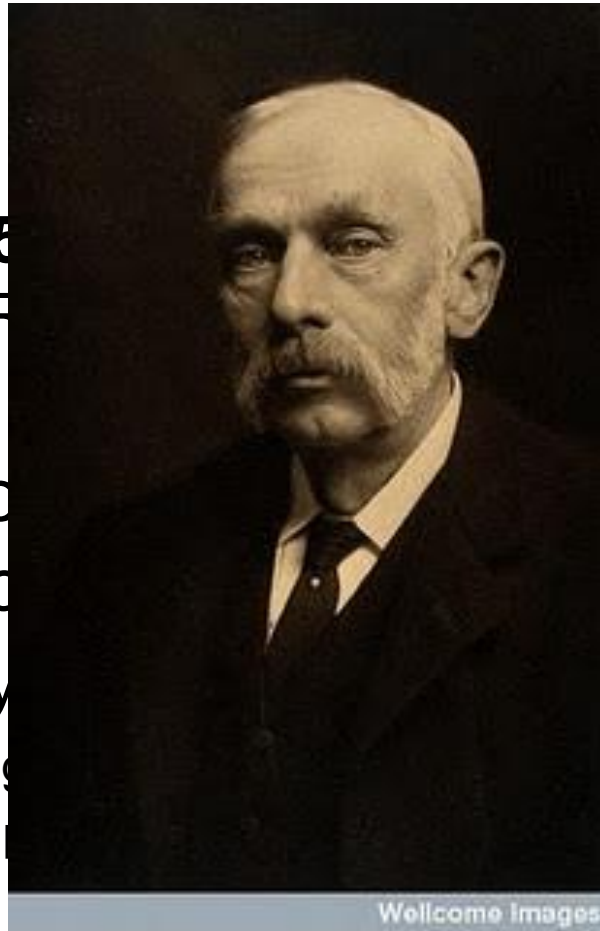
3 months after surgery

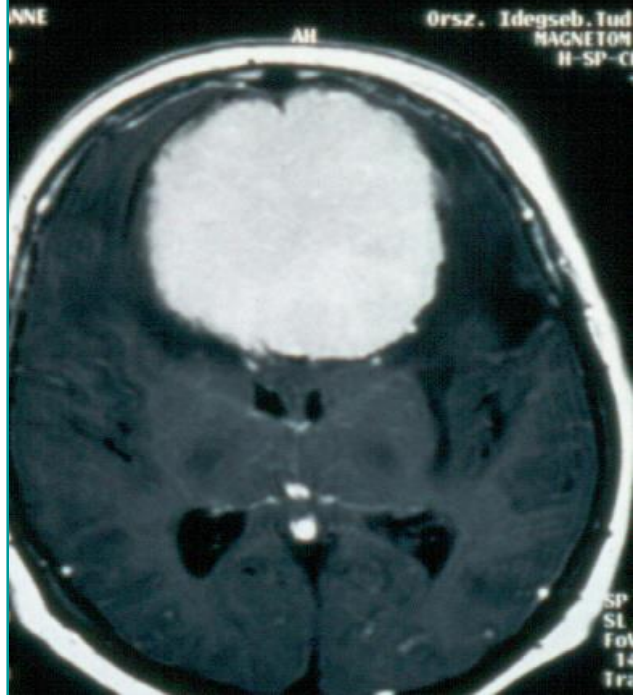
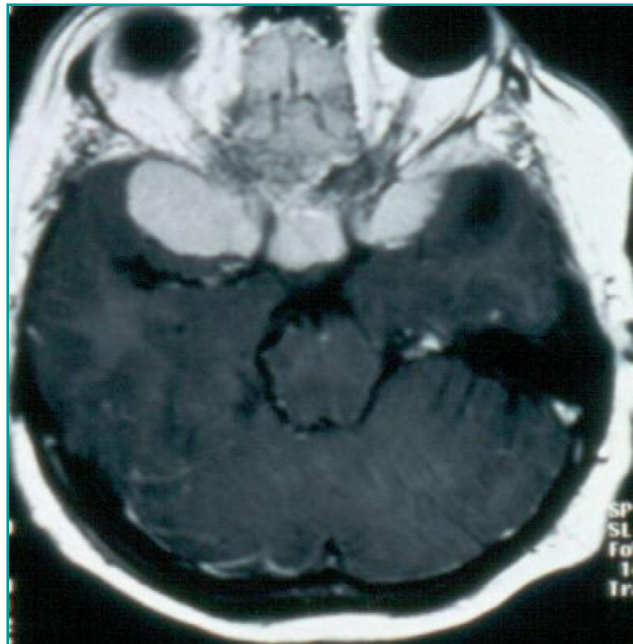




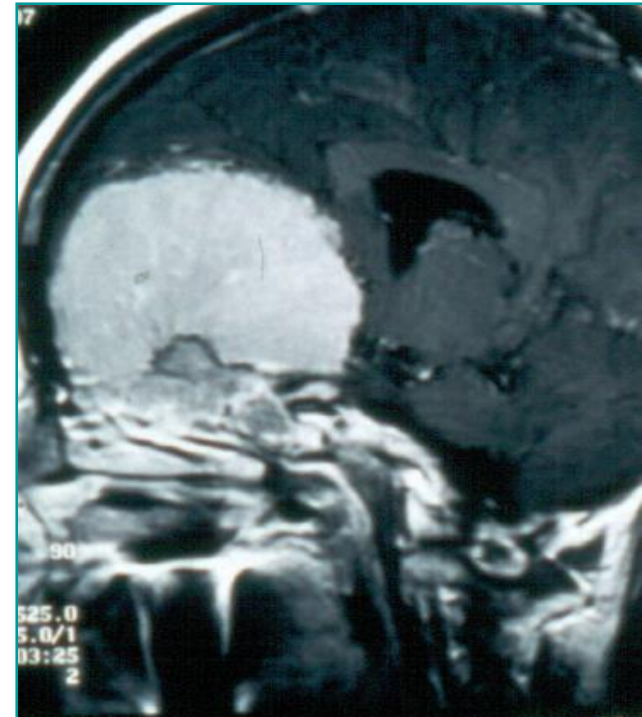
Neurosurgical importance of brain tumors

- Neurosurgical importance of tumor surgery
 - **November 25** 1884: First successful craniotomy at Great St. Asaph's Park Epileptic Hospital; Sir Frederick Trendelenburg and Alexander Hughes
- Cases of famous people who have had brain tumors
 - Karinthy Frigyes: Hungarian writer, author of *Micimackó* in Hungary
 - Winnie the Pooh – A.A. Milne
 - John F. Kennedy, Sen. Edward Kennedy, McCain

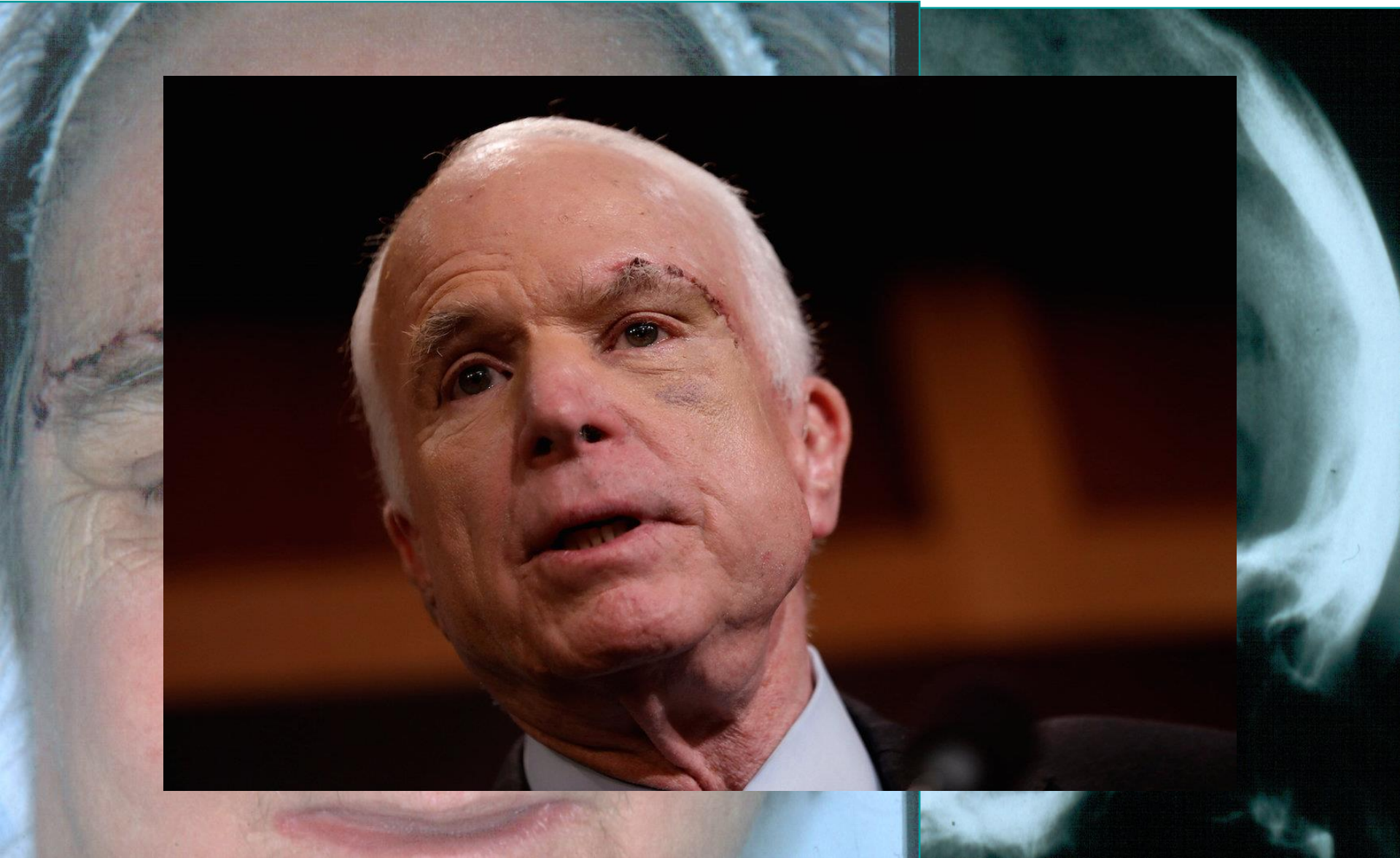


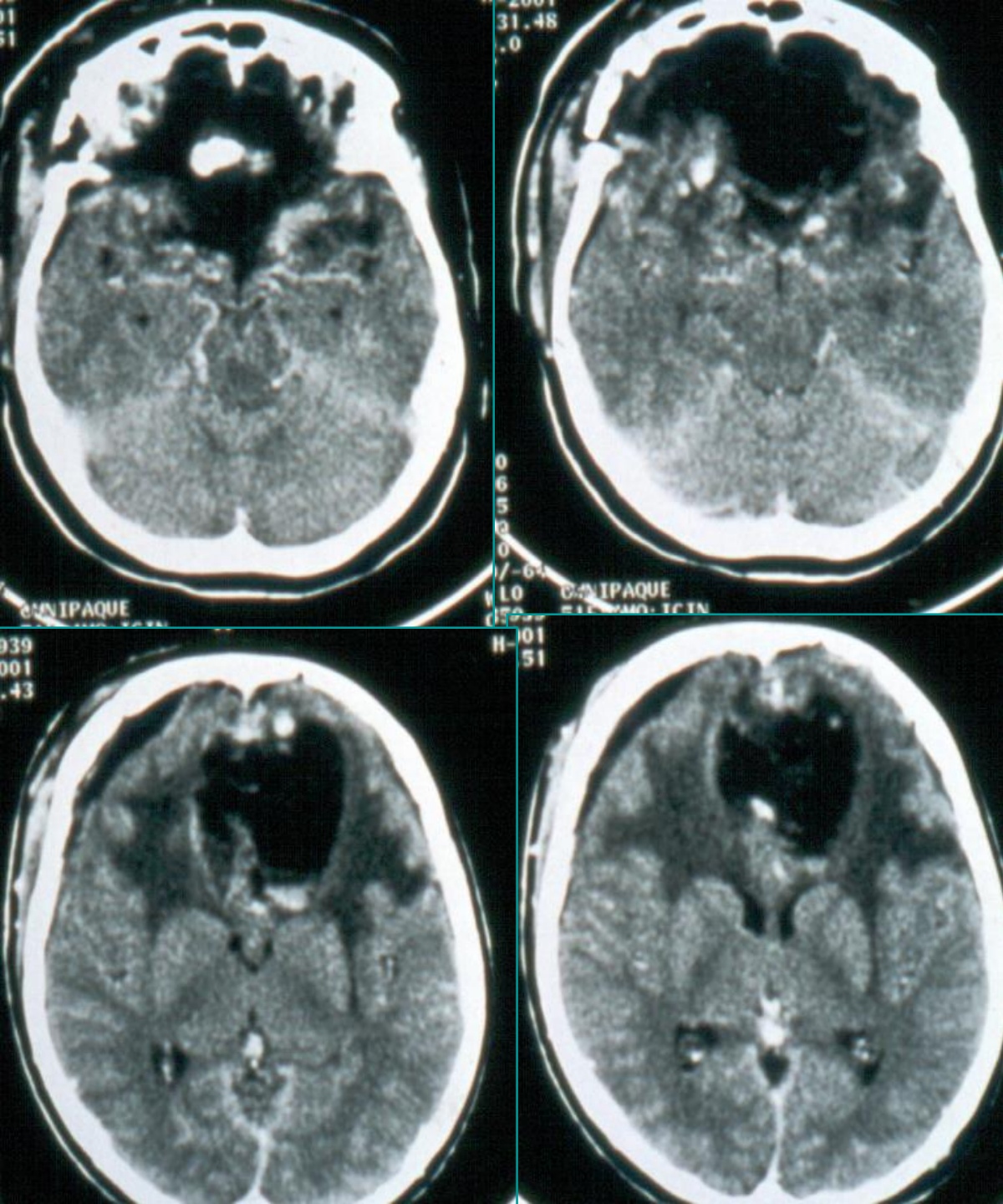


62 y F
5-6 years
hyposmia
visual deficit
obesity
incontinence



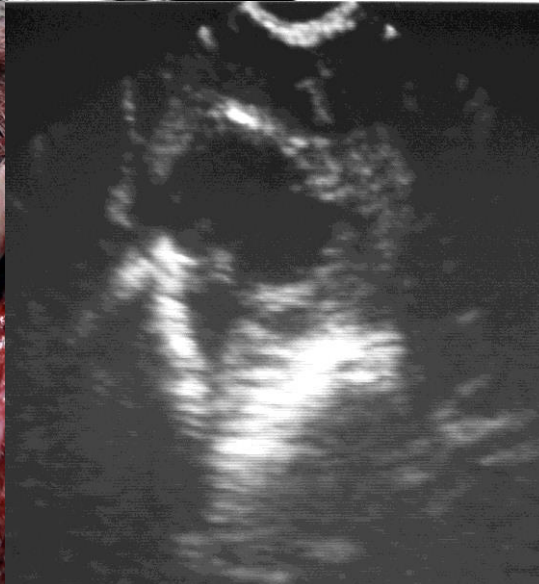
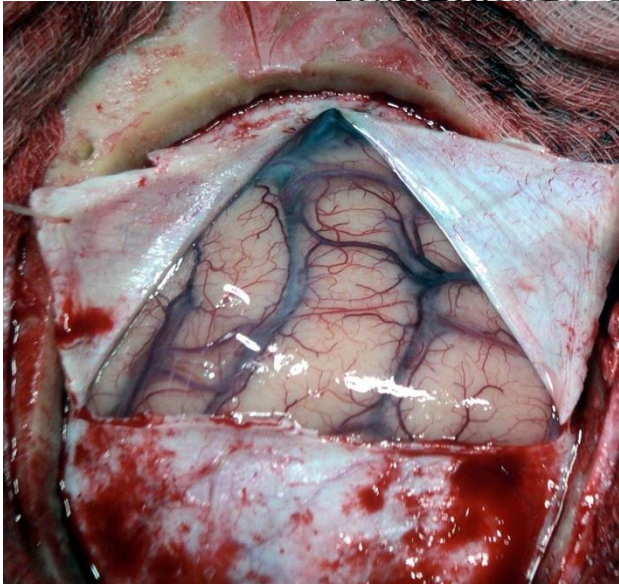
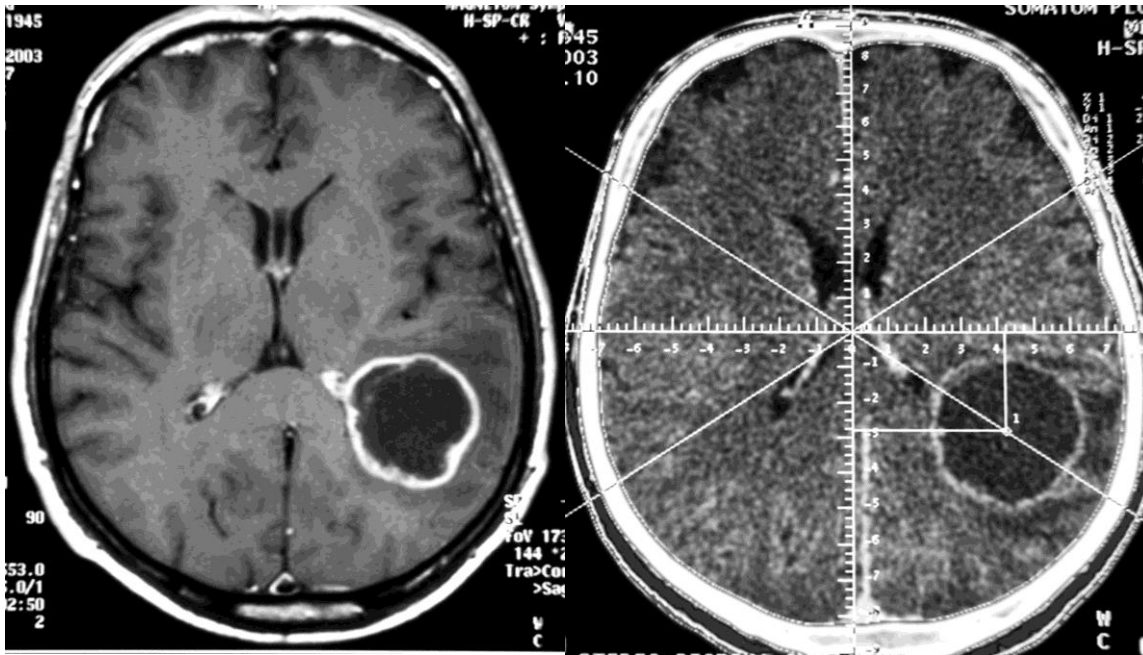
Frontobasal meningeoma 7 days after surgery





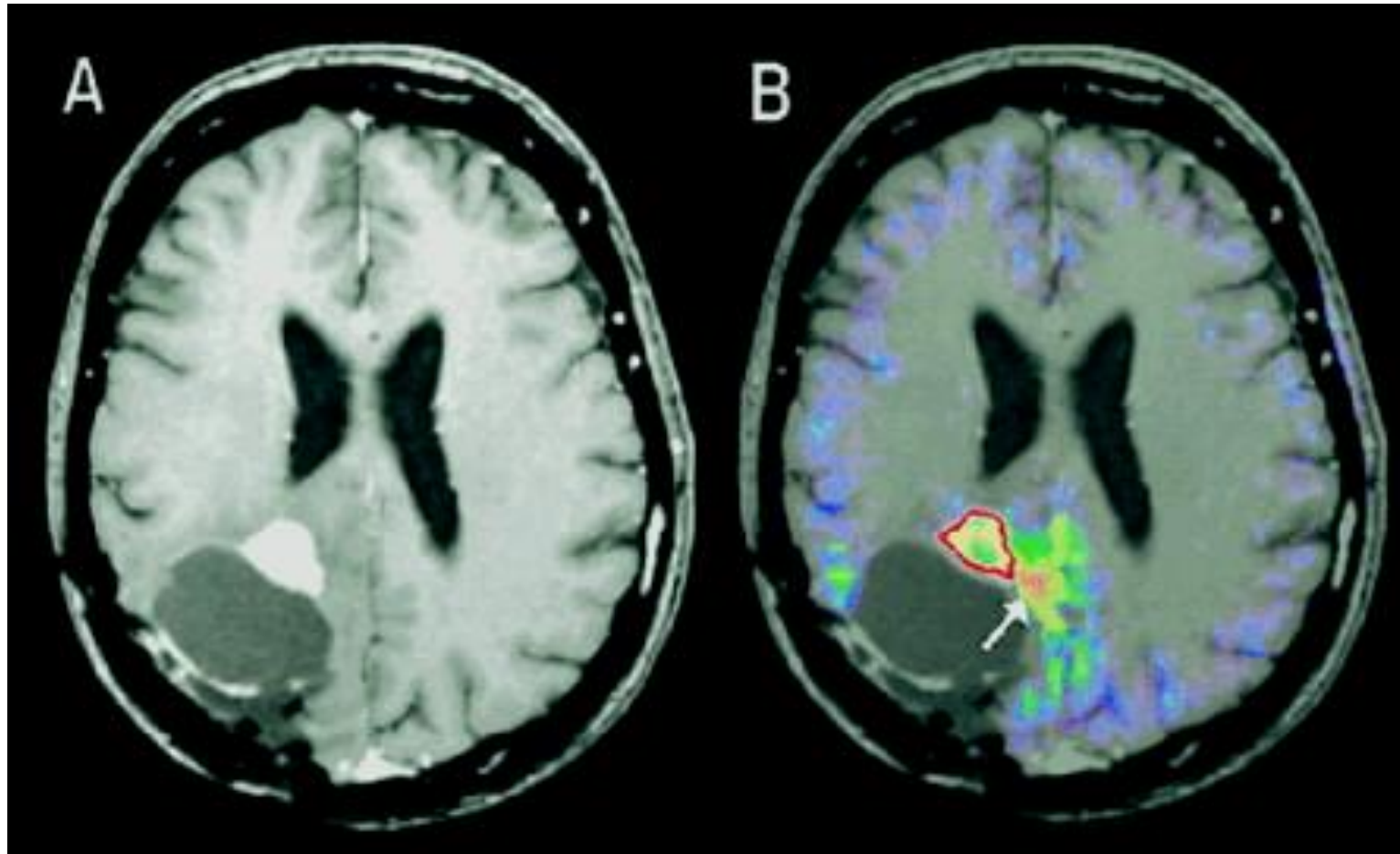
Contrast enhanced
CT scan 2 days after
surgery

Glioblastoma



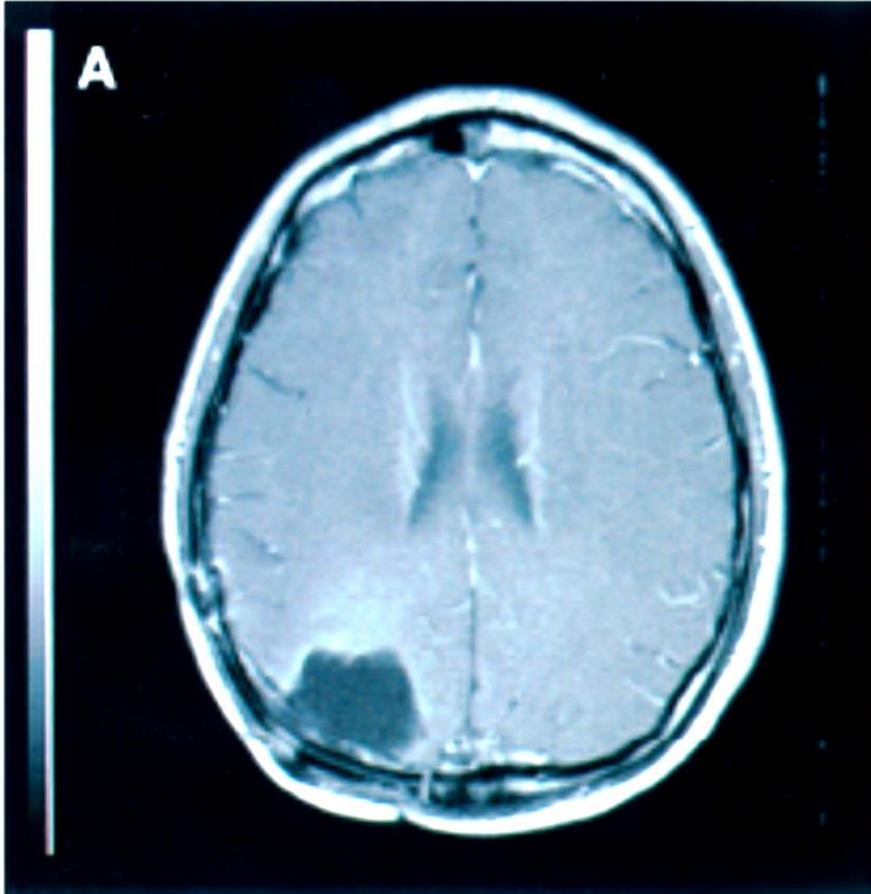
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36

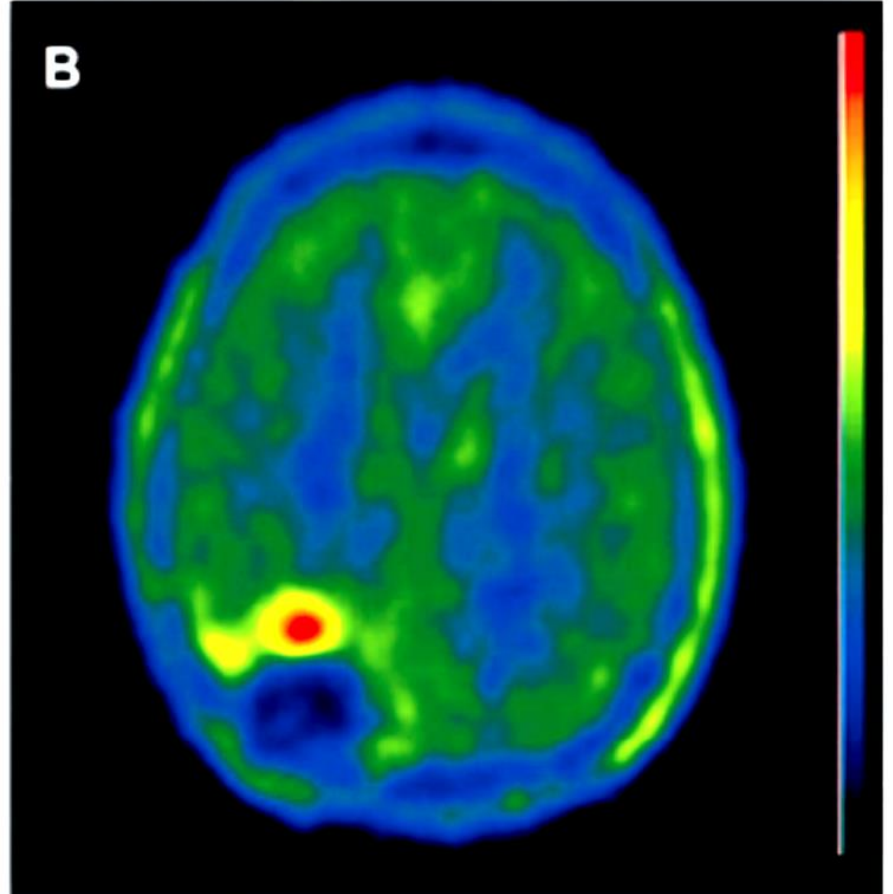


A, T1-weighted MRI scan with gadolinium-diethylenetriamine penta-acetic acid shows contrast enhancement of the suspected lesion at the mesial wall of the cavity where the tumor was removed. B, fusion of coregistered [11C]methionine PET and MRI shows increased tracer uptake (arrow) outside the contrast-enhancing area (red contour in B corresponds to contrast enhancement in A).

A3 after multimodal therapy

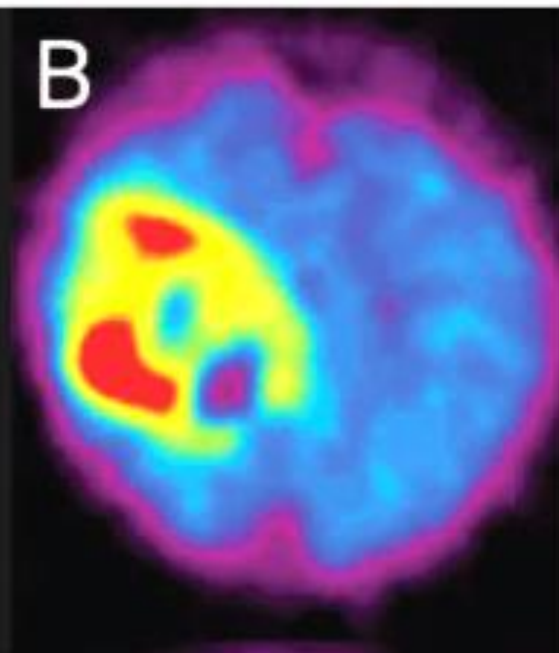
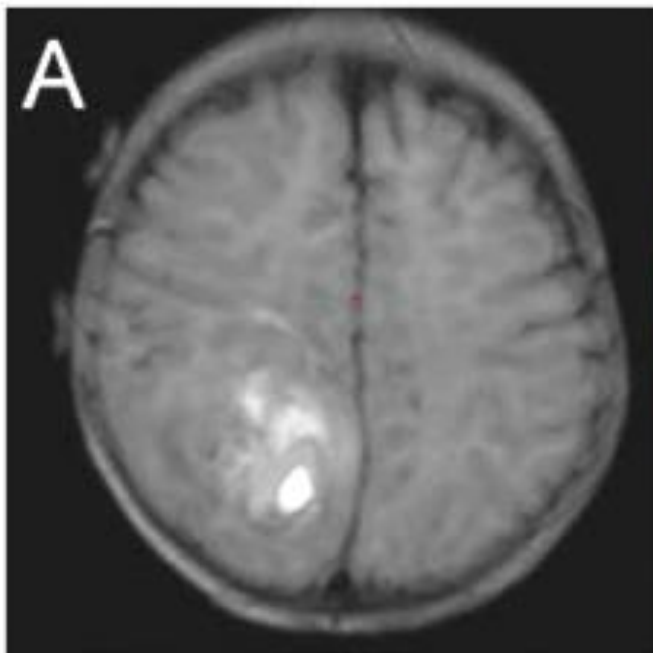


enhanced MRI



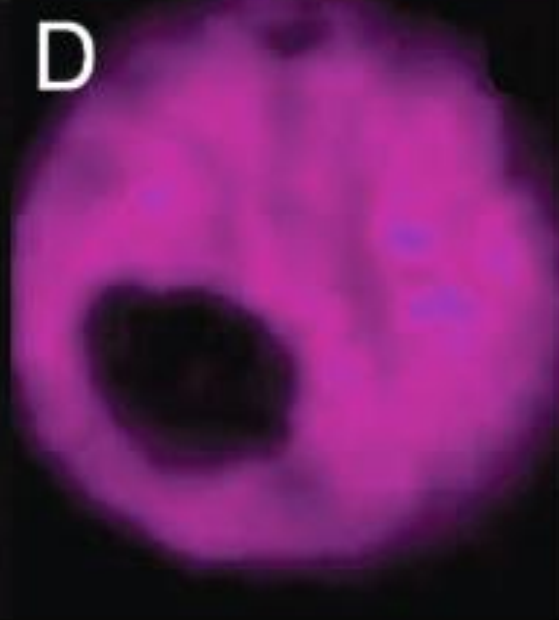
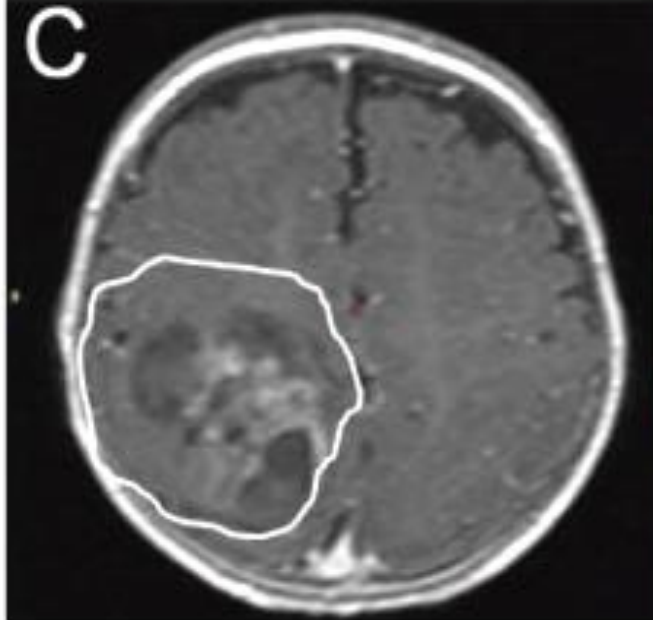
FET-PET

11F



preop

ganglioglioma



postop

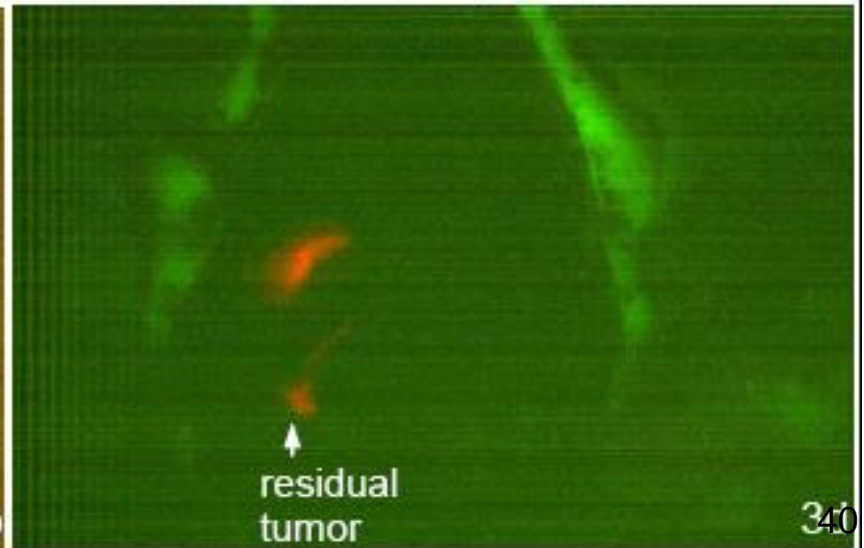
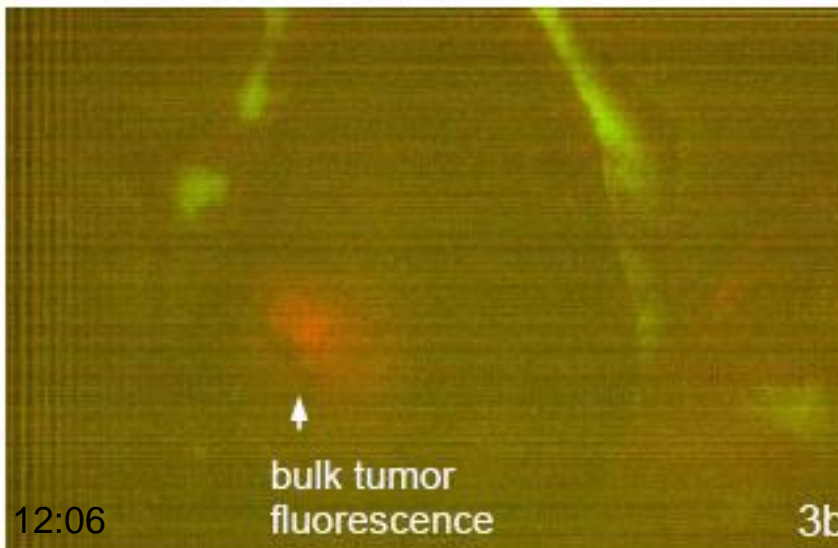
12:06

Flair GadMRI

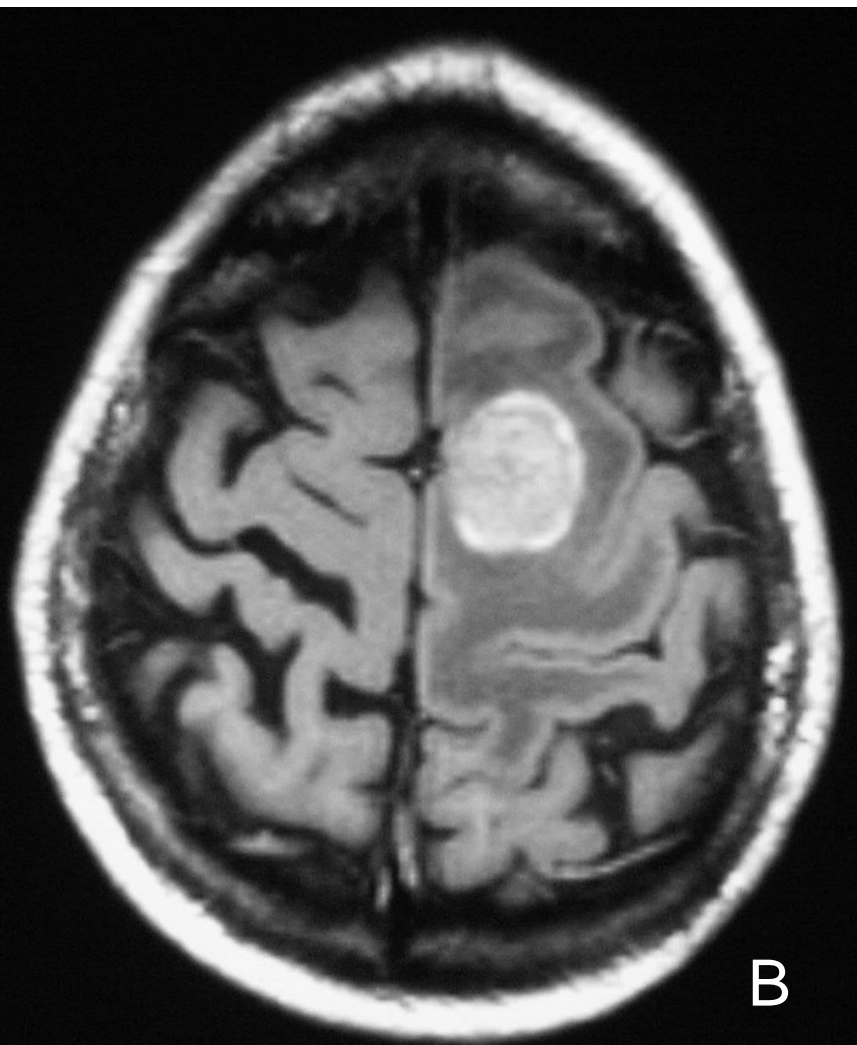
Met-PET

39

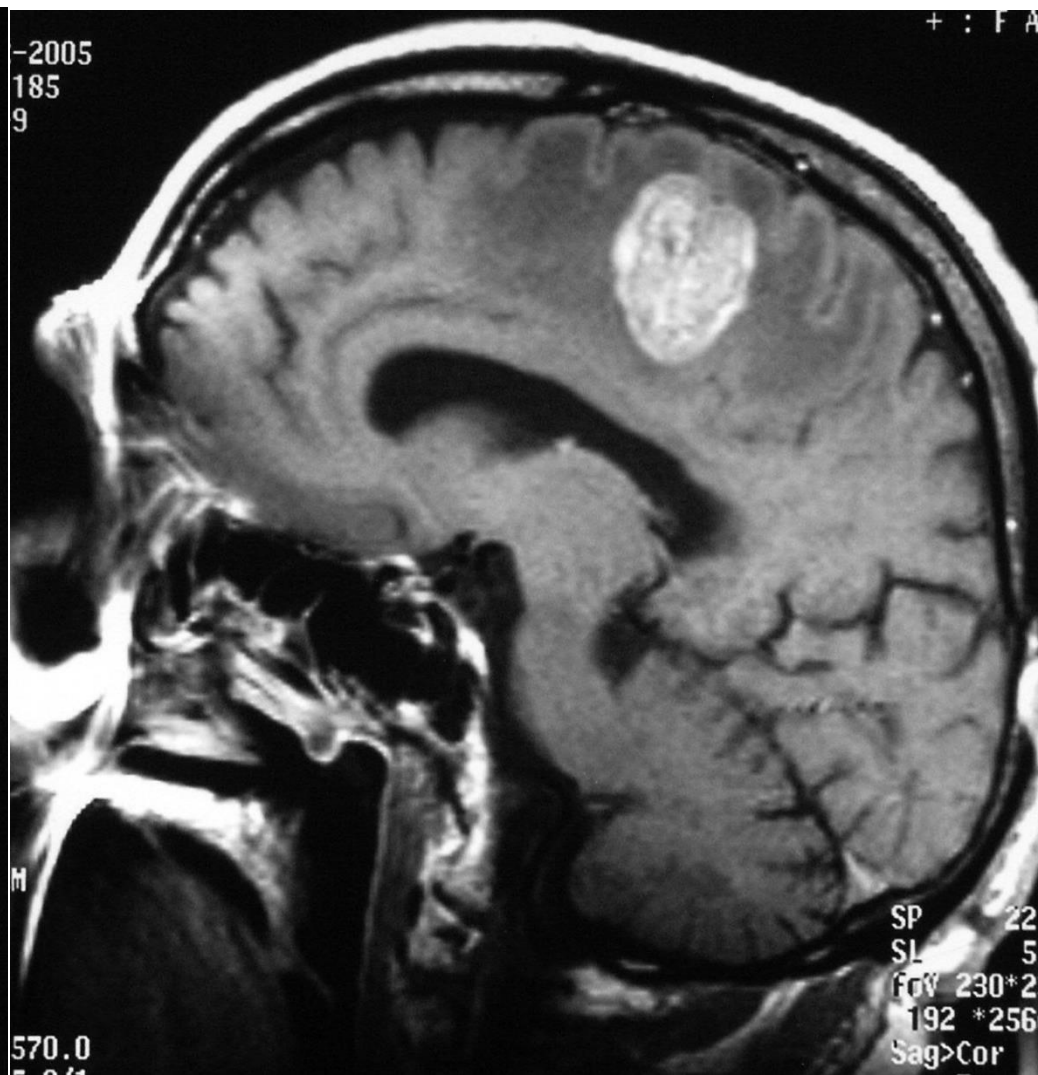
Intraoperatív fluorescens imaging



87y M



B





A professor rövid beszédet mondott az ünnepségen



**Myxopapillary
ependymoma
24y F**

← preop

3 years
postop



G17/04/72
APR-1972
18
MAY-1999
CE 30
1-4

OPNIBudapest
H-SP VB33A
+ : F A L

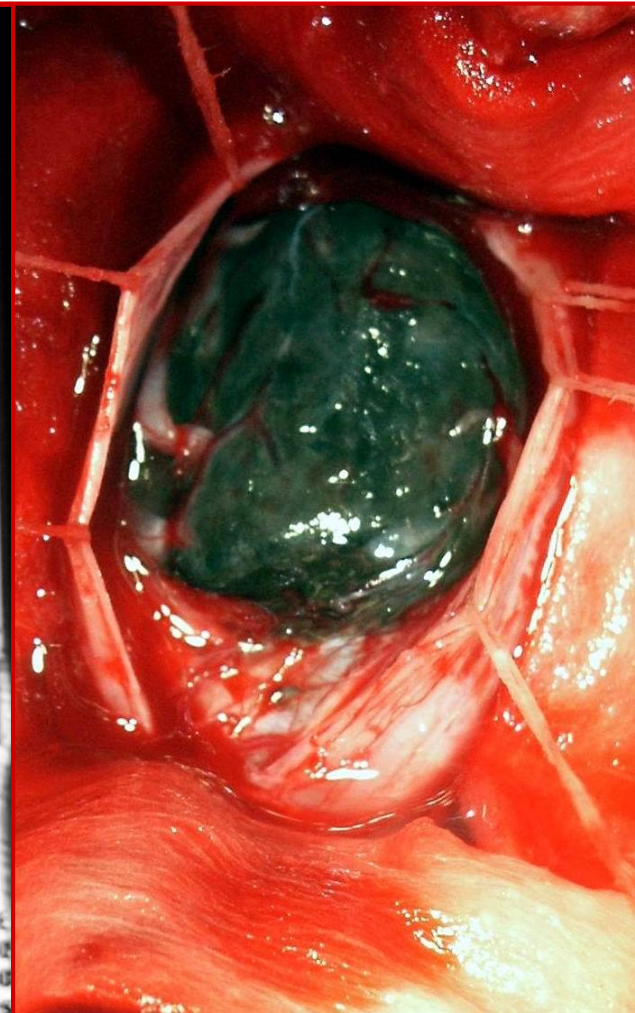
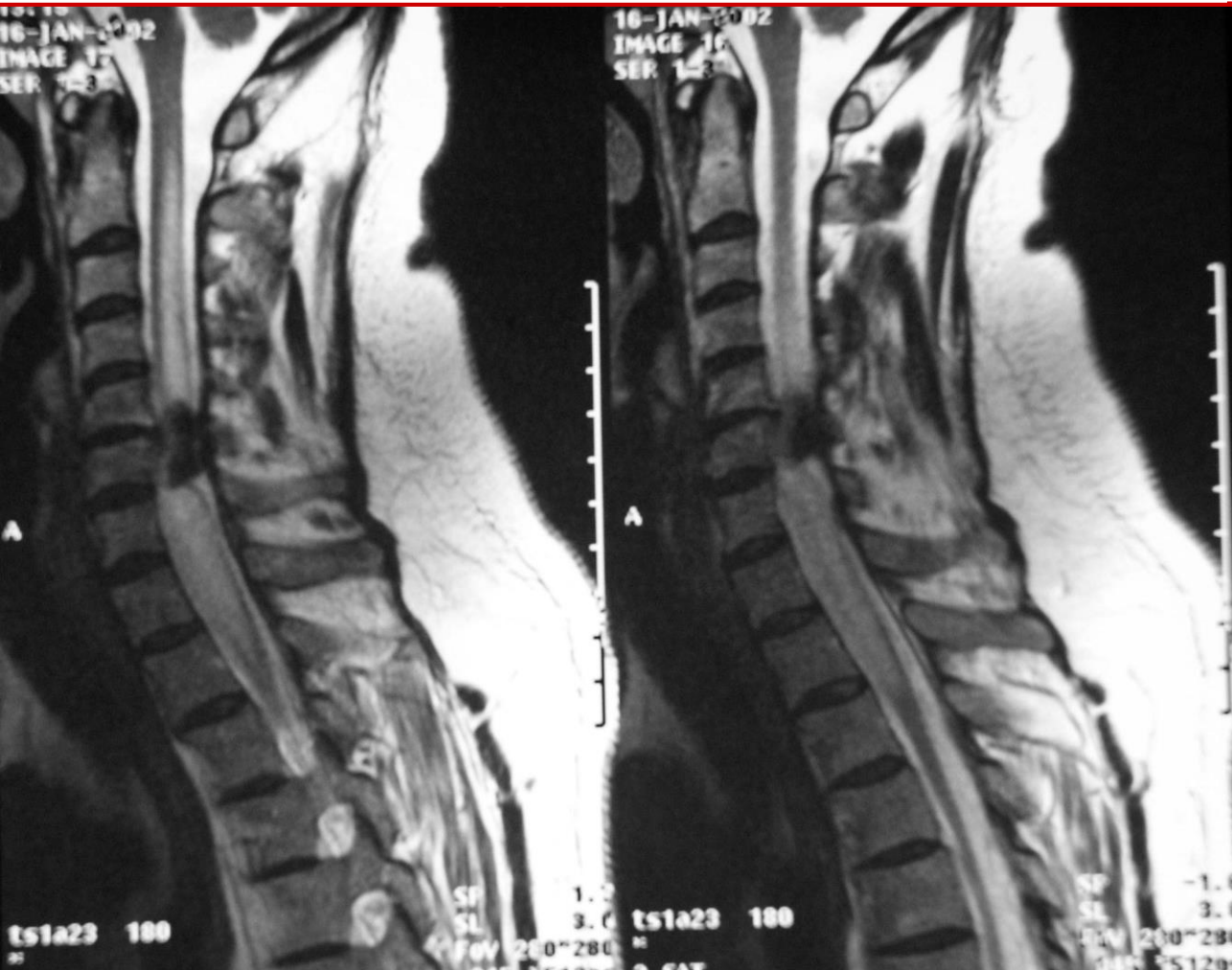
T
800.0
17.0/1
02:09
2

SP 5.6
SL 4.0
FoV 175*280
156 *256o
Sag

MAGNETIST

1512

48y F, primary ectodermal melanocytoma



Importance

- Stroke is the most frequent manifestation of cerebrovascular disorders (szélütés, Hirnschlag, stroke)



Cerebrovascular diseases (CBVD) are conditions that develop as a result of problems with the blood vessels inside the brain

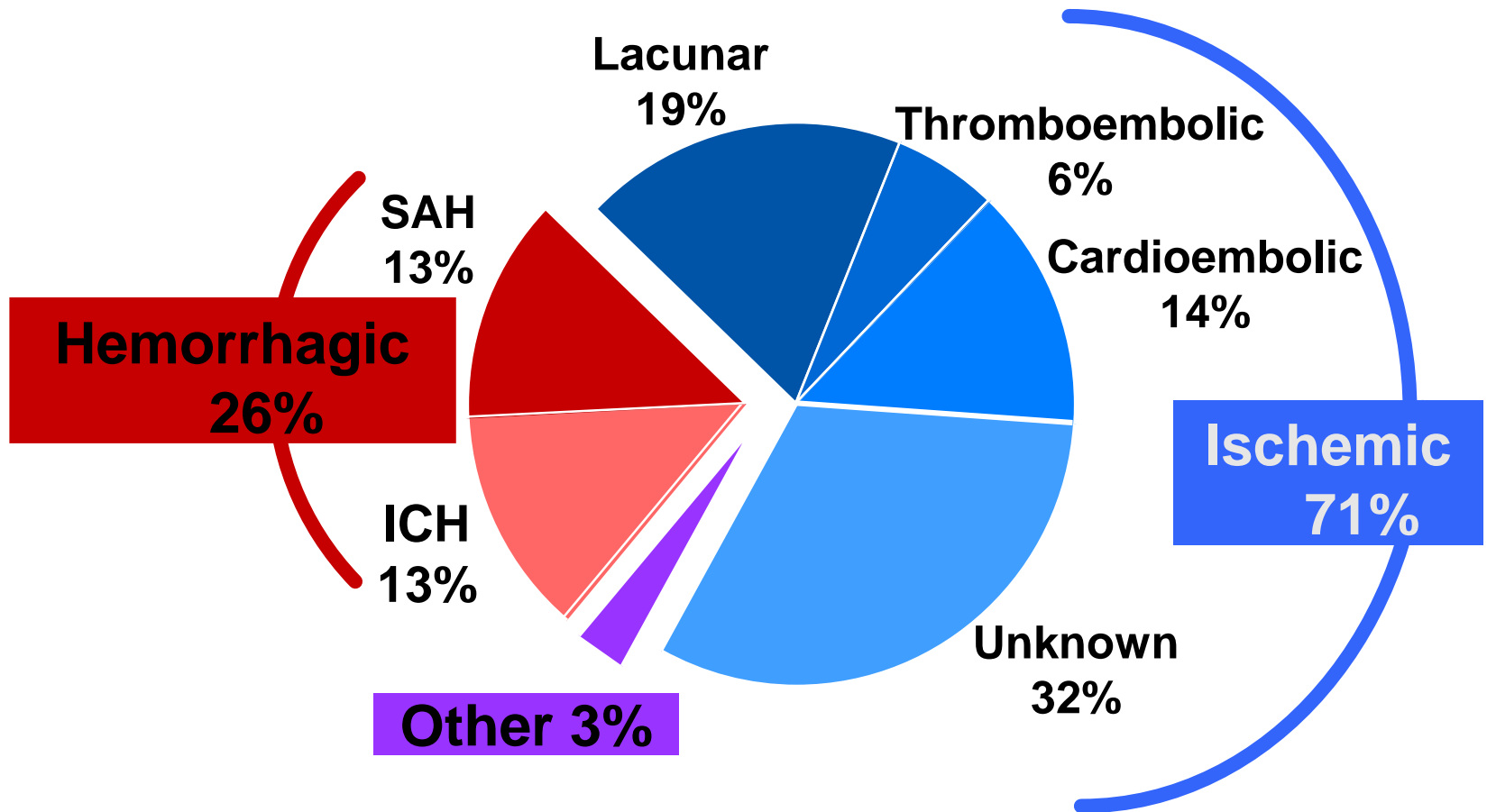
stroke – a serious medical condition where the blood supply to the brain is disturbed

Hans Mielich
IV. Wilhelm Duke of Bavaria
Dying after suffering a stroke
1550
München, Bavarian National Museum

Clinical manifestations

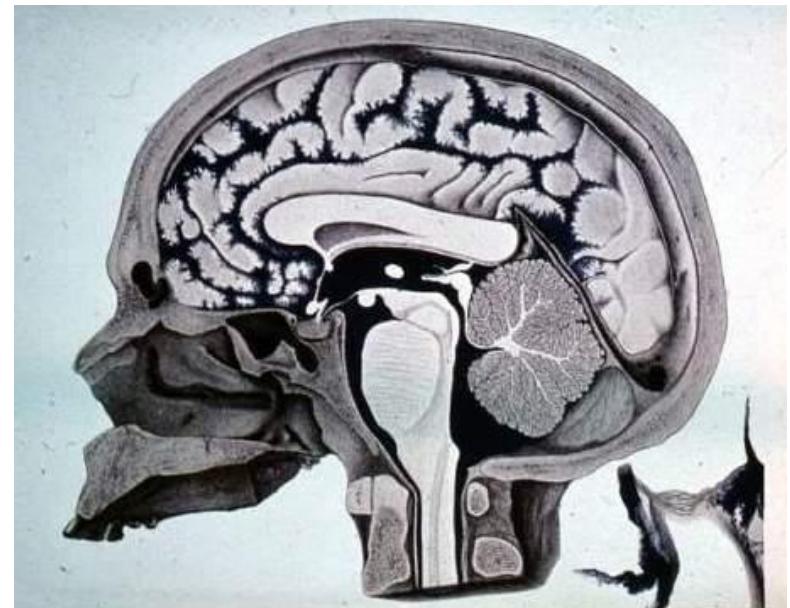
- Ischemic stroke
- Subarachnoidal hemorrhage (aneurysm rupture)
- Arteriovenous malformations
 - Angiomas
 - Cavernomas (cavernous hemangiomas)
 - Dural A-V fistulae
 - Carotideo-cavernous fistulae
- Intracerebral hematomas

Epidemiology – different stroke types



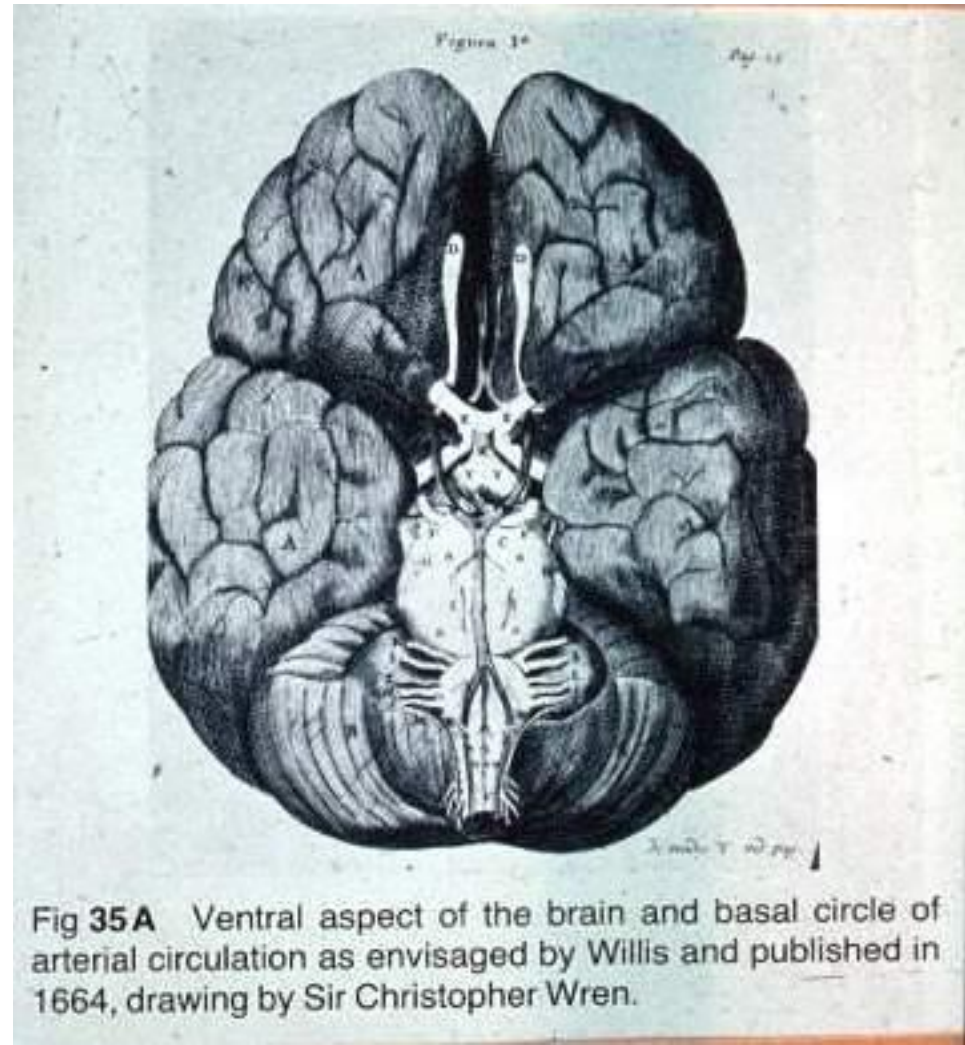
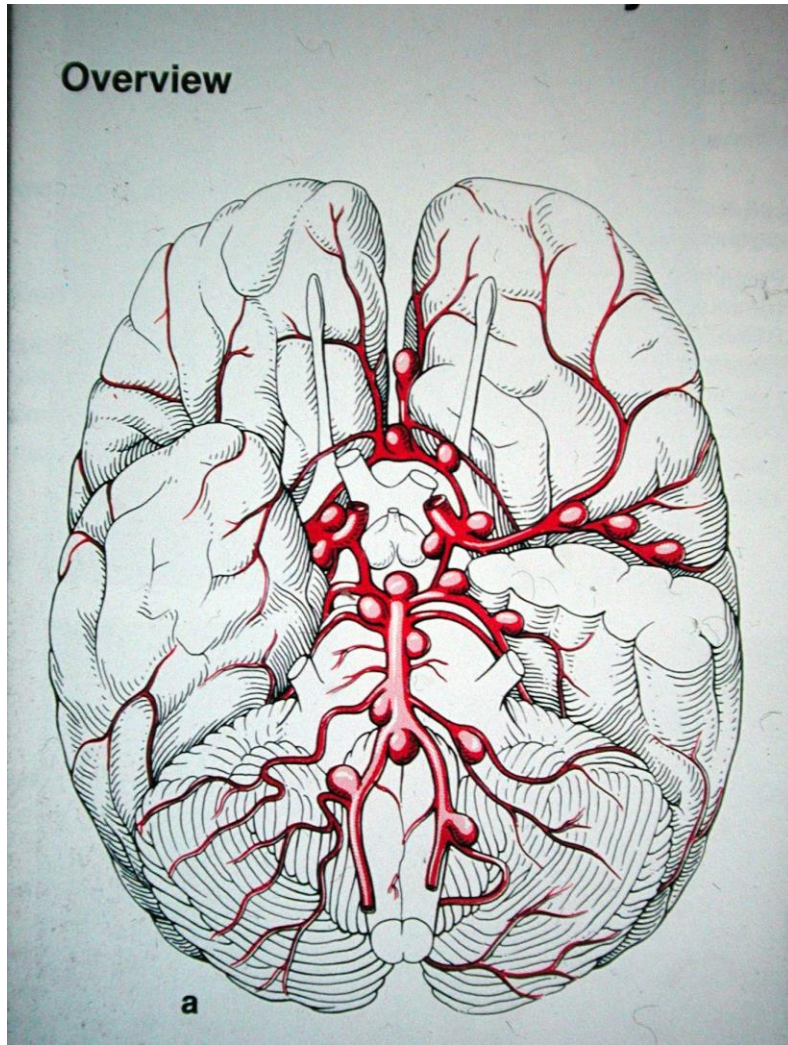
Symptoms of intracranial bleeding

- Subarachnoidal hemorrhage
 - Sudden onset (ictus cerebri)
 - Headache, nausea, vomiting, dizziness
 - Loss of consciousness (LOC)
 - Focal signs
- Intracerebral hemorrhage
 - Focal signs
 - Consciousness maintained



Subarachnoidal spaces from Key and Retzius

Incidence of aneurysms –according to localization

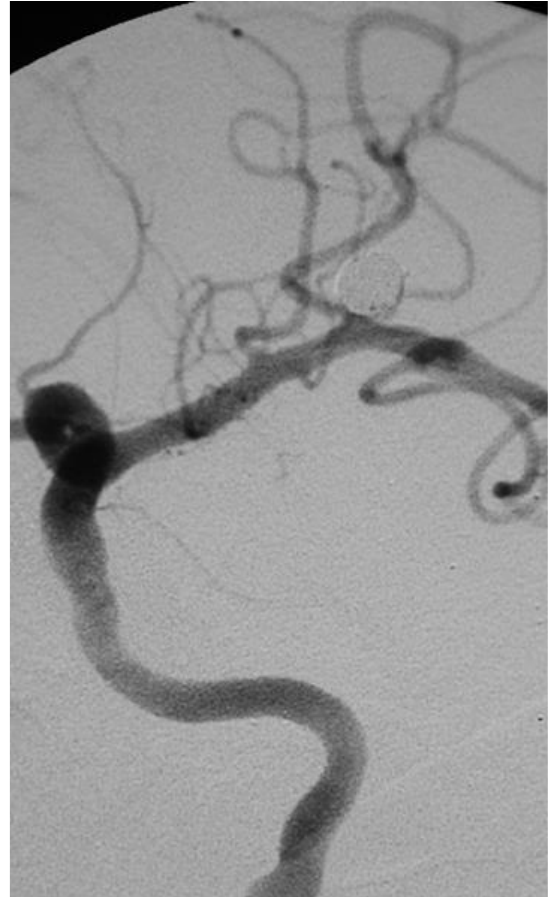
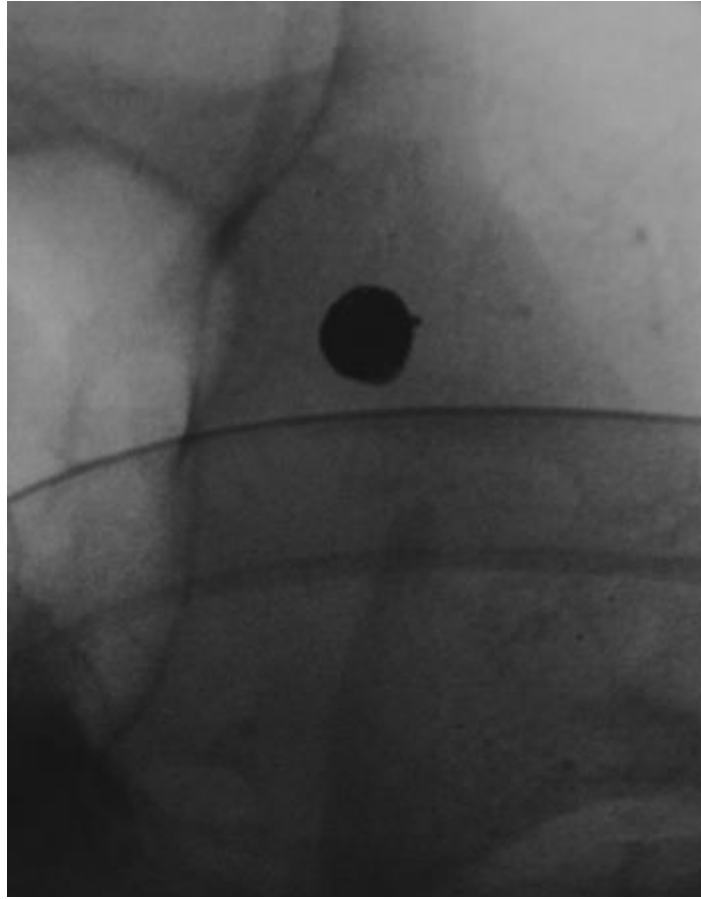
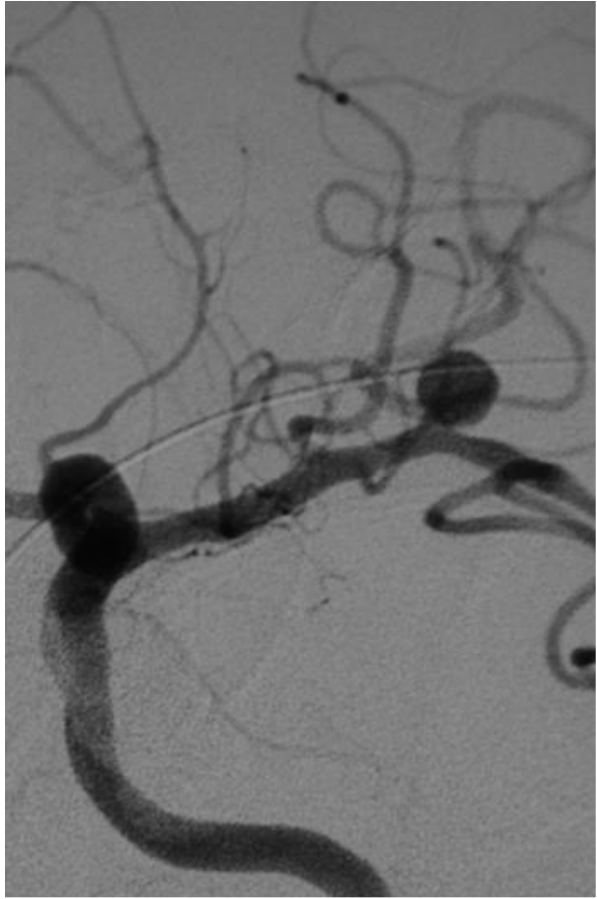


Treatment of aneurysms

- Rule of thumb: the aneurysm must be excluded from the circulation
 - Evolution of the concept
- Direct clipping
 - Safely prevents re-bleeding (long-term experience)
 - Higher treatment risk
- Endovascular obliteration (coiling)
 - Long-term experience is less
 - Low treatment risk
- Vasospasm

Aneurysm obliteration with microcoils





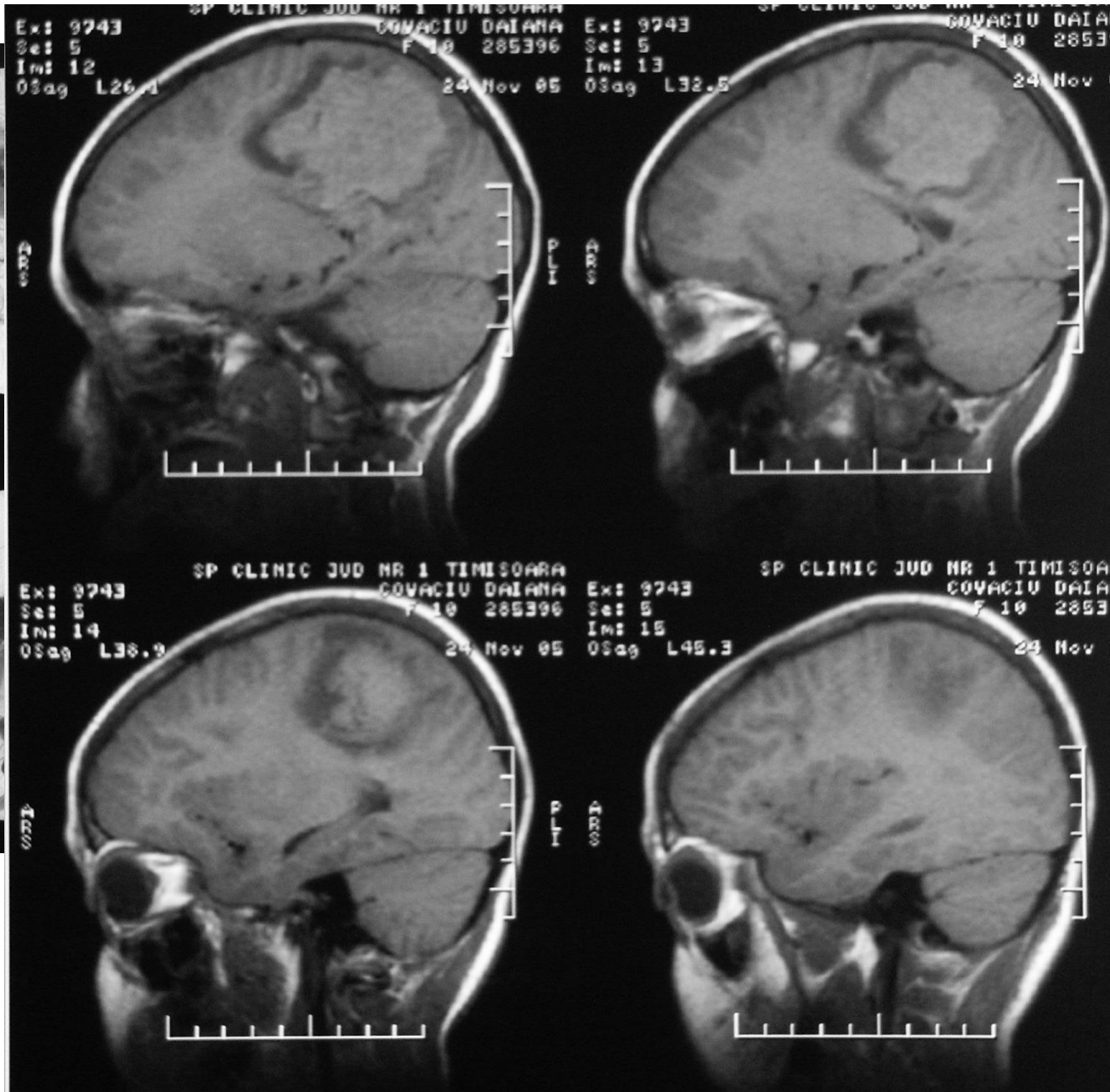
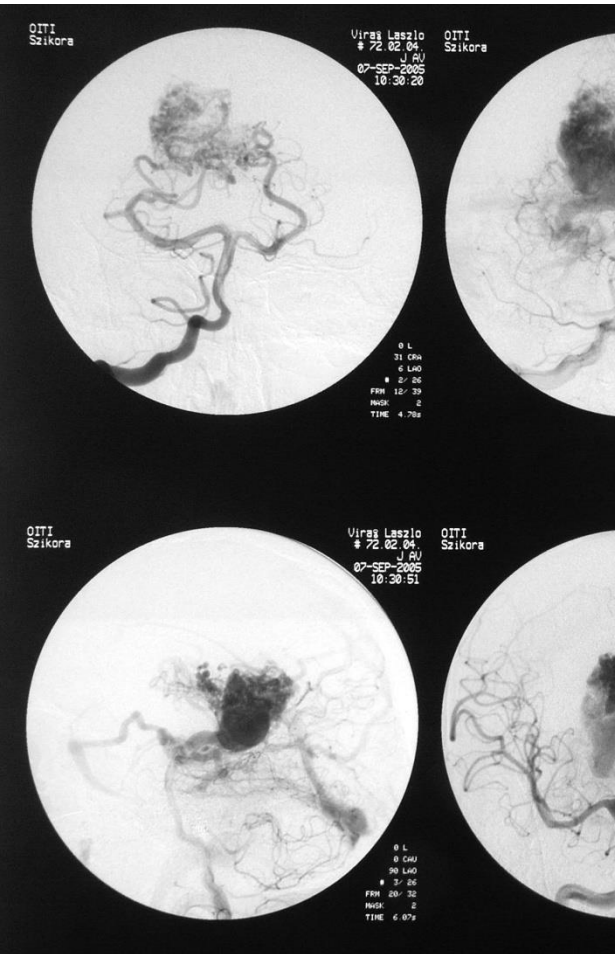
Angiomas

high flow A-V malformations

- Treatment: combined, multimodal
 1. Endovascular embolisation
 2. Resection of residuals either by surgery
or
 1. radiosurgery (small, compact, non-bleeding angiomas)

Results are excellent, low mortality and morbidity – as compared to previous results

Angiomas



Cavernomas

low flow A-V malformations

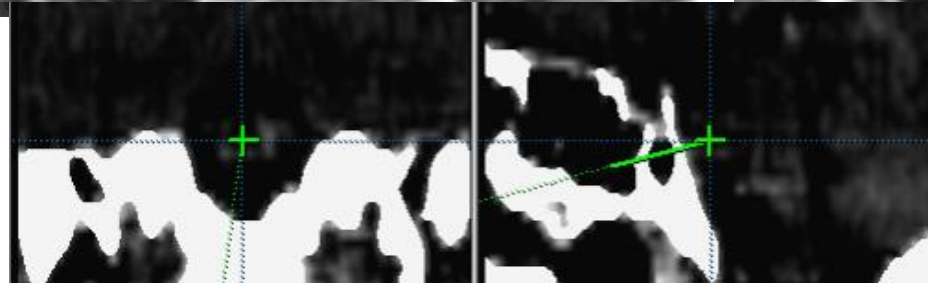
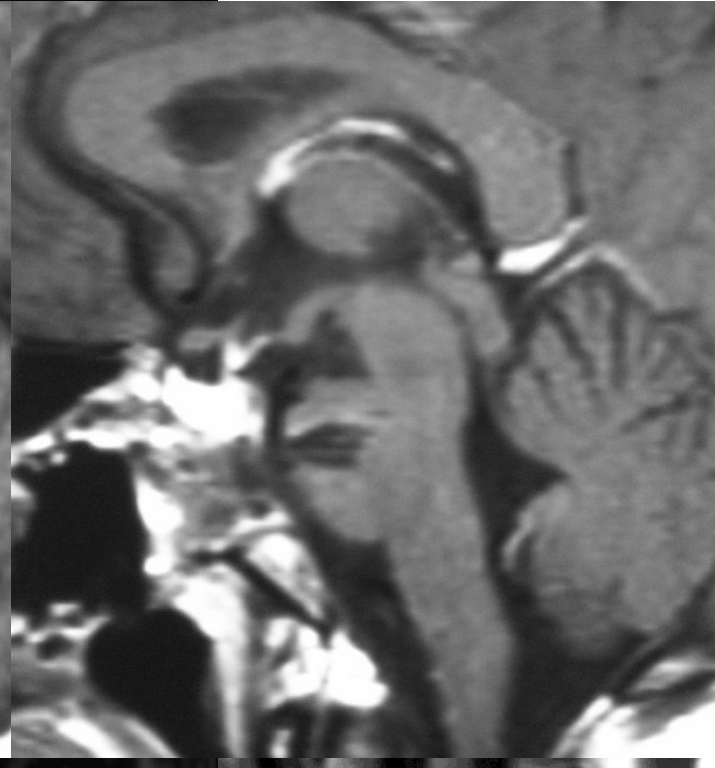
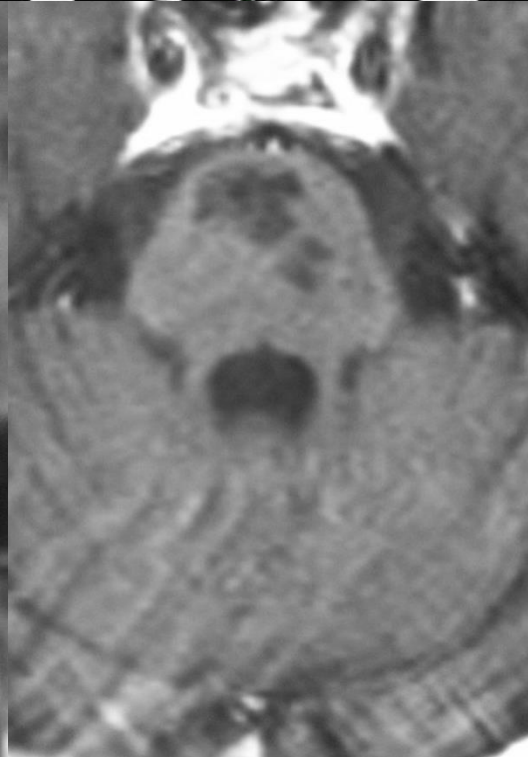
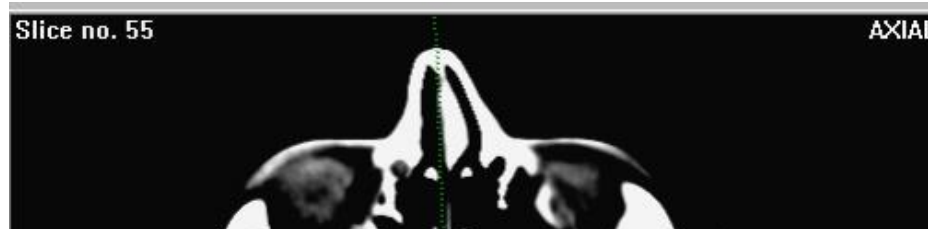
- Anywhere may occur in the CNS – even multiple
- Its more prone to bleeding
 - Bernoulli's law
- Cavernomas causing bleeding need surgical resection
 - Localization can be a challenge

21y F



Cavernoma in the pons

31F

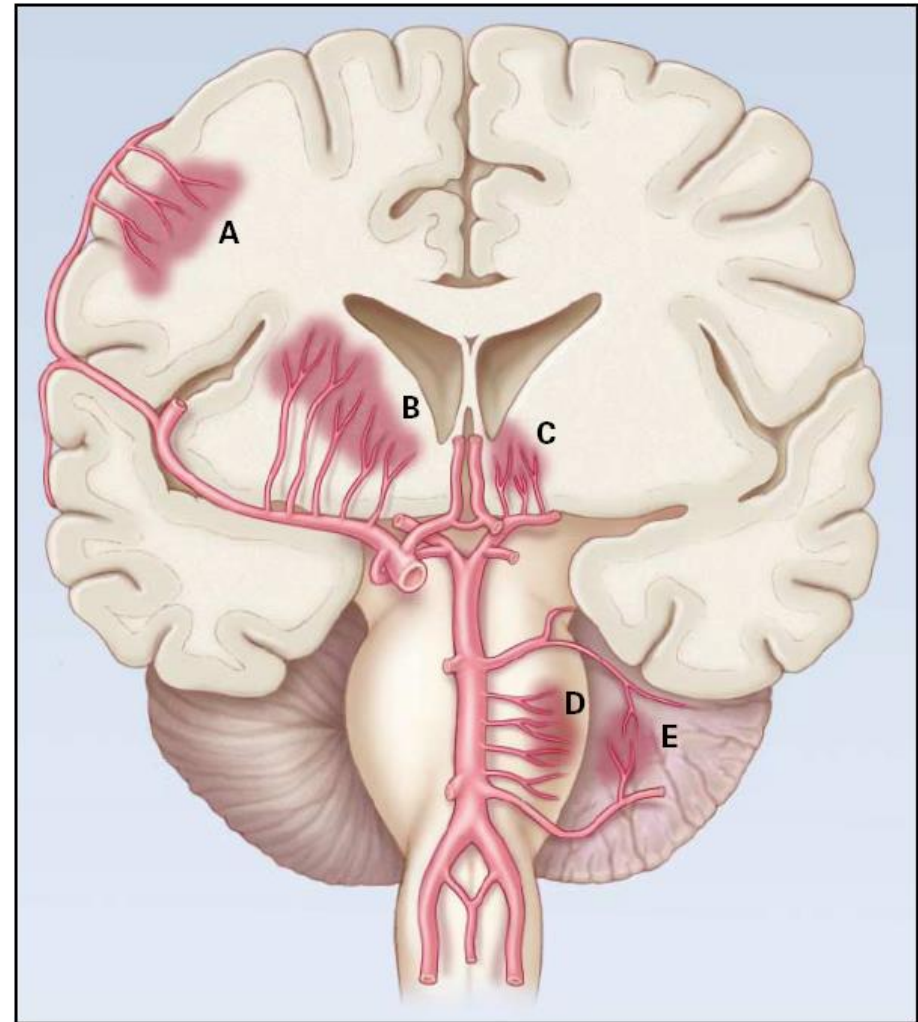


Intracerebral hematoma

- Treatment strategy is still not clarified
 - It is not a surgical-technical problem!
 - There is no unequivocal answer: what to do and when

Intracerebral haematoma

(not caused by malformation)



Surgery of intracerebral haematoma



"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

Thank you for the attention!

