INTRACRANIAL ARACHNOID CYSTS: CLASSIFICATION AND MANAGEMENT

G. Tamburrini,

Rome

Incidence

2% of occasional neuroradiological findings

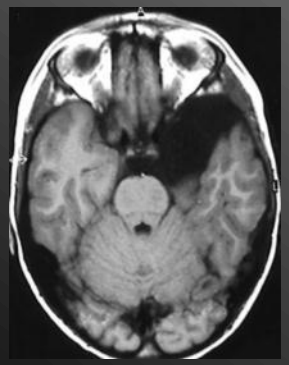
From clinical studies (1960's): 0.4-1% of intracranial space occupying lesions (bias: asymptomatic cases)

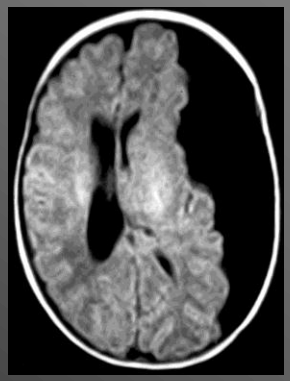
From autopsies: 0.1% (bias: tearing of the lining when brain is removed)

Classification:

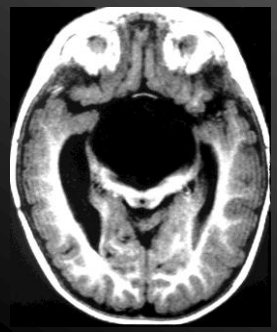
SUPRATENTORIAL

- Syivian fissure

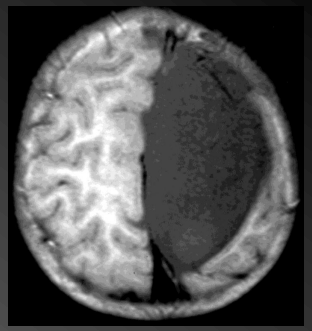




- Sellar region

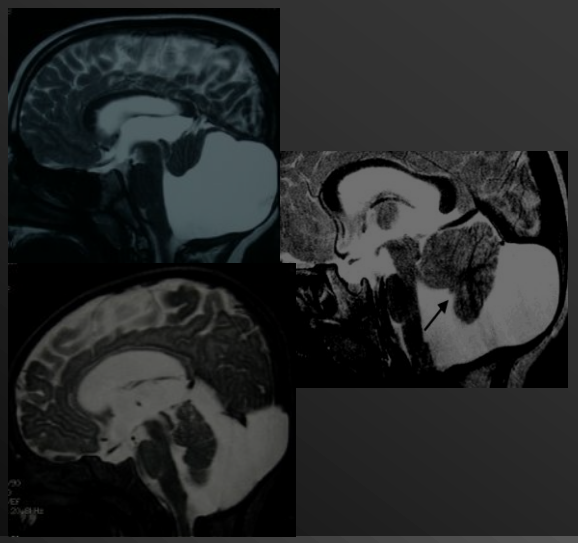


- Interhemispheric / Parasagittal



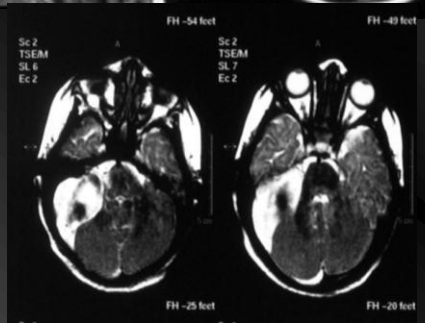
INFRATENTORIAL

- Dandy-Walker Malformation (DWM)
- Mega Cisterna Magna (MCM)
- Dandy-Walker Variant (DWV)
- Persisting Blake's Pouch



- **Arachnoid Cysts (AC)**
- **- Retrocerebellar**

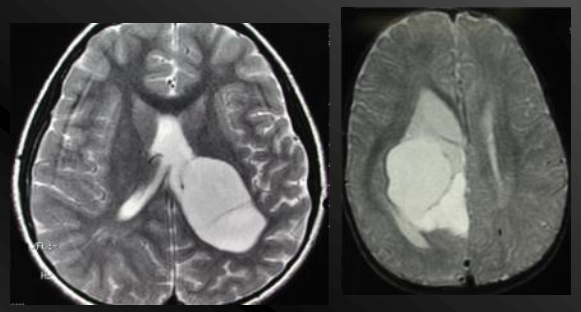
- **- Laterocerebellar**



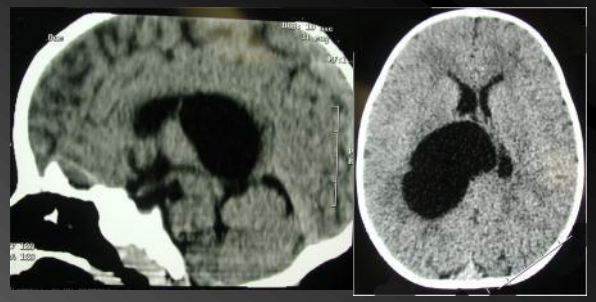
INTRA/PARAVENTRICULAR

- Quadrigeminal region / Tentorial notch

Subependymal/ paraventricular cysts



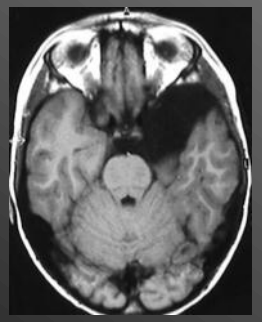
- Choroid plexus cysts



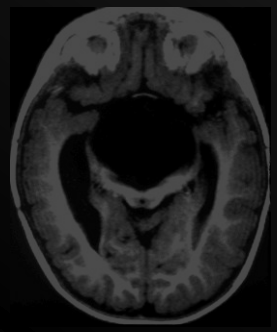
Classification:

SUPRATENTORIAL

- Syivian fissure (SAC) (50%)



- Sellar region



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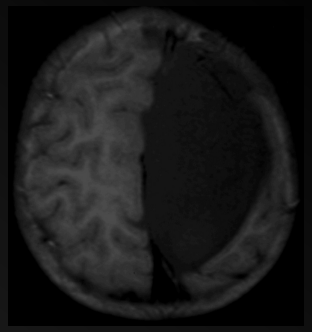
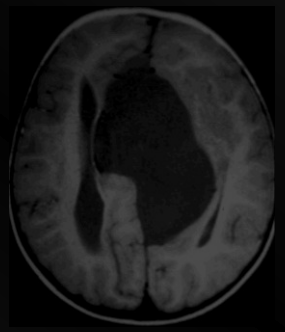
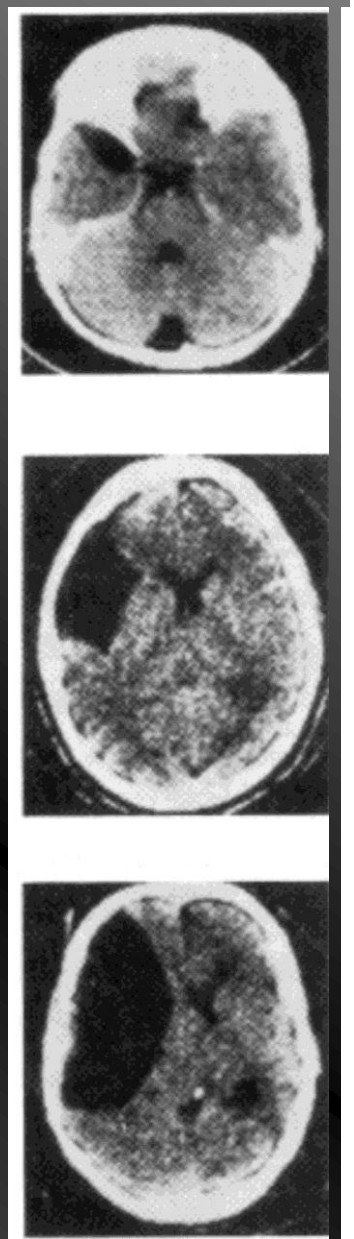




Sylvian fissure cysts:

E Galassi et al.
Surg Neurol 17:363-369,1982

CT Scan and Metrizamide CT Cisternography in Arachnoid Cysts of the Middle Cranial Fossa: Classification and Pathophysiological aspects



PROBLEMS
1.NATURAL HISTORY

- Quiescient throughout life
- Dormant for years before showing clinical manifestations
- Occasionally disappearing spontaneously

NATURAL HISTORY

- Progressively enlarging, compressing and dislocating surrounding structures, and interferring with CSF circulation

NATURAL HISTORY

Pathogenesis of enlargement:

- Ball-valve mechanism

  (microsurgical and endoscopic observations)
- Fluid production by the cyst wall cells

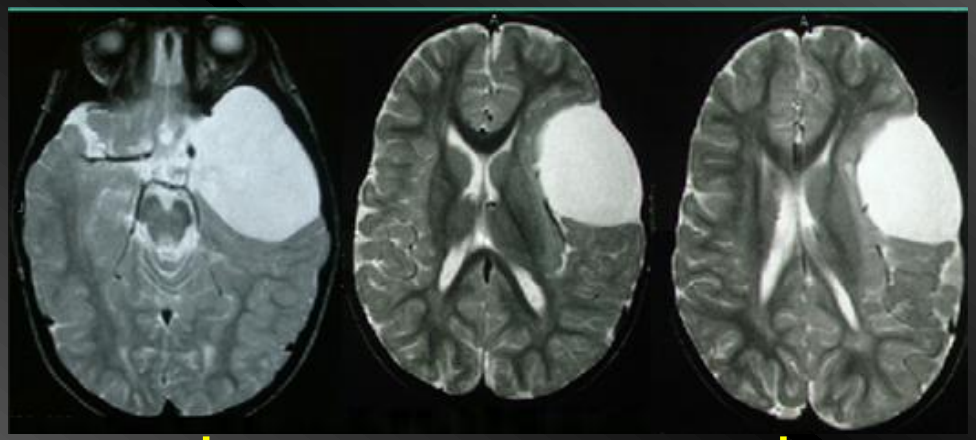
  (similar to the subdural neuroepithelium)
- Osmotic gradient

Are all related SYMPTOMS?

- Headache ?
- Macrocrania, focal skull enlargement
- Intracranial hypertension
- Focal neurological deficits
- Seizure disorder ?
- Psychomotor retardation ?

..a survey

Tamburrini et al,
Child's Nerv Syst, 2008
INTERNATIONAL SURVEY ON NEUROSURGICAL ATTITUDE RECOMMENDATIONS



..the case proposed

HEADACHE

Indication for surgery: 13.3%
Prophylactic surgery: 28.8%

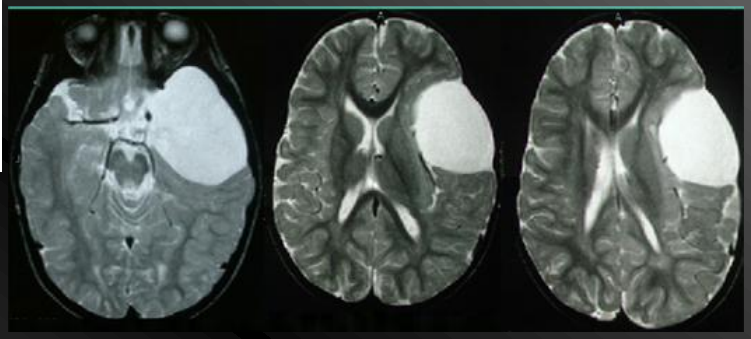
Prolonged clinical follow-up and seriated MR: 42%

……HEADACHE

Tamburrini et al,
Child's Nerv Syst, 2008

- Presenting sign: up to 70% of "symptomatic" cases
- Chronic, unspecific, unrelated to cyst size, compression,distortion of surrounding cerebrovascular structures
- Unrelated to intracystic pressure

BENEFIT OF ICP RECORDING CONTROVERSIAL



Tamburrini et al,
Child's Nerv Syst, 2008
INTERNATIONAL
SURVEY ON
NEUROSURGICAL ATTITUDE
RECOMMENDATIONS

SEIZURES

Indication for surgery: 37%

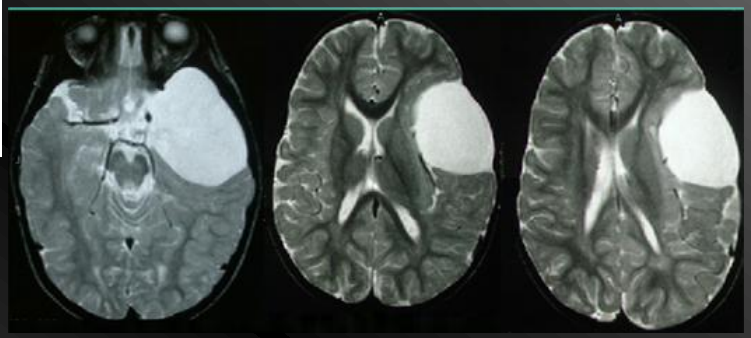
Prophylactic surgery: 26.6%

Prolonged clinical follow-up and seriated MR: 15.5%

……SEIZURES

Tamburrini et al,
Child's Nerv Syst, 2008

- Extensive documentation in literature on the uncertain correlation between surgical excision of the cyst and epilepsy control
- One fourth of the patients may have developmental cortical anomalies far from the cyst
- Rare concordance between cyst location and seizures semeiology
- Controlateral EEG anomalies common



Tamburrini et al,
Child's Nerv Syst, 2008
INTERNATIONAL
SURVEY ON
NEUROSURGICAL ATTITUDE
RECOMMENDATIONS

PSYCHOMOTOR RETARDATION

Indication for surgery: 31.1%

Prophylactic surgery: 11.1%

Prolonged clinical follow-up and seriated MR: 24.3%

Tamburrini et al,
Child's Nerv Syst, 2008

……PSYCHOMOTOR RETARDATION

- Limited amount of information concerning psychomotor evaluation in literature

……PSYCHOMOTOR RETARDATION

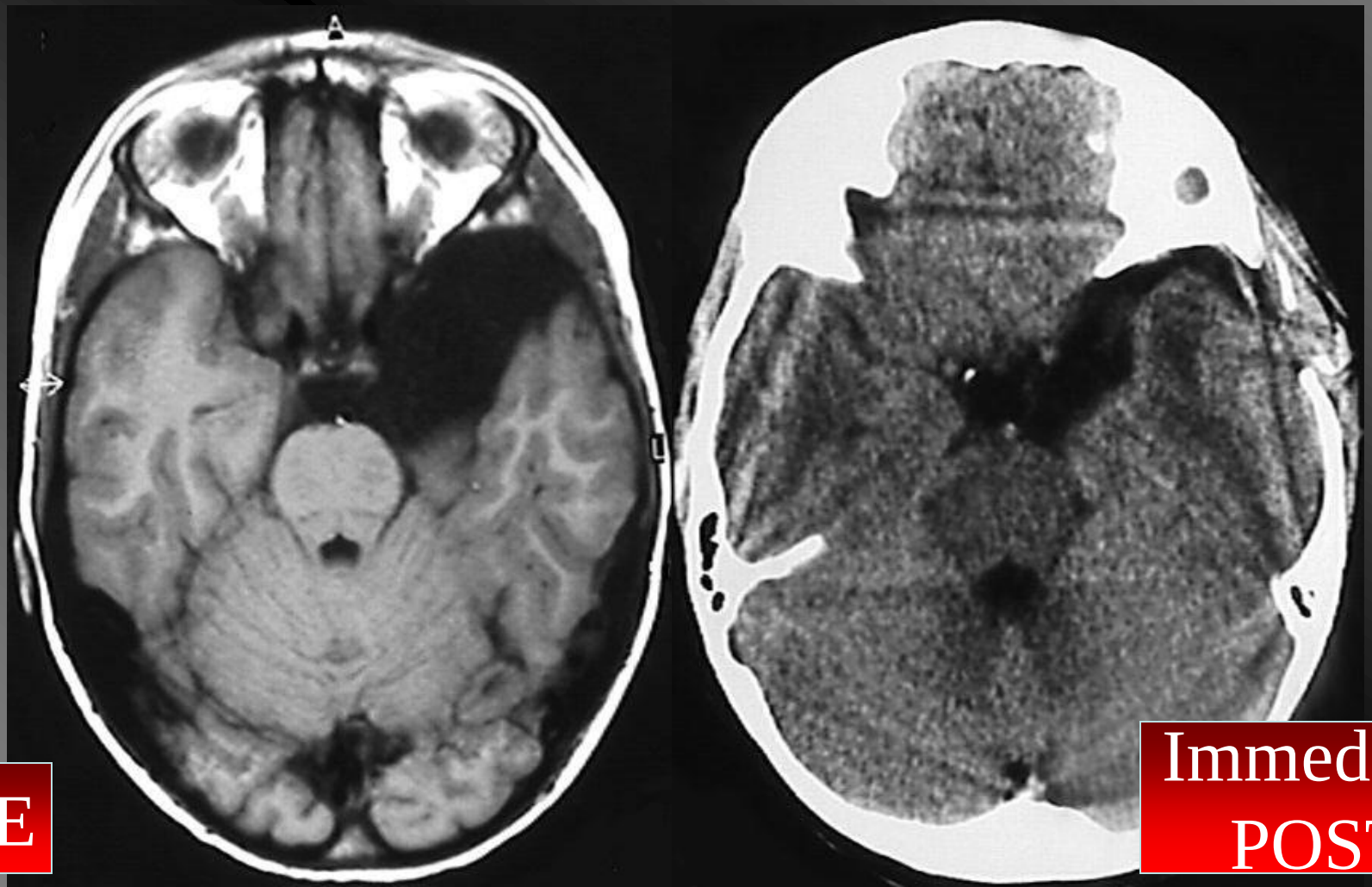
Tamburrini et al,
Child's Nerv Syst, 2008

- Most of the data indicating postoperative cognitive improvement from adults and from one single research group

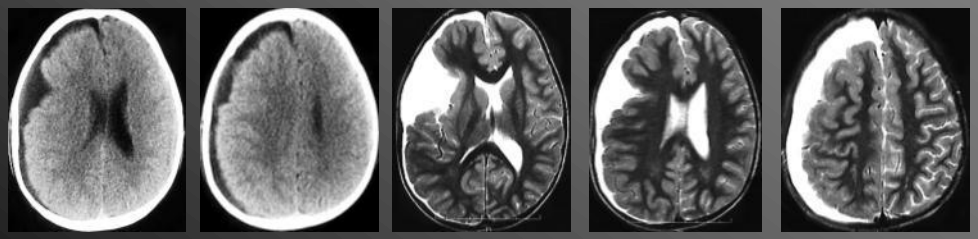
  ("few selected neuropsychological tests"
  "it remains uncertain whether these laboratory test results reflect true clinical problem for the patient")
- Anomalies associated to the reduced volume of the temporal lobe rather than to the volume of the cyst
- Language dominance preserved on the side of the cyst

Is there a role for prophylactic surgery?

9 y old boy. Type II Cyst



…CAN IT AVOID/REDUCE THE RATE OF SUBDURAL HYGROMAS/ HEMATOMAS?



"Prophylactic" surgical treatment of Sylvian arachnoid cysts is weighted by a twofold risk of subdural hygromas (5-7%) than the natural history of the condition (2-3%)

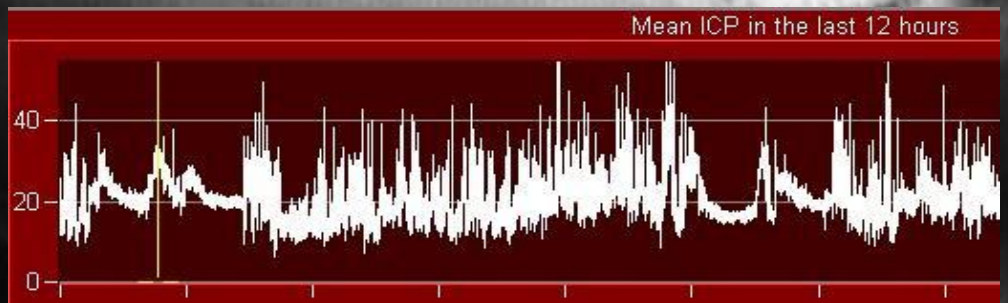
Fewel et al., 1996, Parsch et al., 1997, Donaldson et al., 2000, Gelabert-Gonzalez et al, 2002, Tamburrini et al., 2003

SURGICAL INDICATION

Hypometabolism

Abnormally high ICP

SPECT



Sylvian fissure cysts:

Surgical options:

- Cystoperitoneal shunt

In favor:

1. Easy and
2. Effective operation

- Against:

1. Shunt dependency
2. Plugging of the shun
   by the cyst lining

Sylvian fissure cysts:

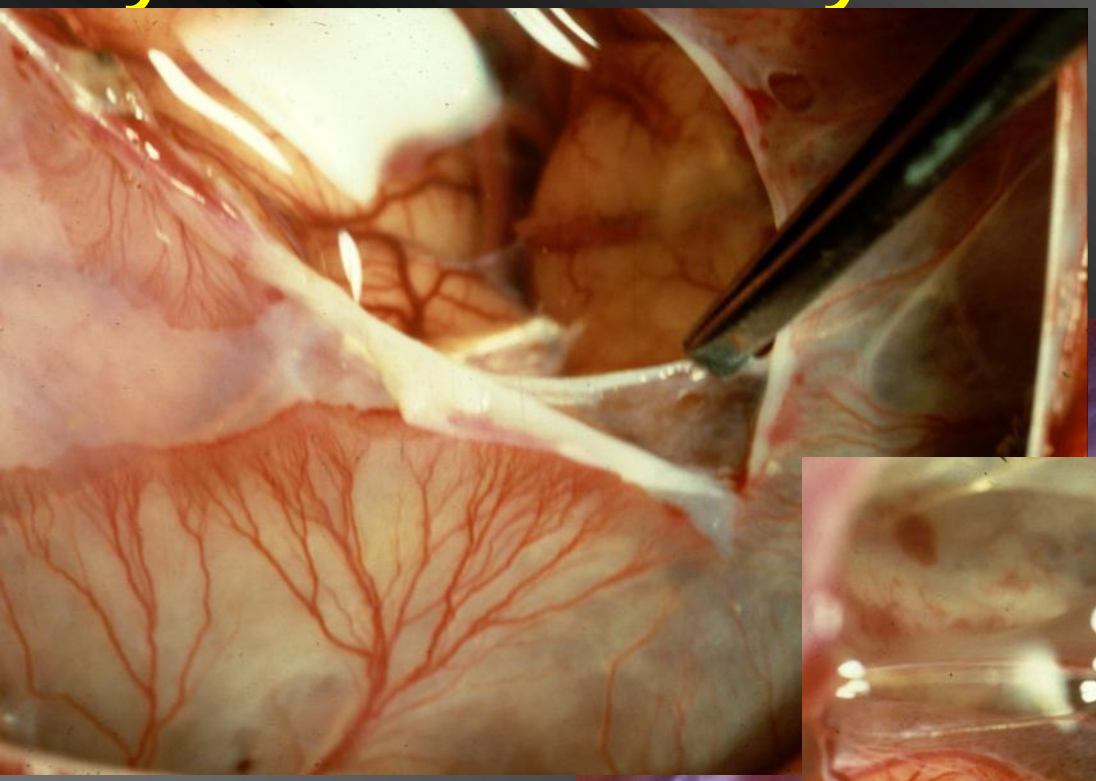
Surgical options:

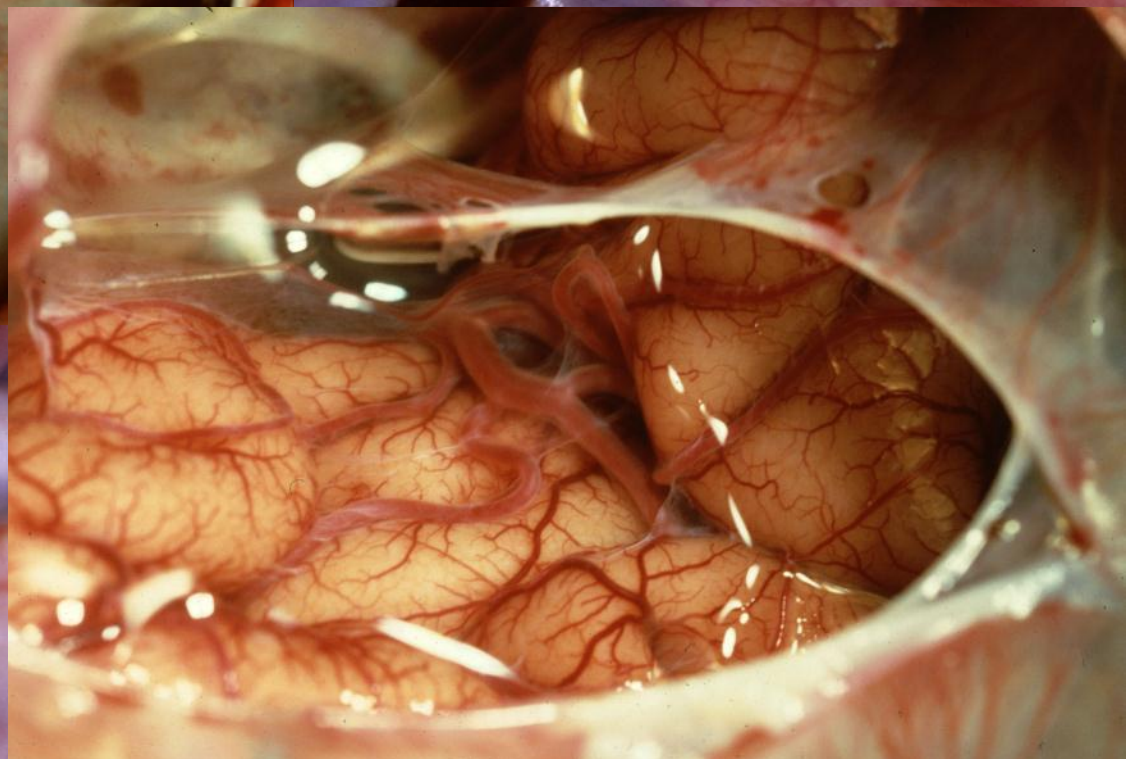
- Craniotomy and cyst lining excision / marsupialization

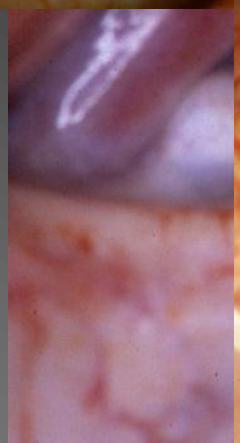
- Against:

1. Severity of the operation
2. Frequent failures
3. Interference with CSF circulation

Sylvian fissure cysts:







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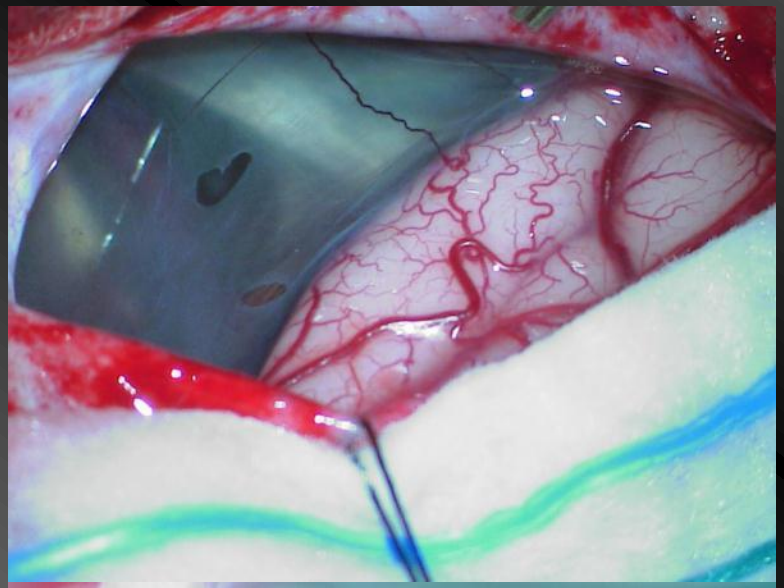
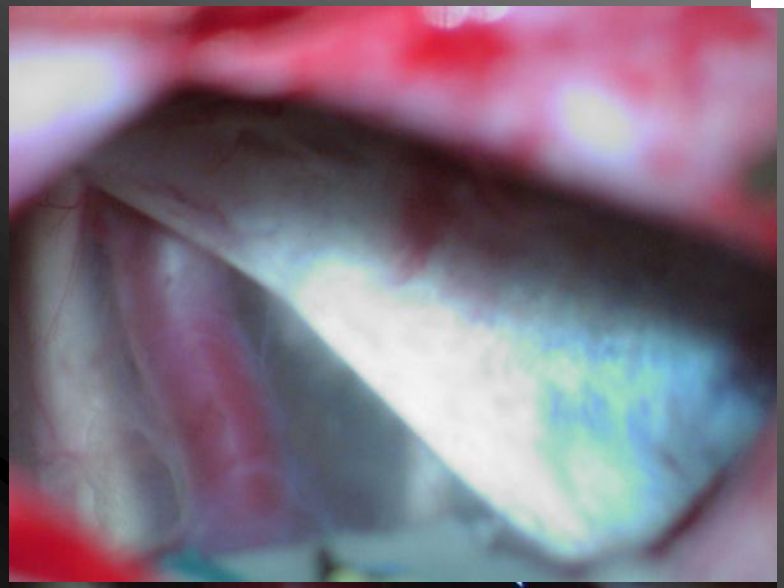
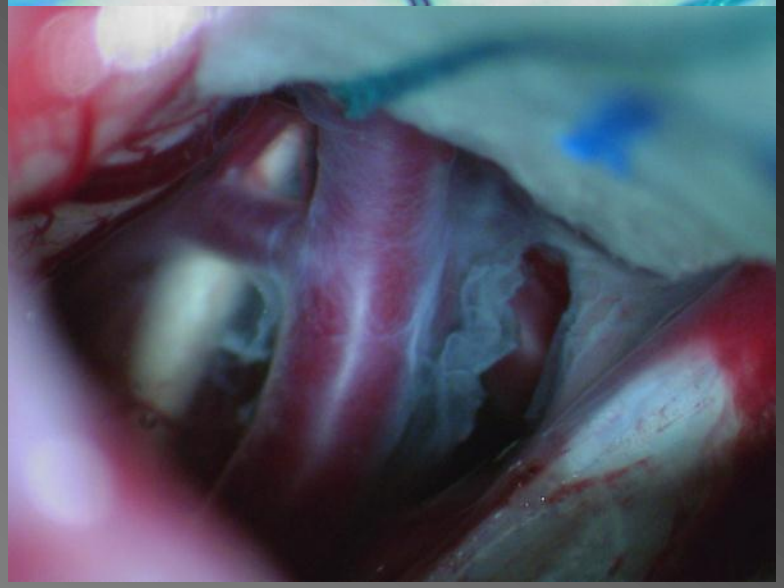
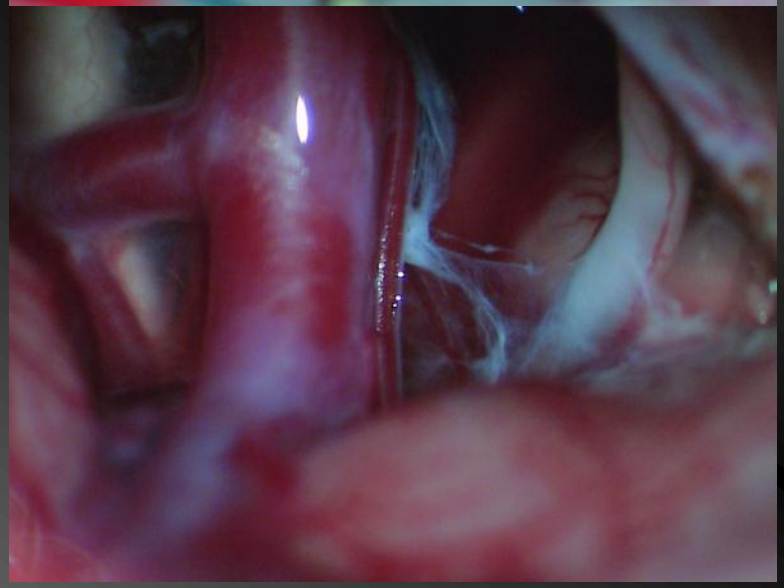






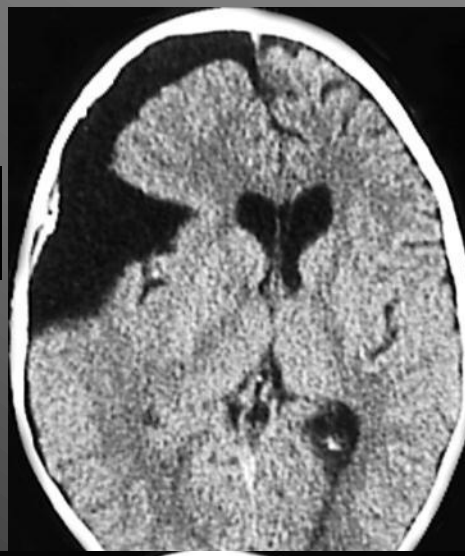


COMPLICATIONS

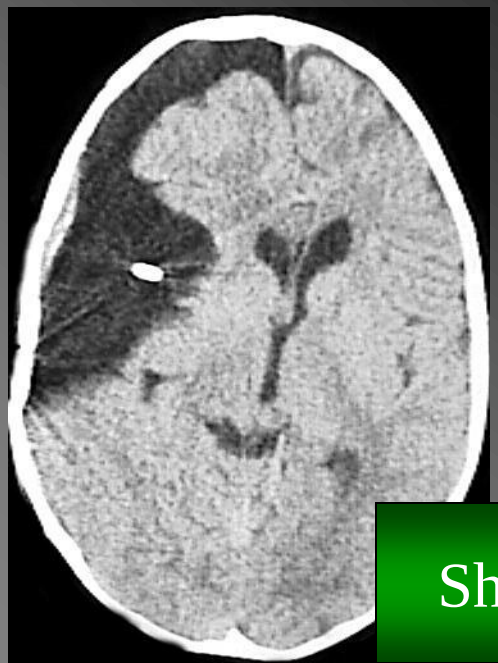
Preop

Postop

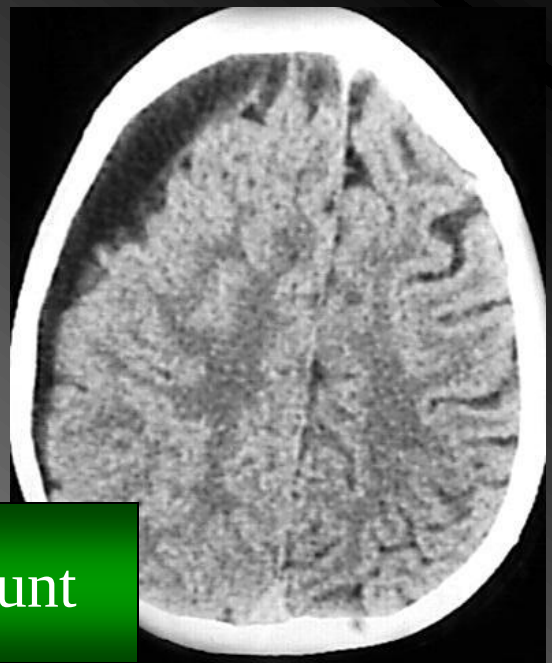
Ext drain



Post
ext drain

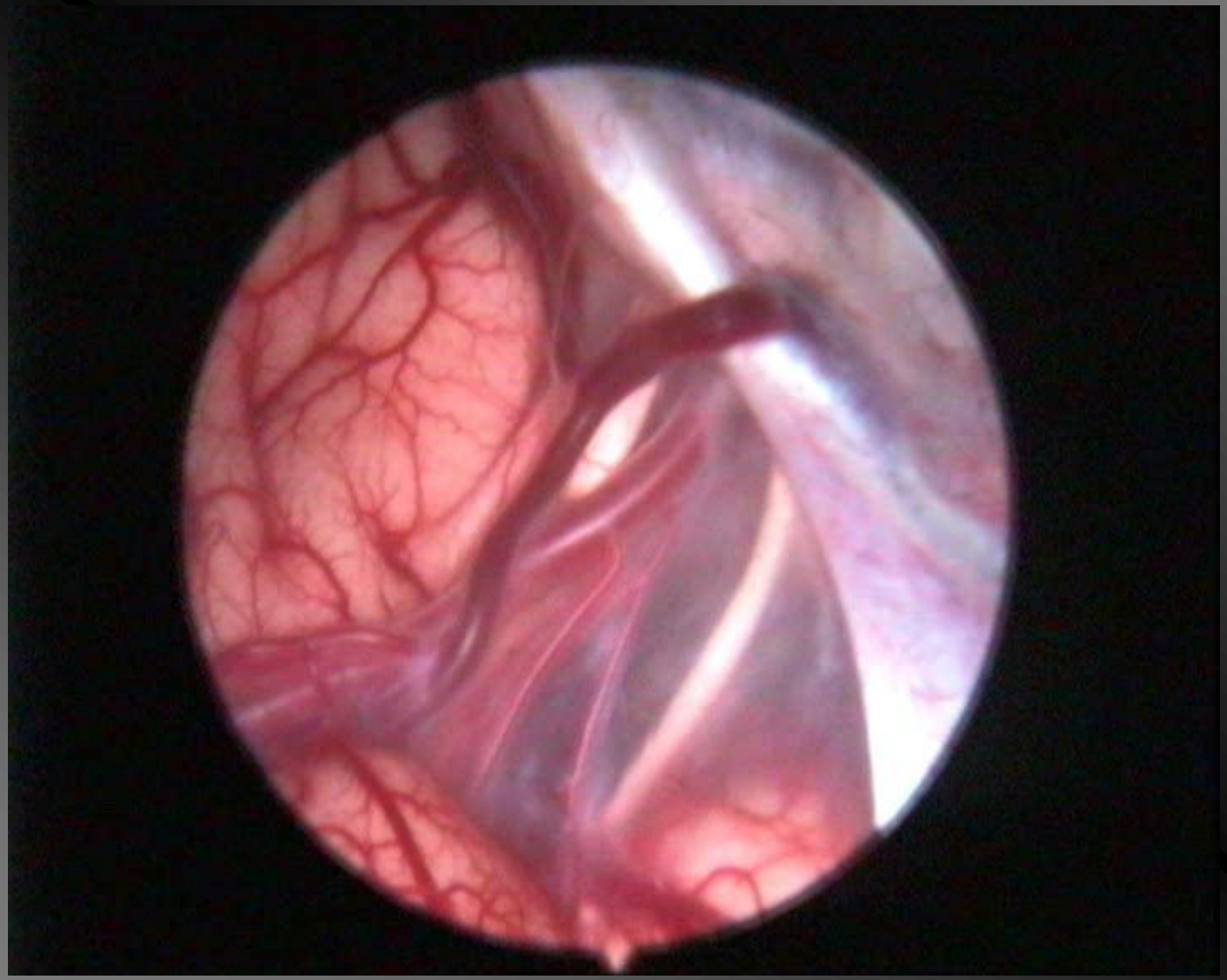


Shunt



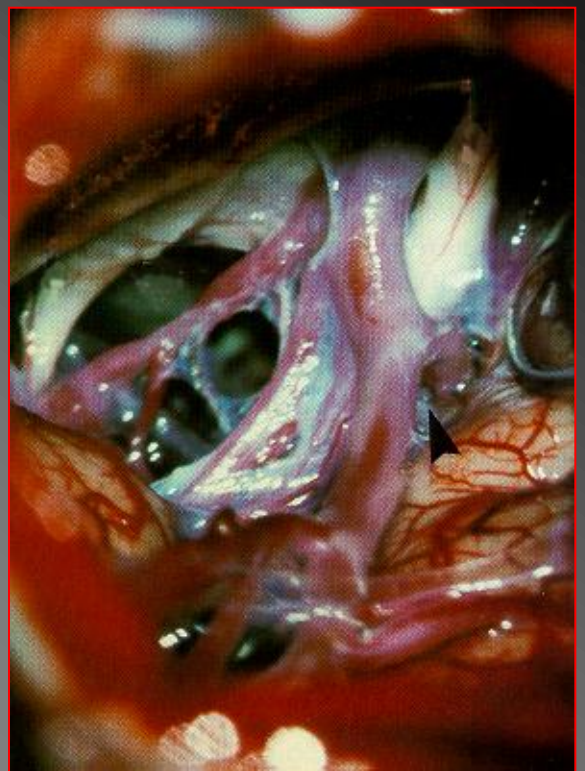
Sylvian fissure cysts:

- Endoscopic cyst fenestration



Sylvian fissure cysts:

- Endoscopic cyst fenestration
- Minicraniotomy and limited cyst membrane excision



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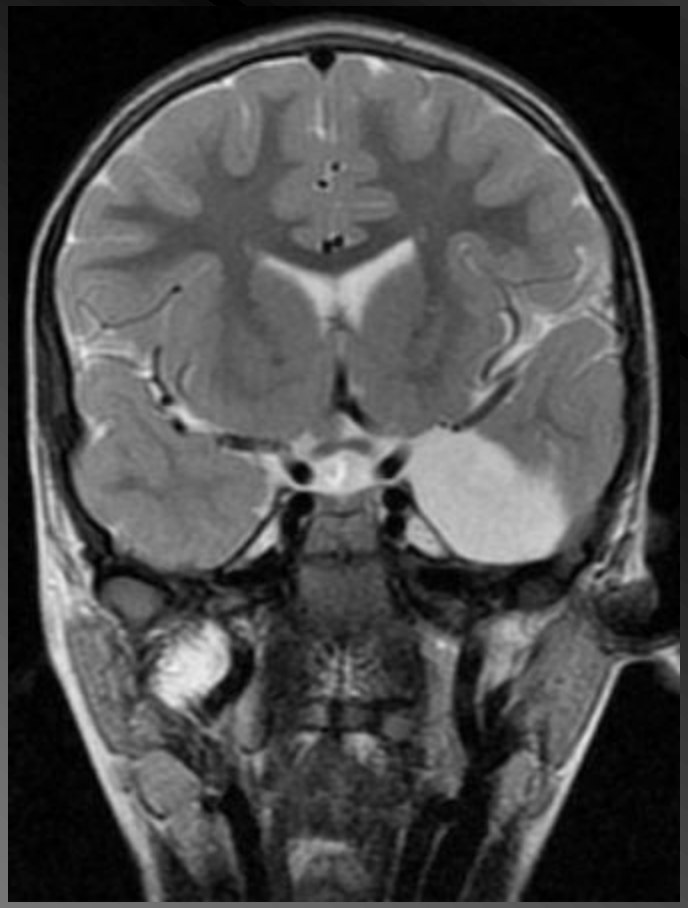

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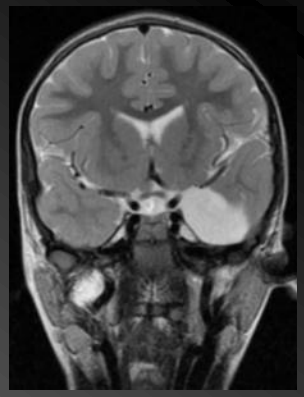

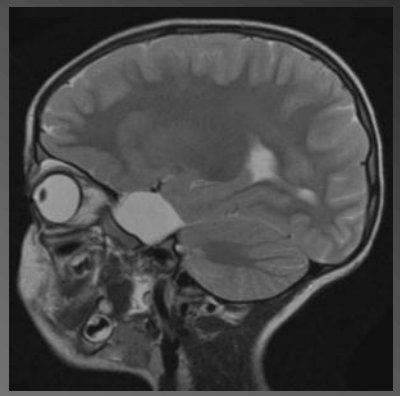

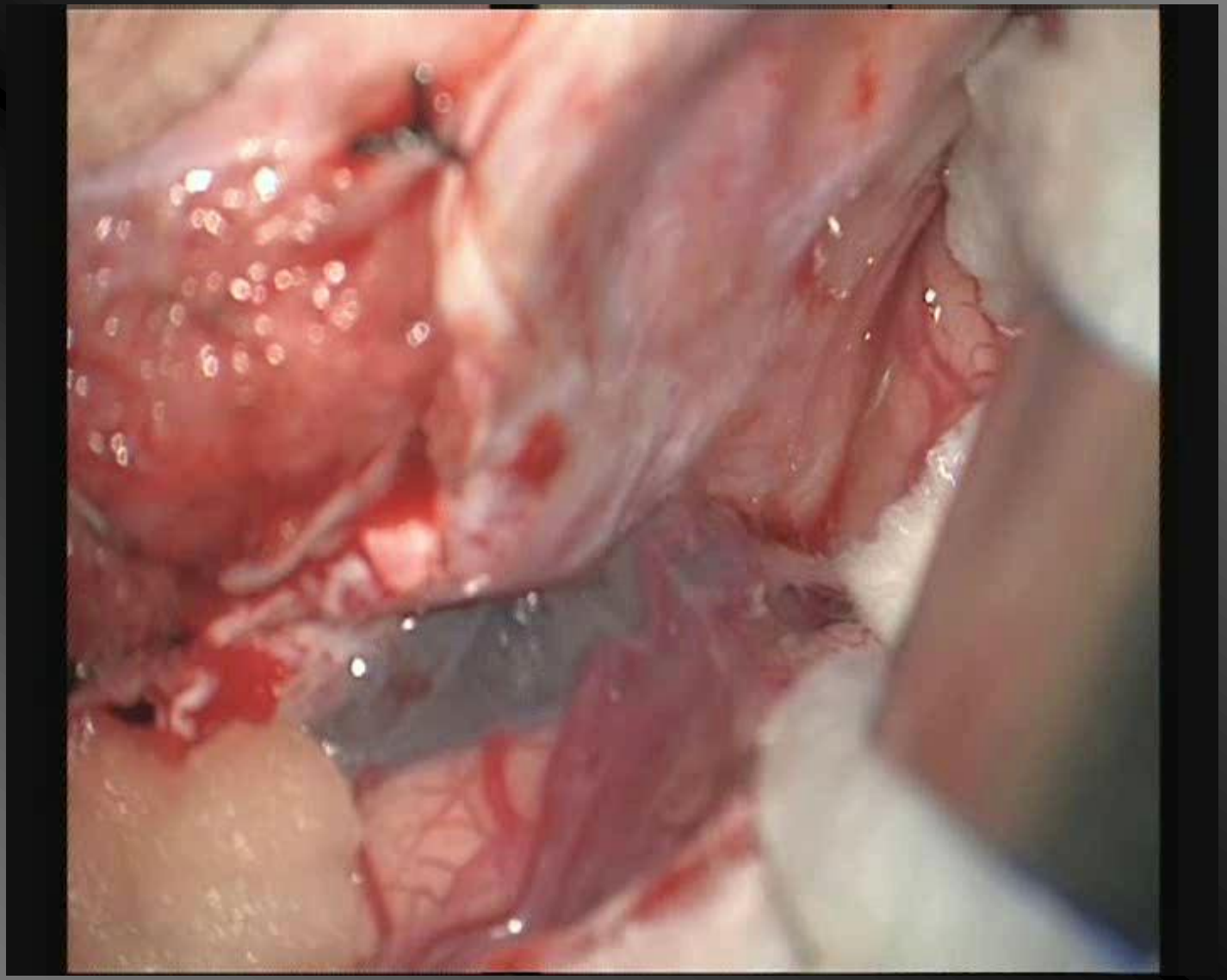

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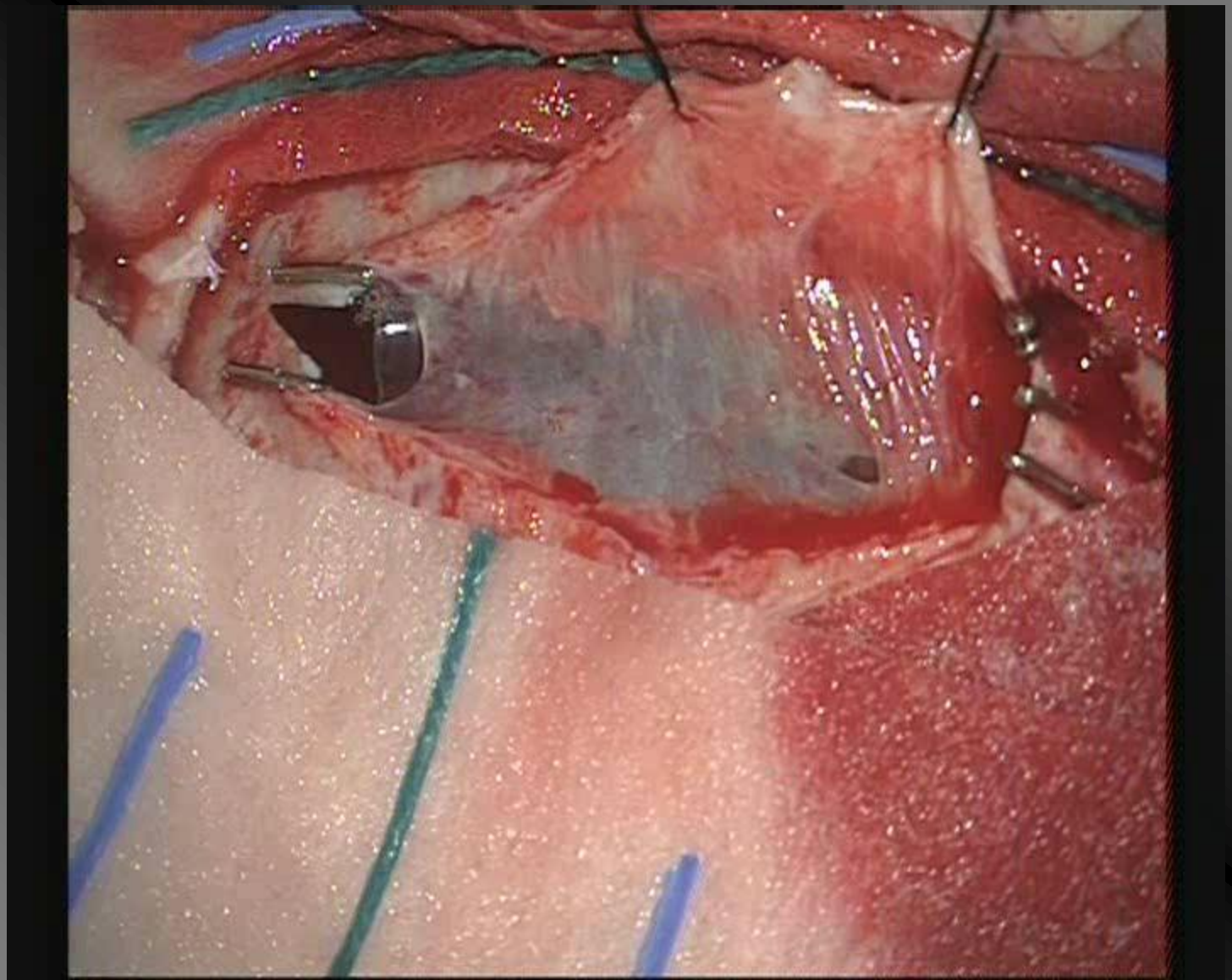

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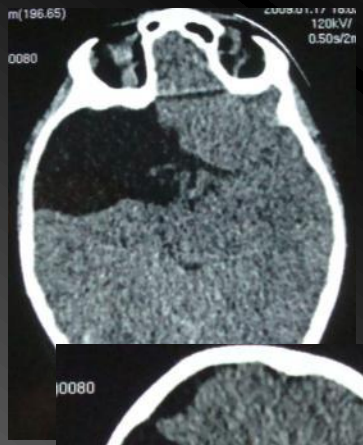
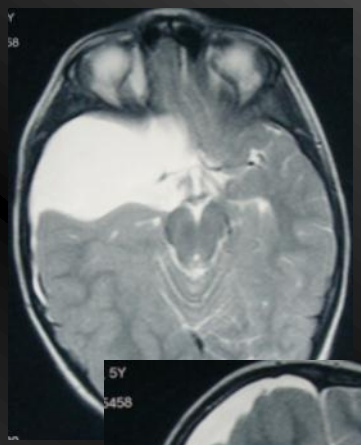
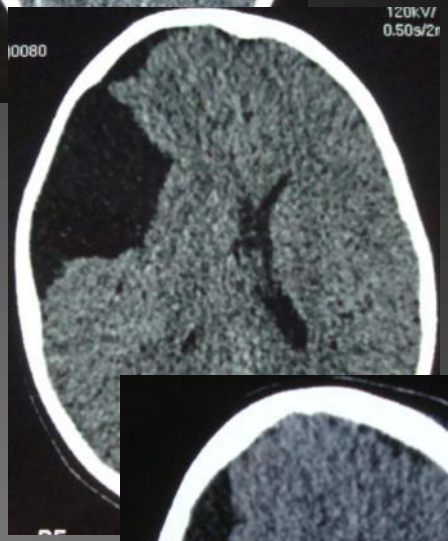
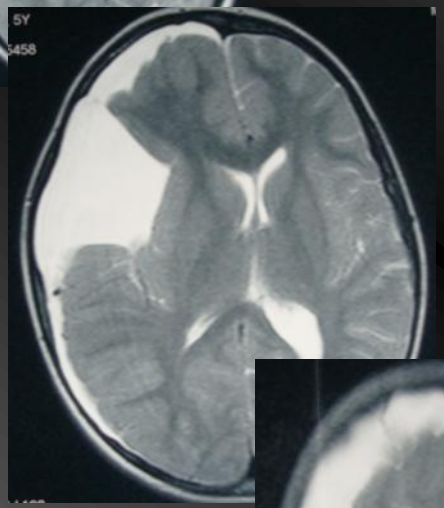
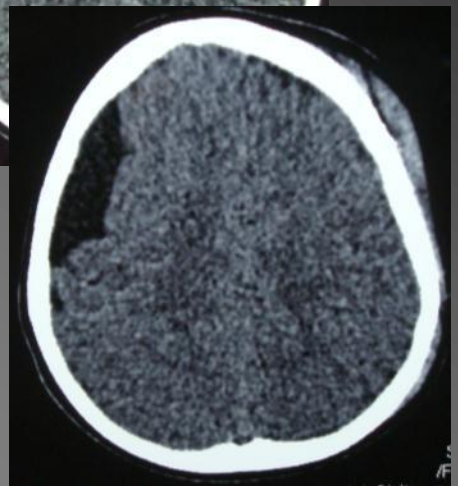
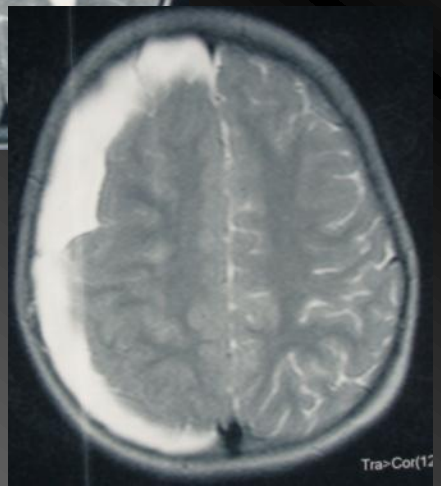








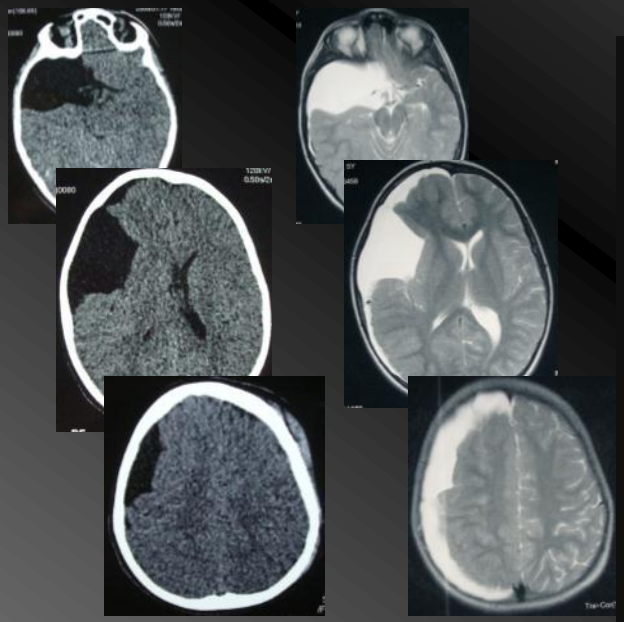


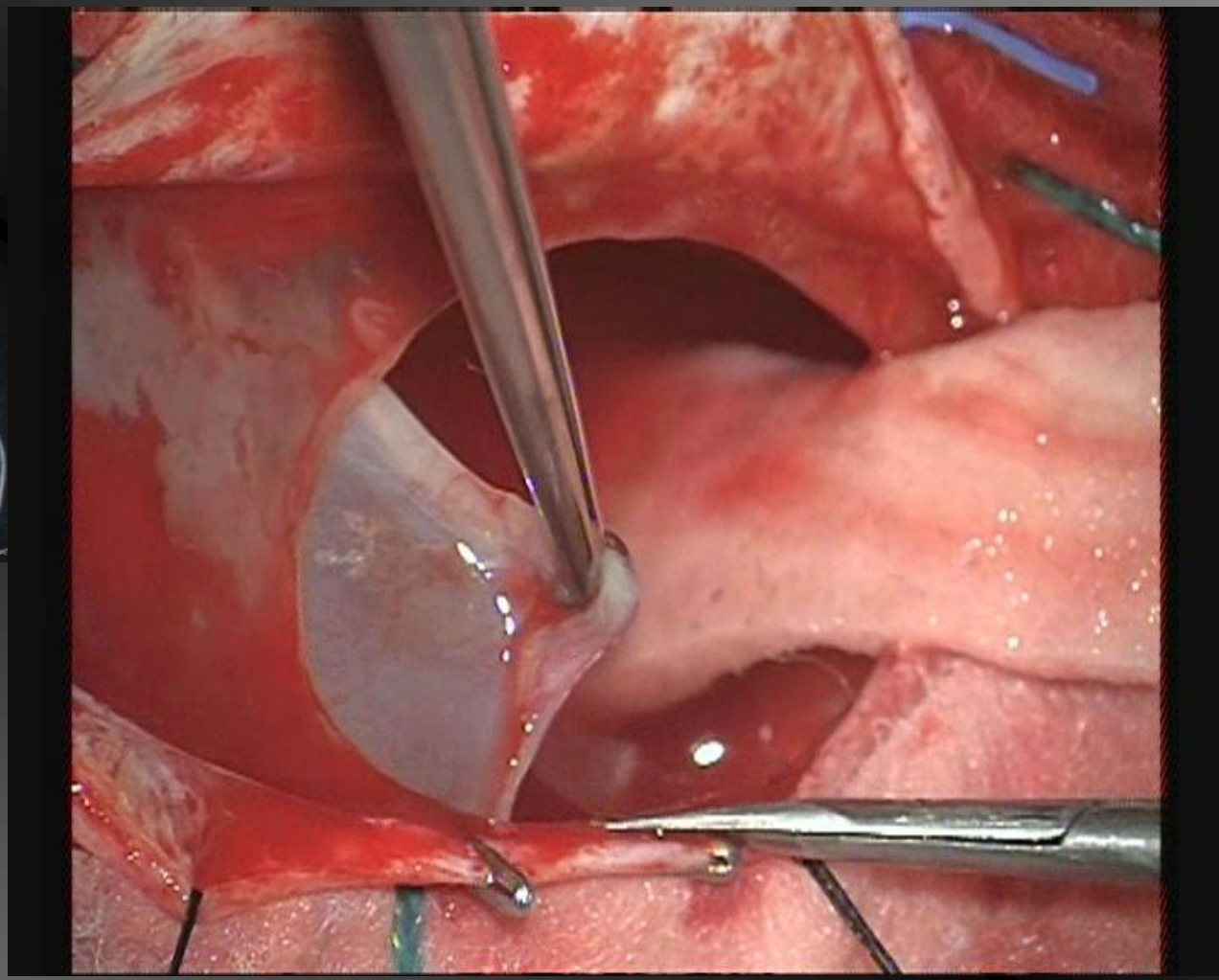


Pre

Post-endoscopic opening

Sylvian fissure cysts:





Sellar region cysts:

Varieties:

Intrasellar: typically in adults
(mean age:42 yrs)

Suprasellar: typically in children
(78% < 1y.o in our series)

Expand in all directions;
Hydrocephalus common
(obstructive or from ↓ CSF absorption)

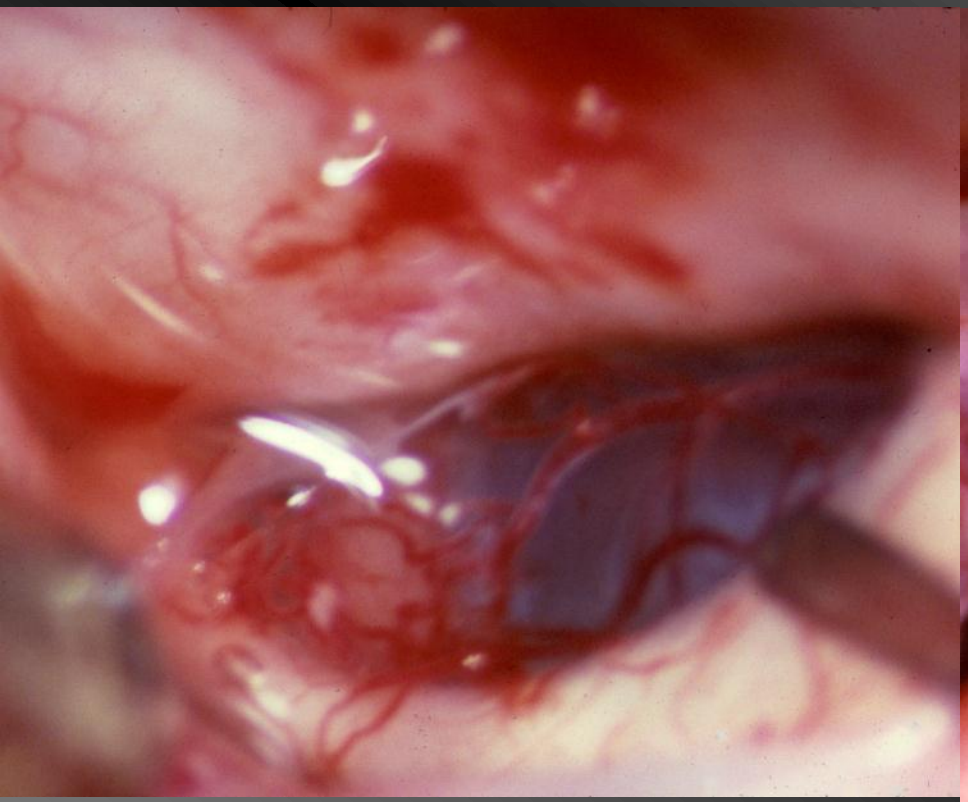
Sellar region cysts:

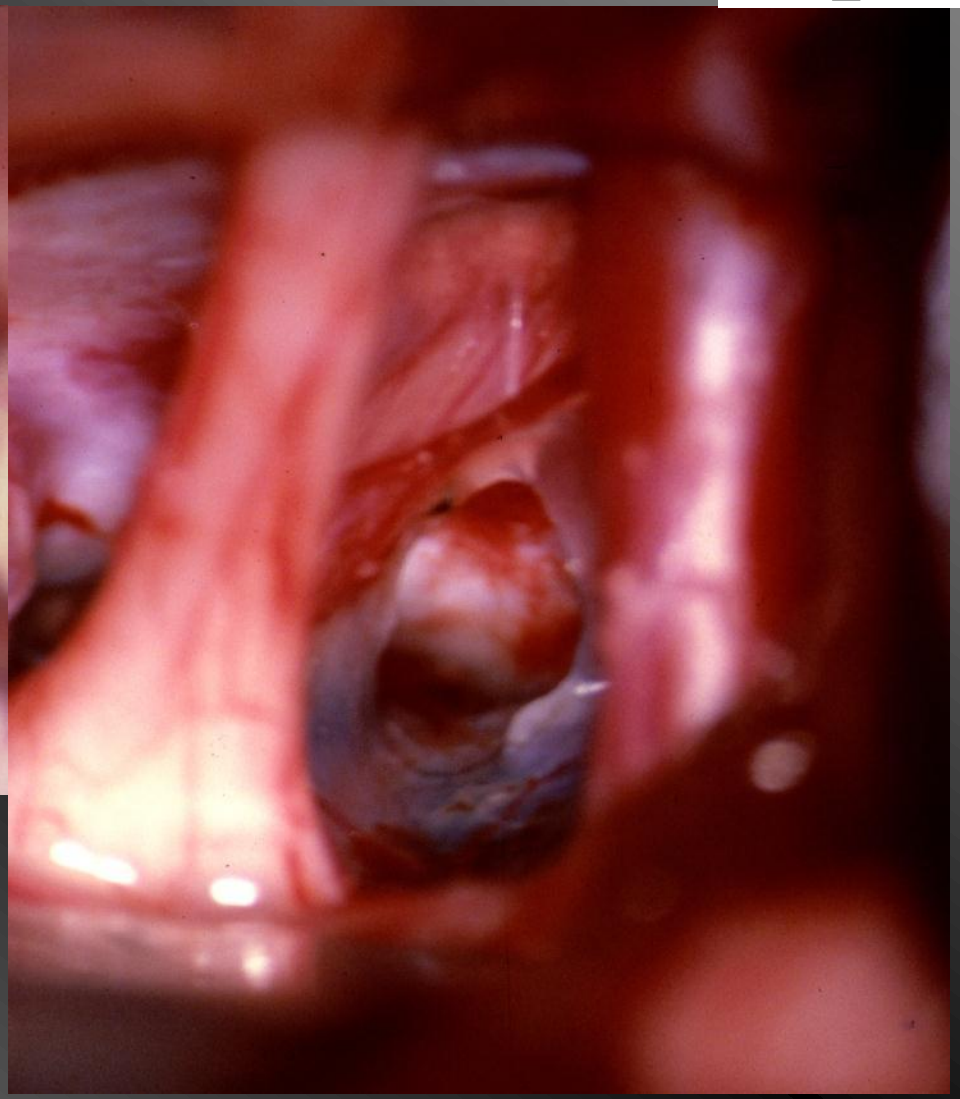
RISK

VISUAL IMPAIRMENT

ENDOCRINE DYSFUNCTION (Growth retardation, isosexual precocity)

Sellar region cysts:





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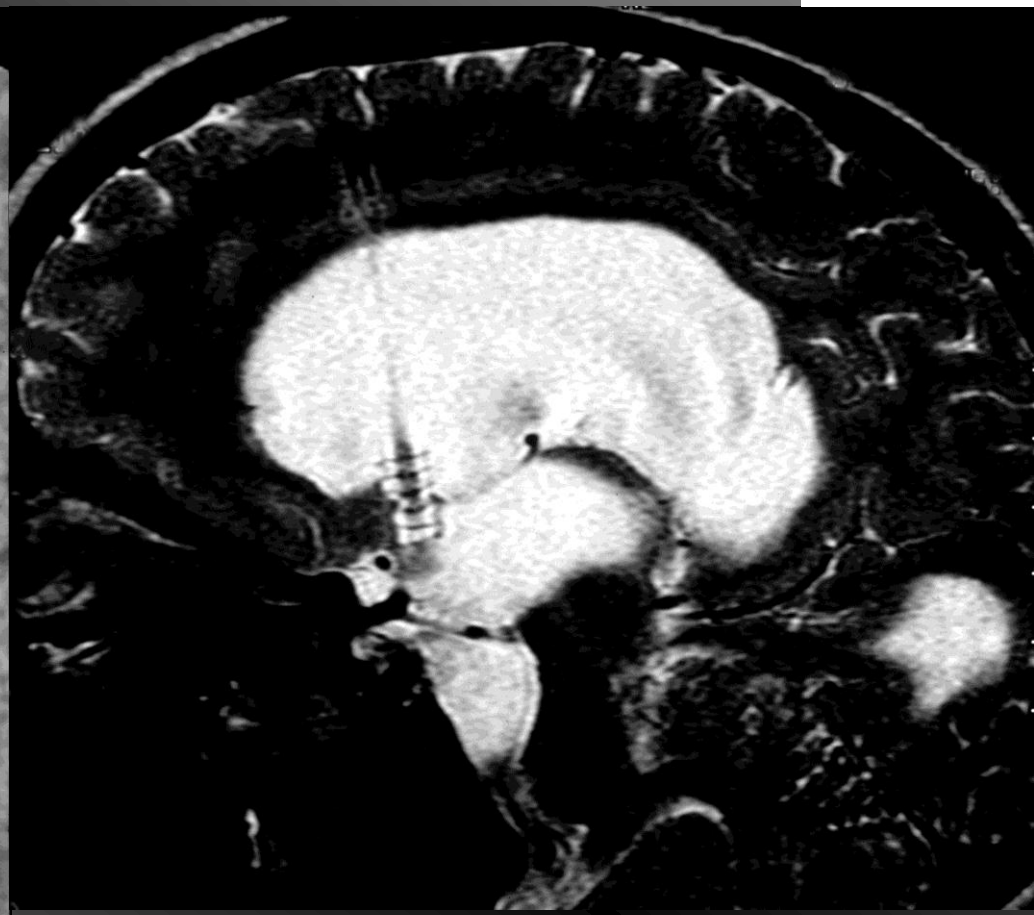

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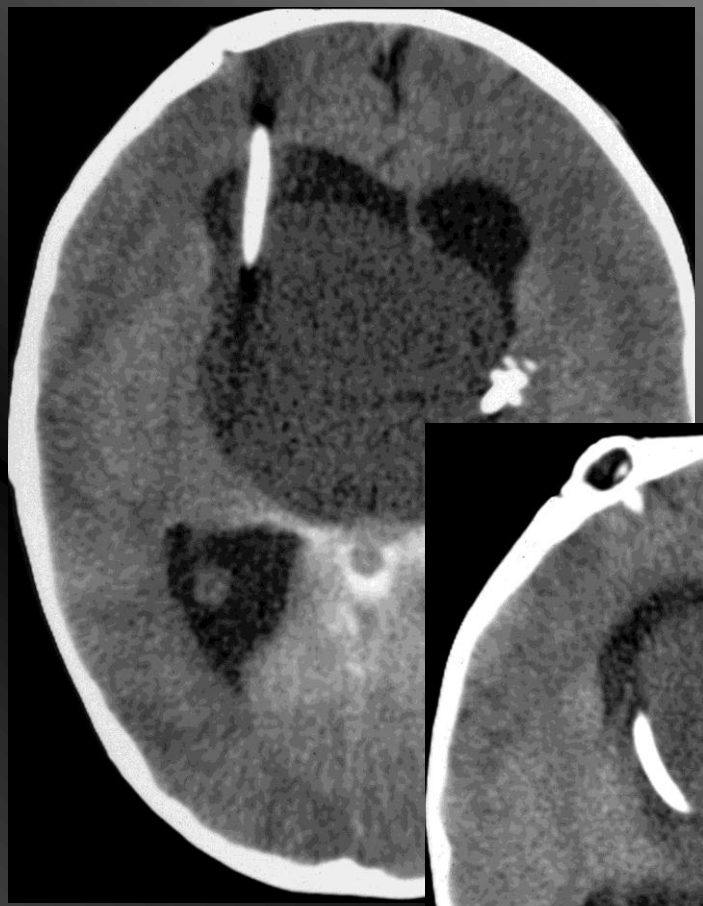
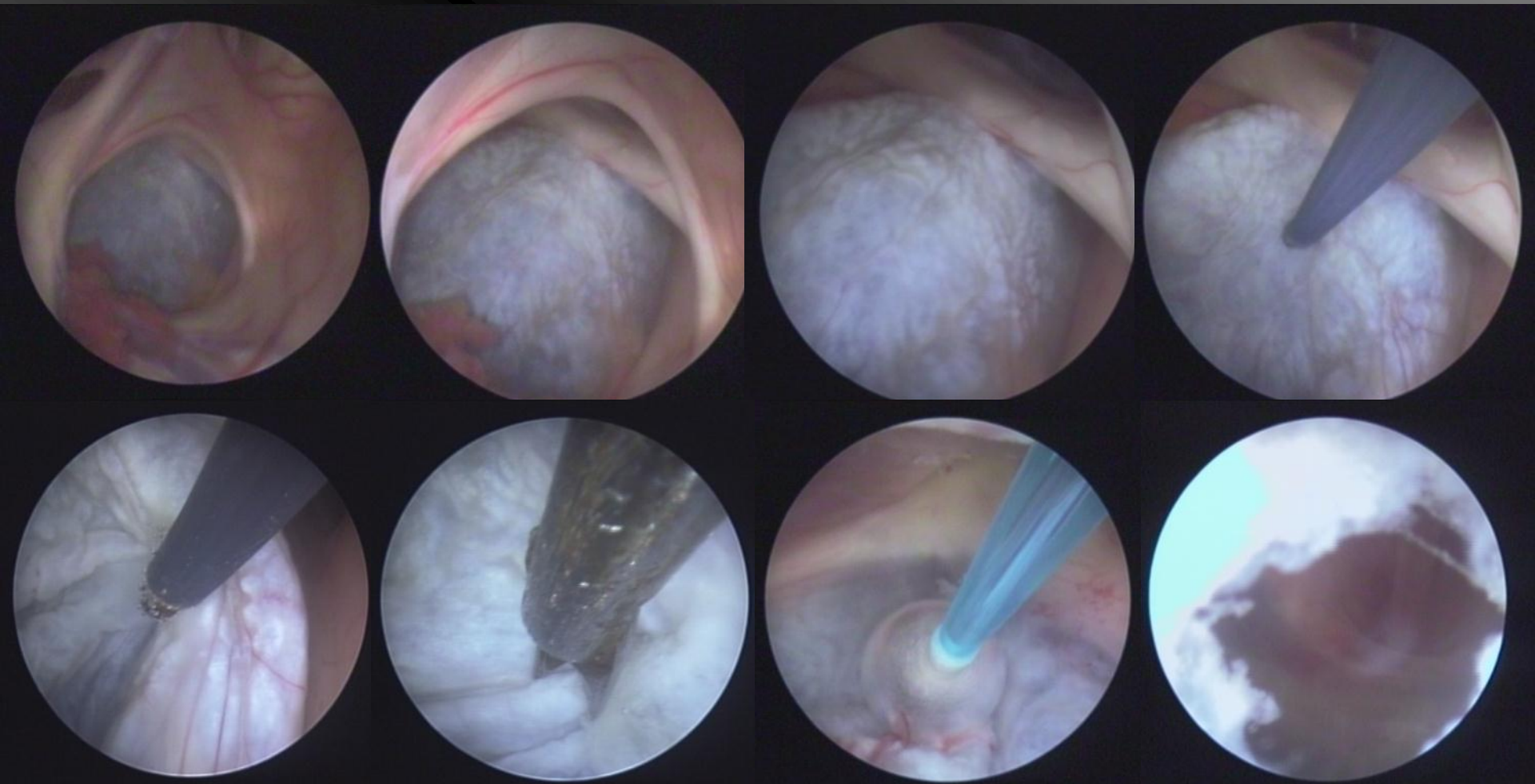


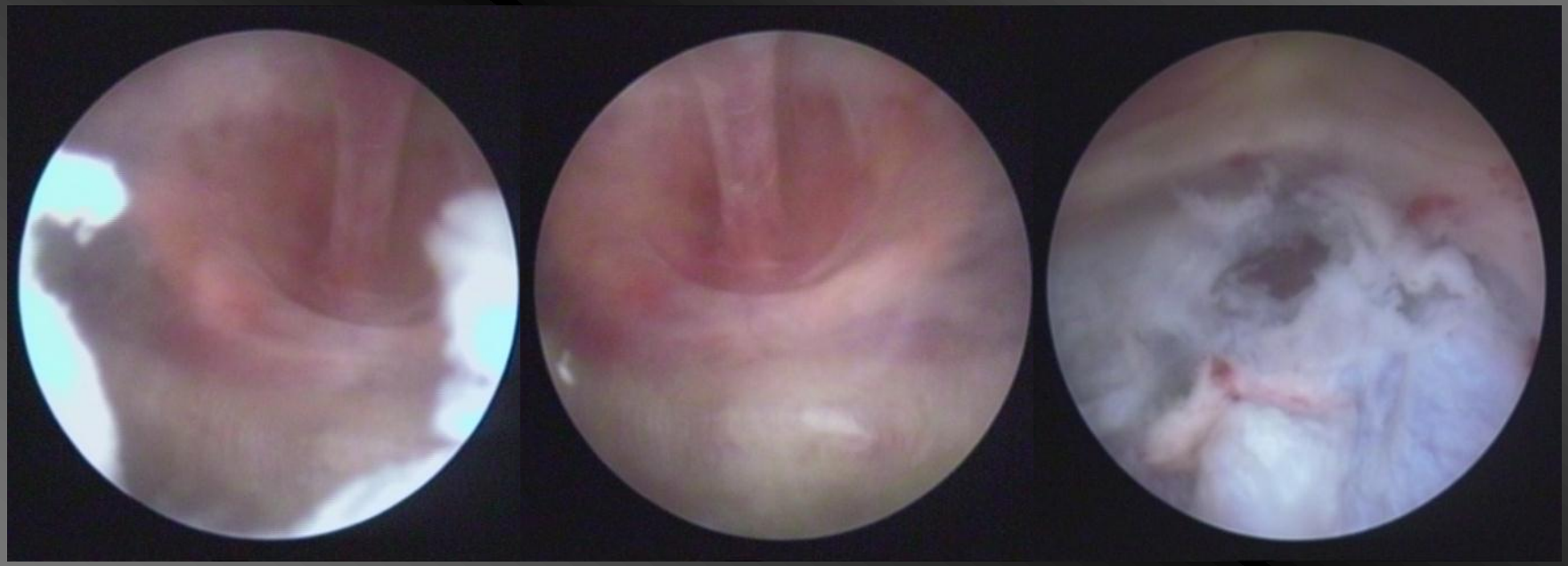
Sellar region cysts:

ENDOSCOPIC APPROACH: cyst opening into the III ventricle and basal cisterns



Sellar region cysts:

ENDOSCOPIC APPROACH: cyst opening into the III ventricle and basal cisterns



Cerebral convexity cysts:

CHILDREN

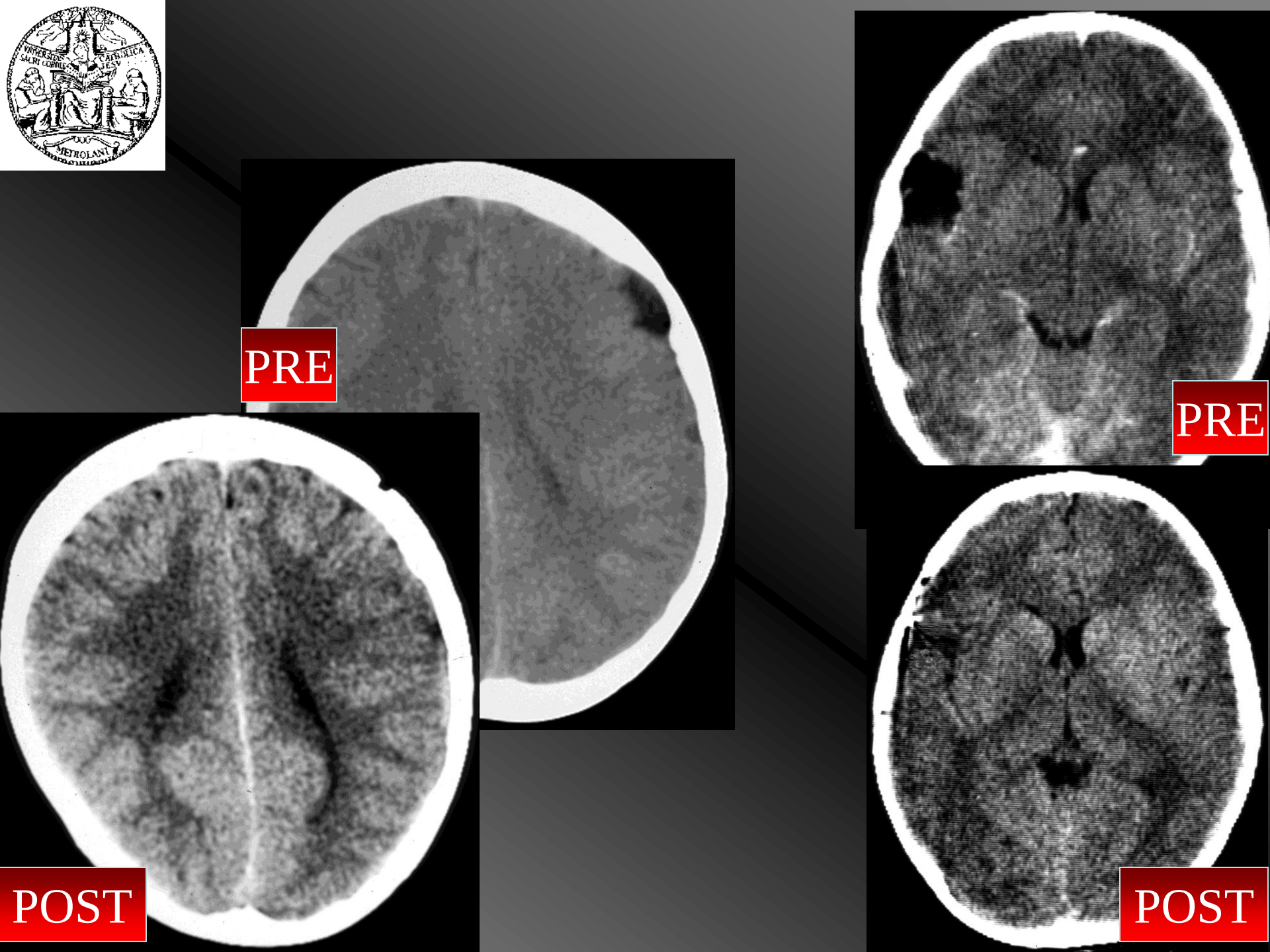
Localized skull bulging
Cranial asymmetry without neurological deficits

ADULTS

Increased intracranial pressure

Epilepsy

Neurological deficits


PRE
PRE
POST
POST

Cerebral convexity cysts:

Varieties

- Focal

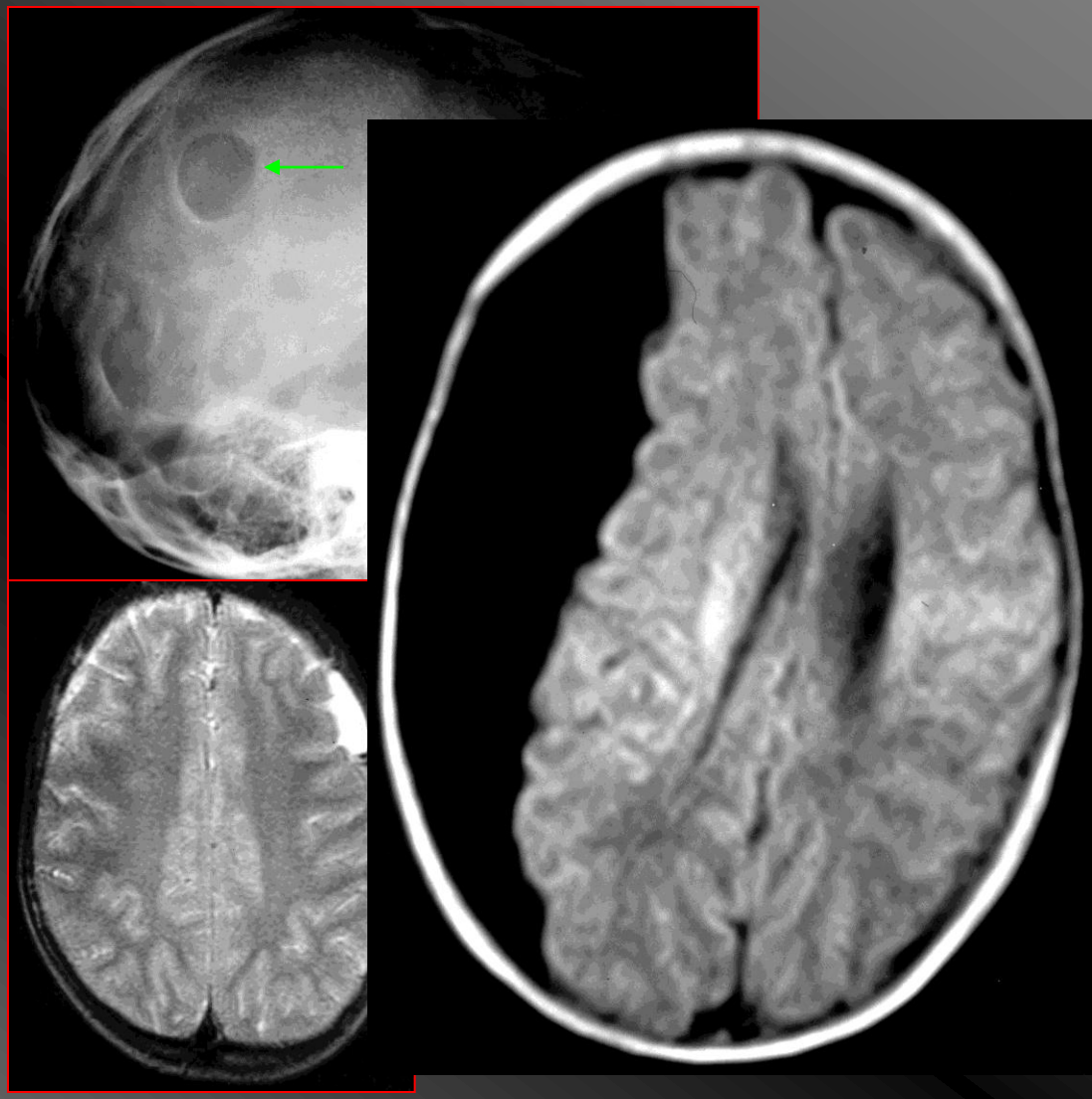
  Treatment:

  Craniotomy and cyst wall excision

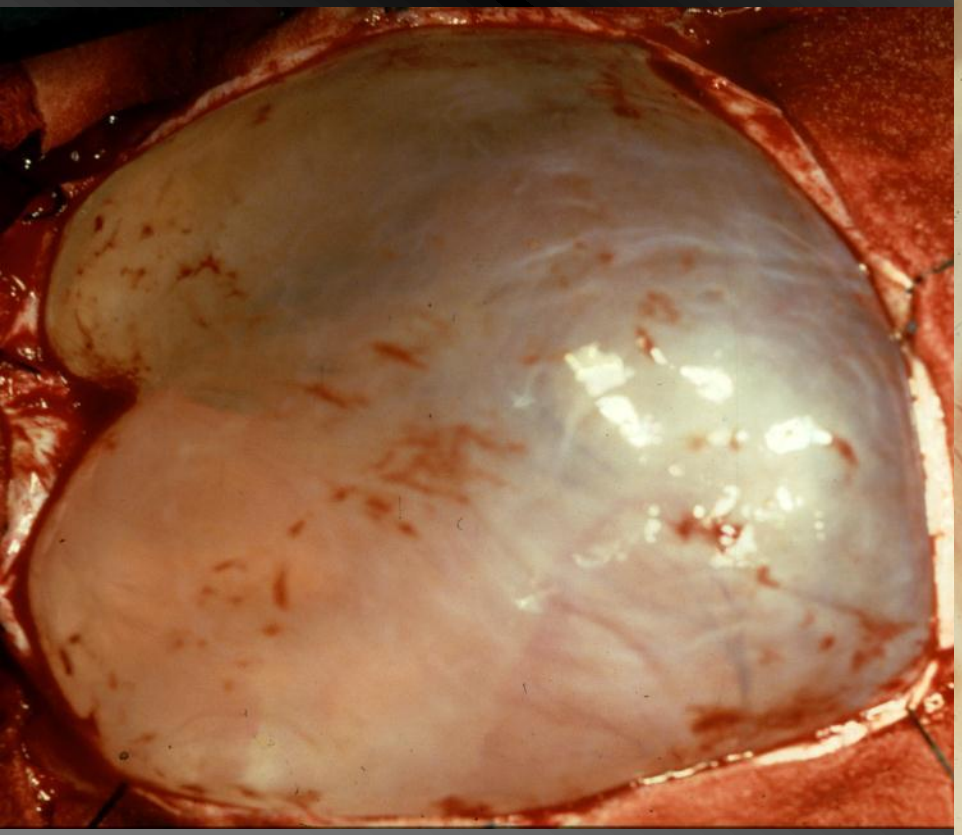
- Hemispheric

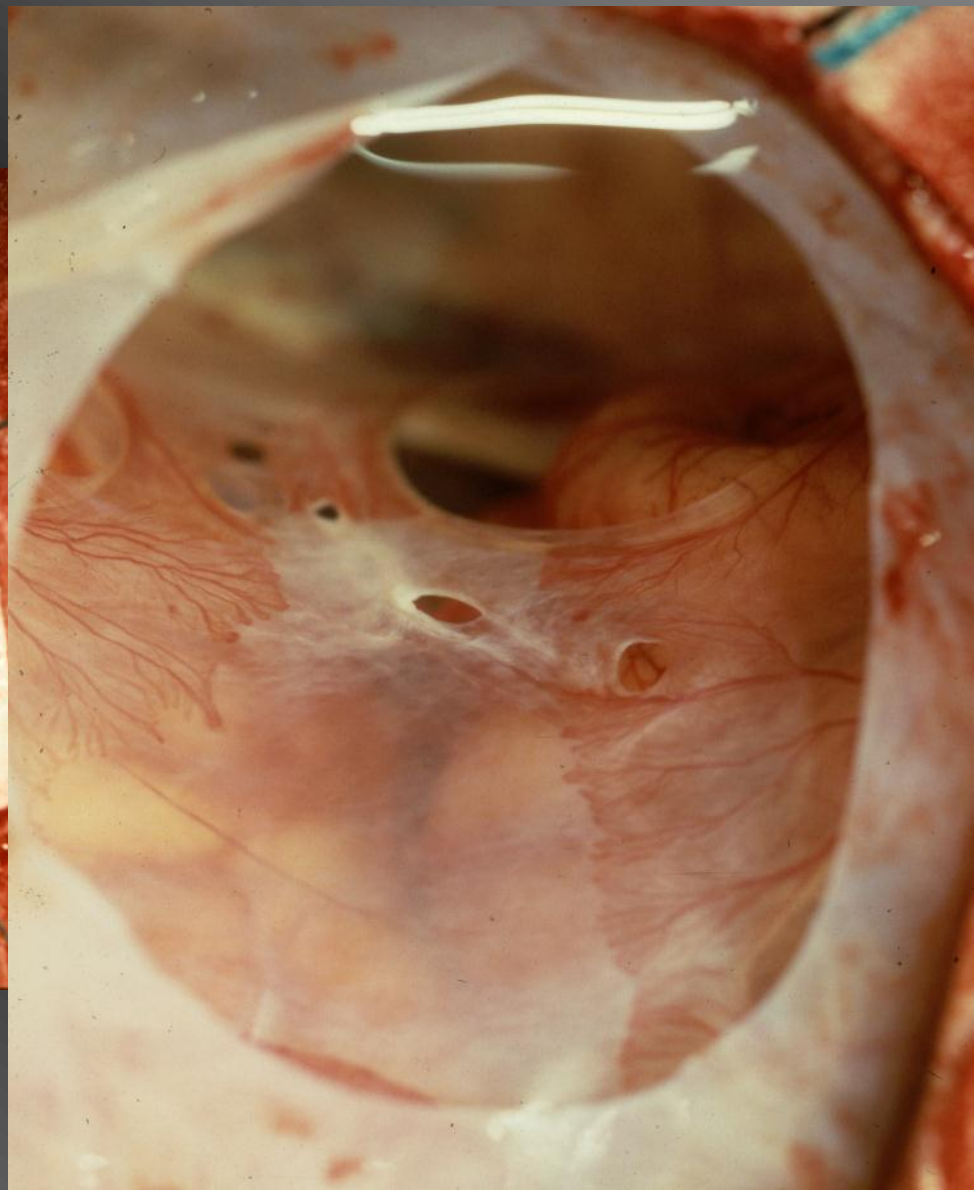
  Treatment:

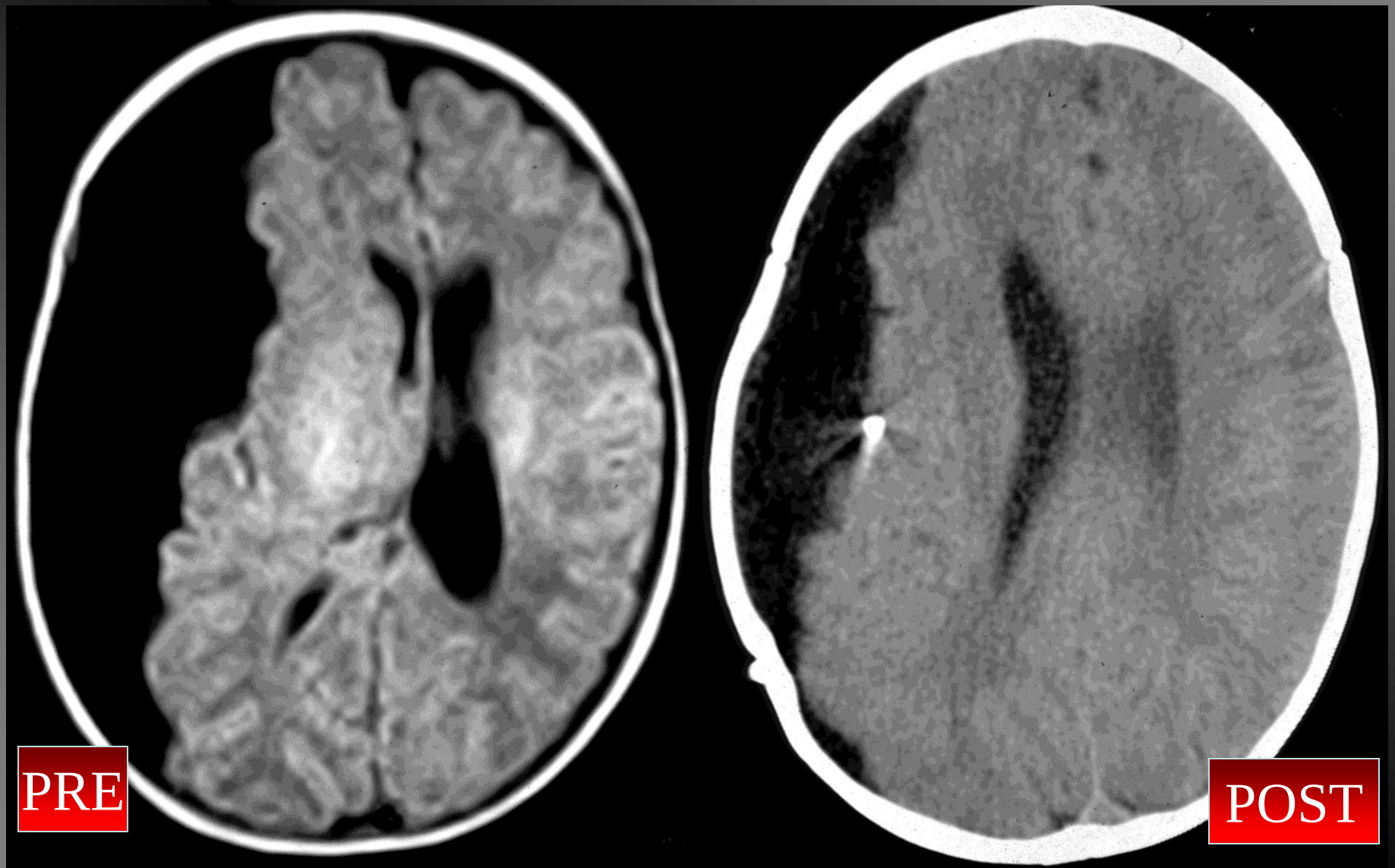
  Shunting (?)



Cerebral convexity cysts:






PRE
POST

Interhemispheric fissure cysts:

Varieties

- Interhemispheric
- Parasagittal

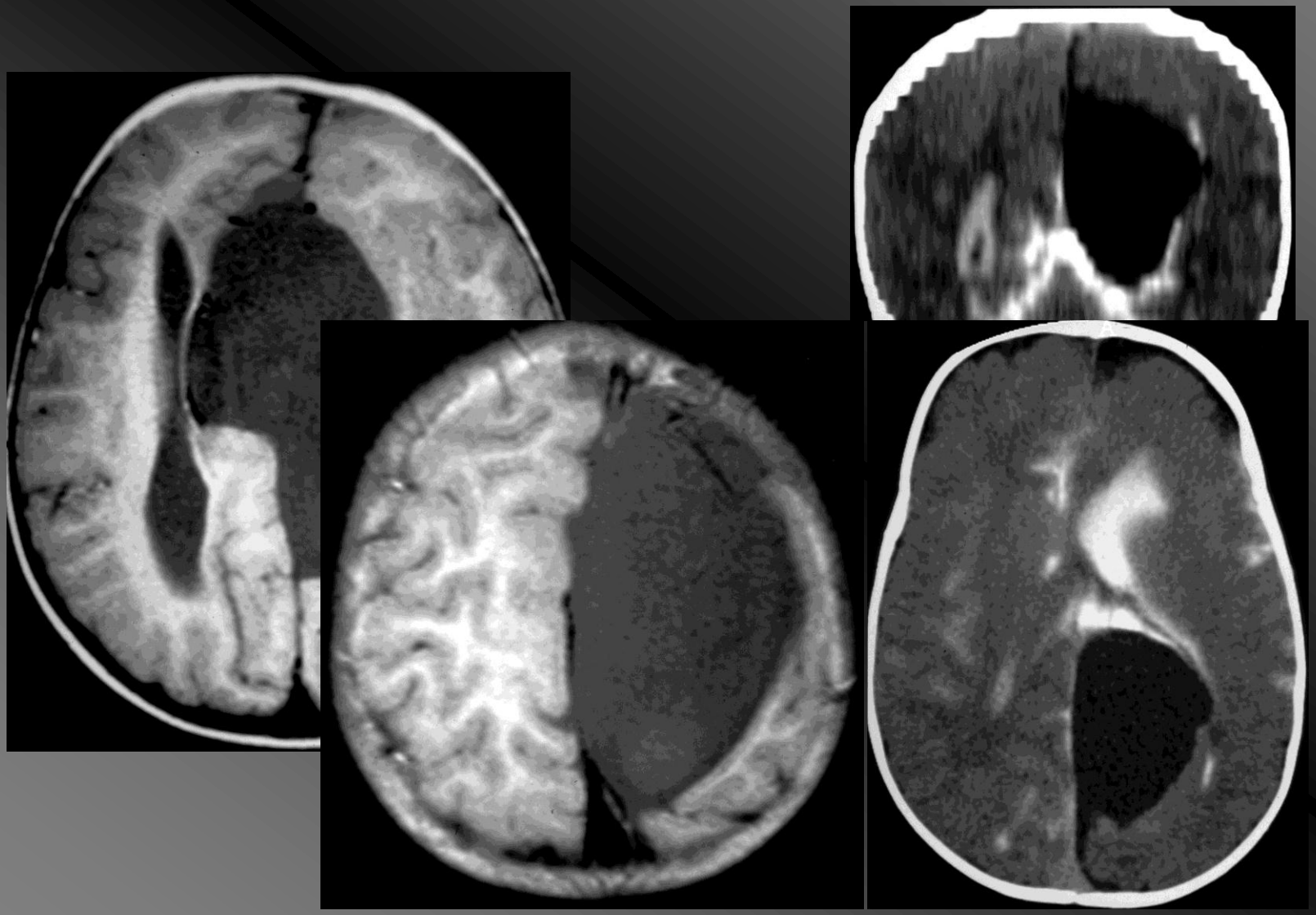
RISK

- Hydrocephalus
- Motor deficits

TREATMENT

- Cyst membrane fenestration (endoscopy, craniotomy)
- Shunting

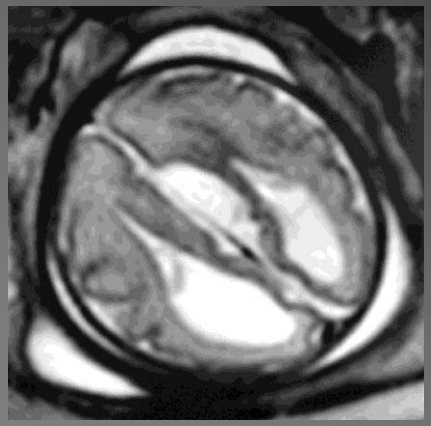
Interhemispheric fissure cysts:

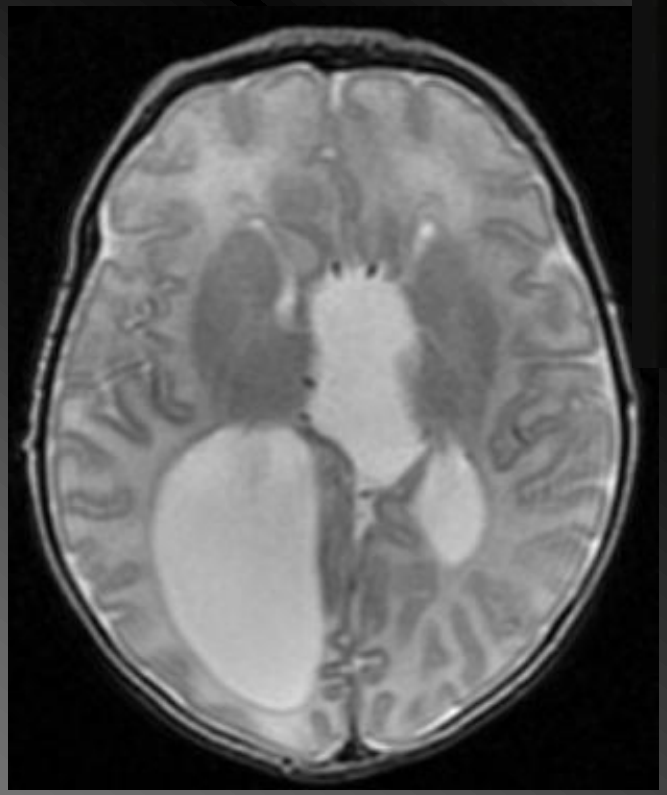


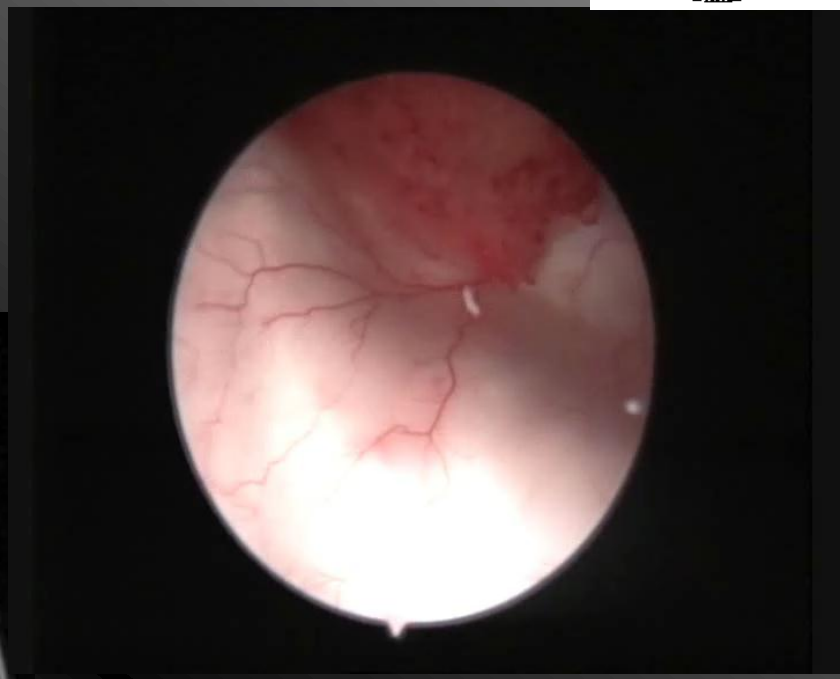
Interhemispheric fissure cysts:

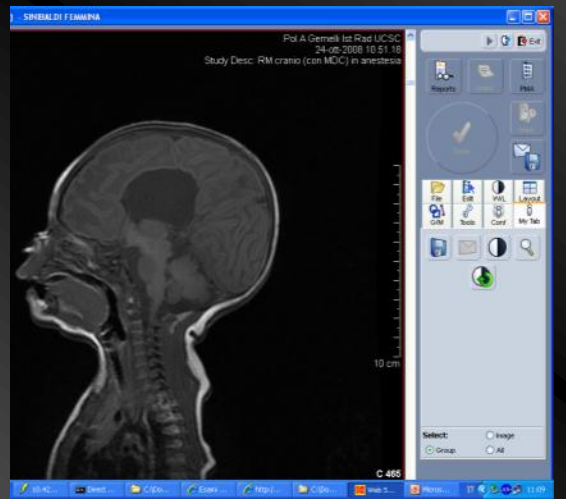
Treatment:

Endoscopy!



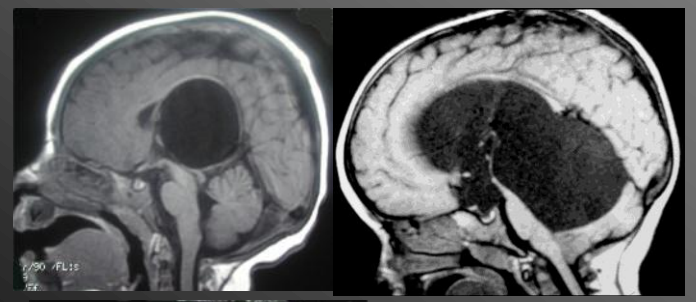




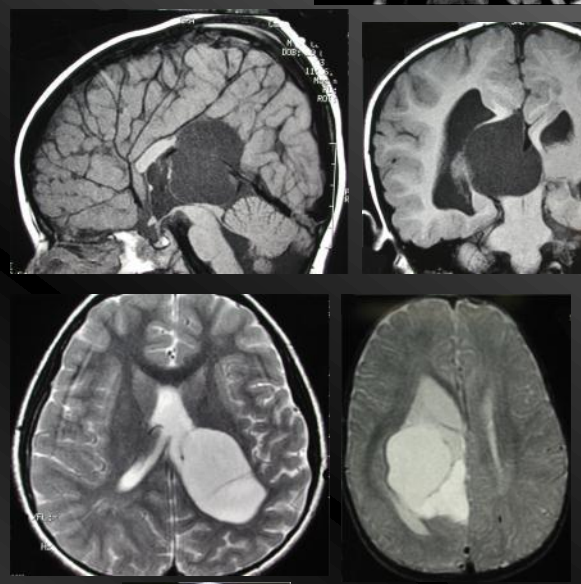


INTRA/PARAVENTRICULAR

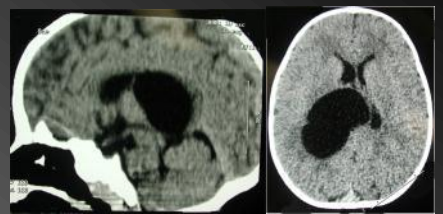
- Quadrigeminal region / Tentorial notch



- Subependymal/ paraventricular cysts



- Choroid plexus cysts

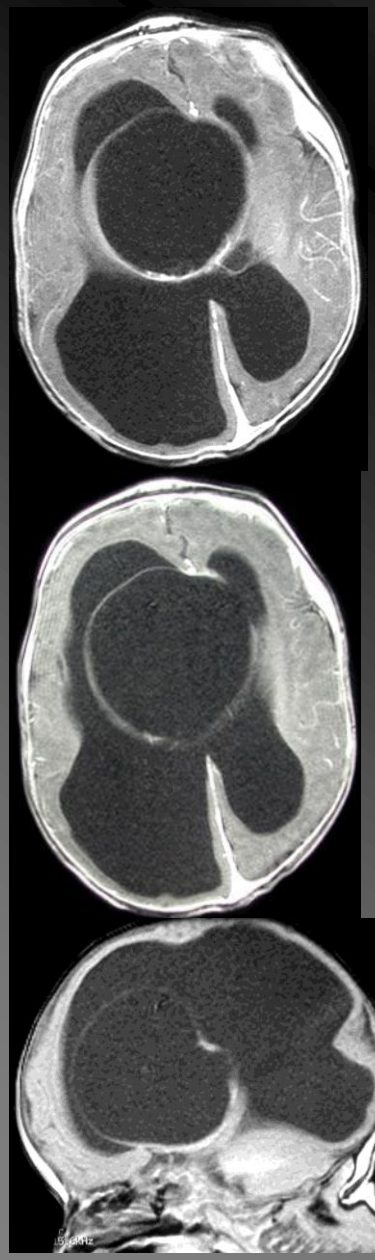


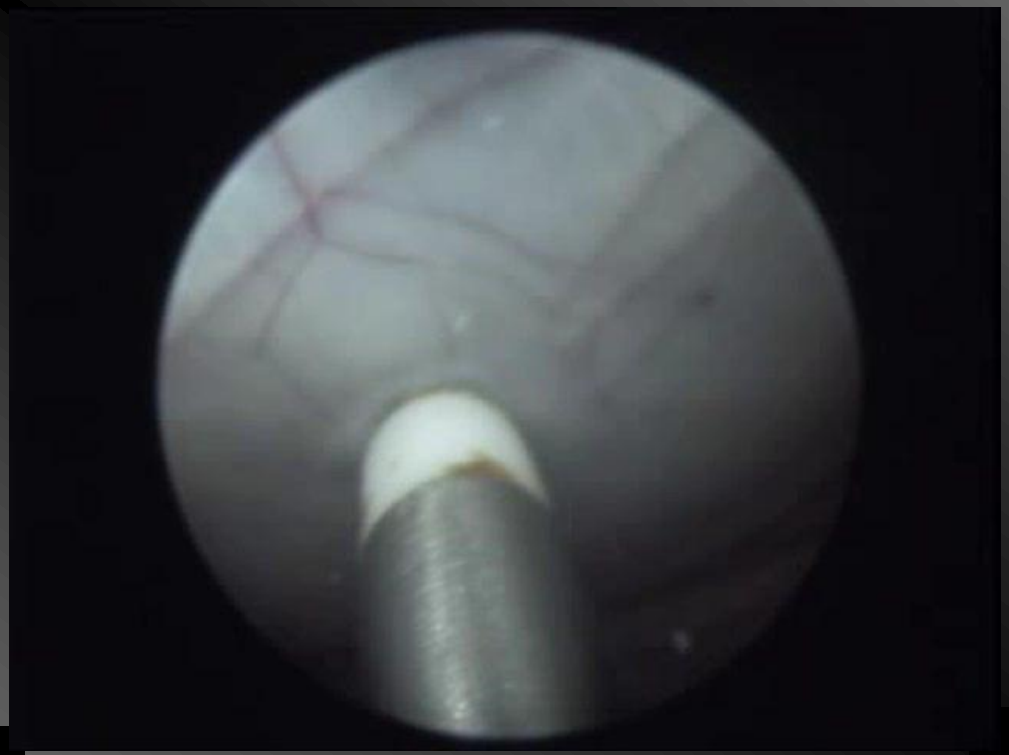
INTRA/PARAVENTRICULAR

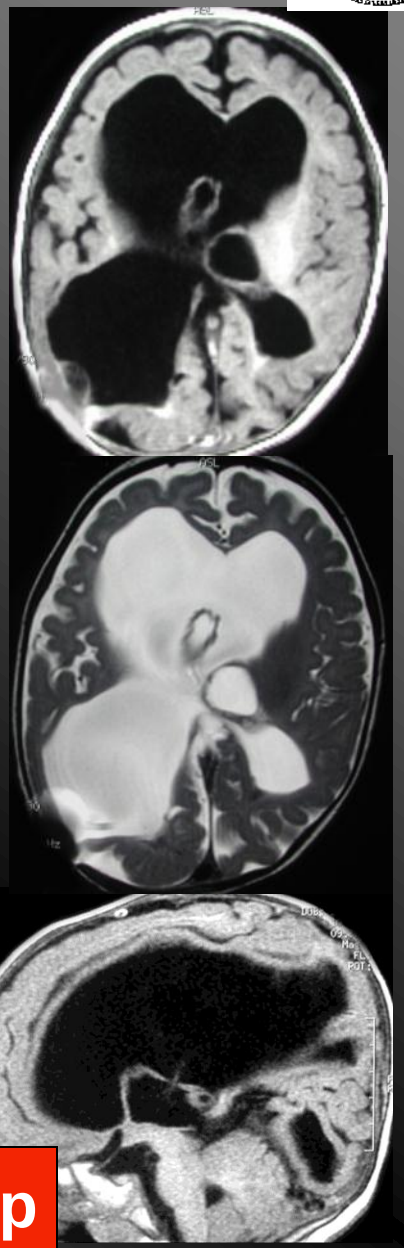
Clinical manifestations

- Symptoms of increased ICP due to obstructive hydrocephalus in most cases
- Focal signs (Parinaud, motor deficits) less frequent

Intraventricular cysts treatment: endoscopy

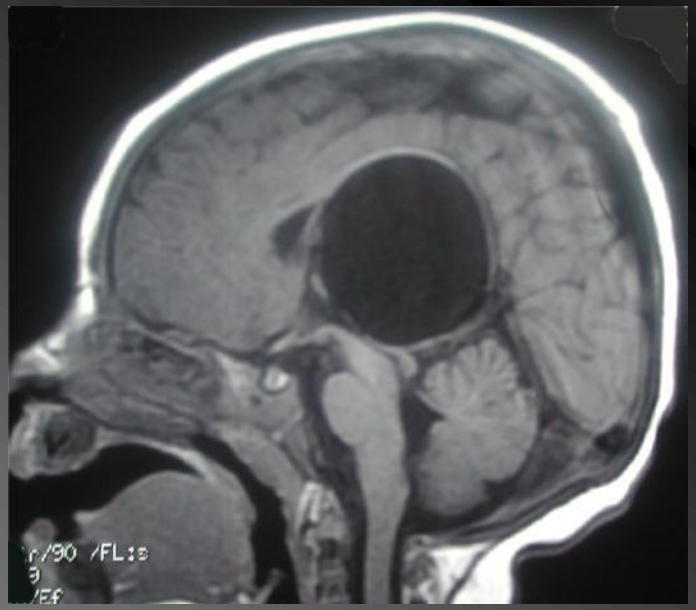


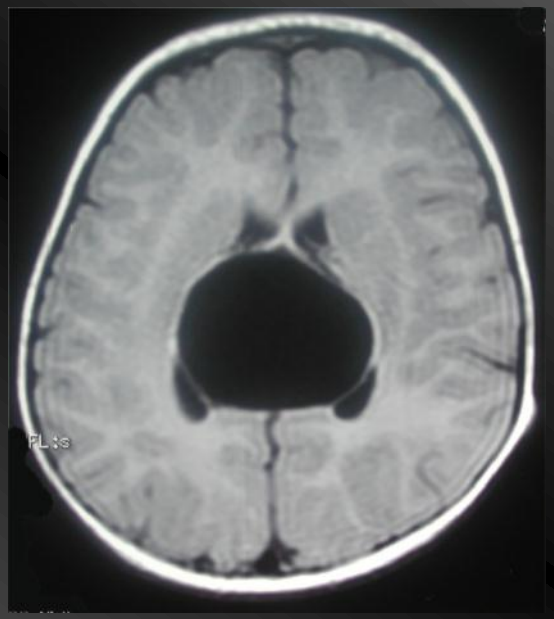


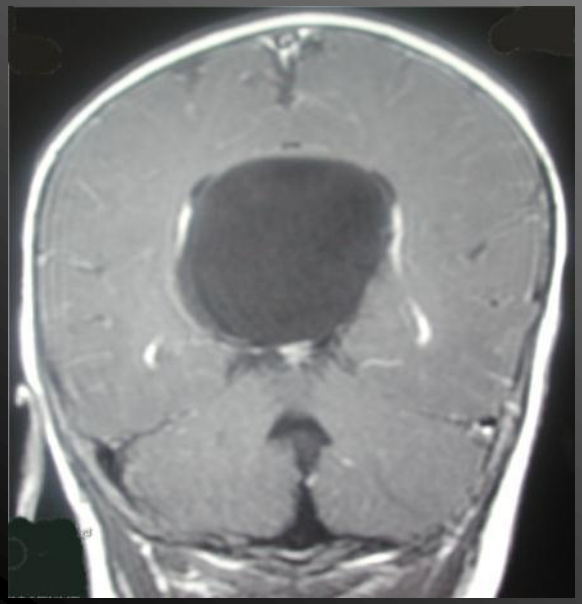


Postop

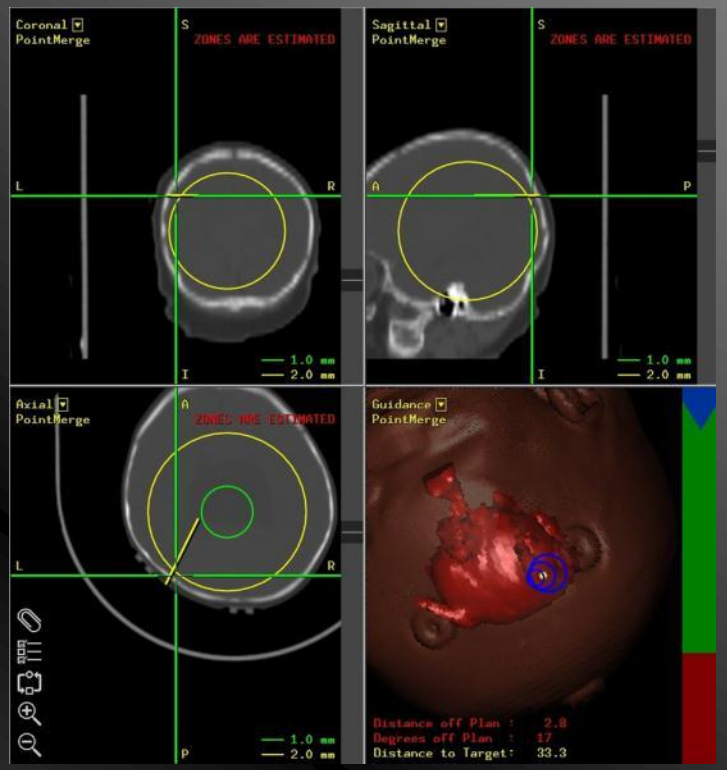
LIMITED VENTRICULAR ACCESS DOES NOT REPRESENT A CONTROINDICATION



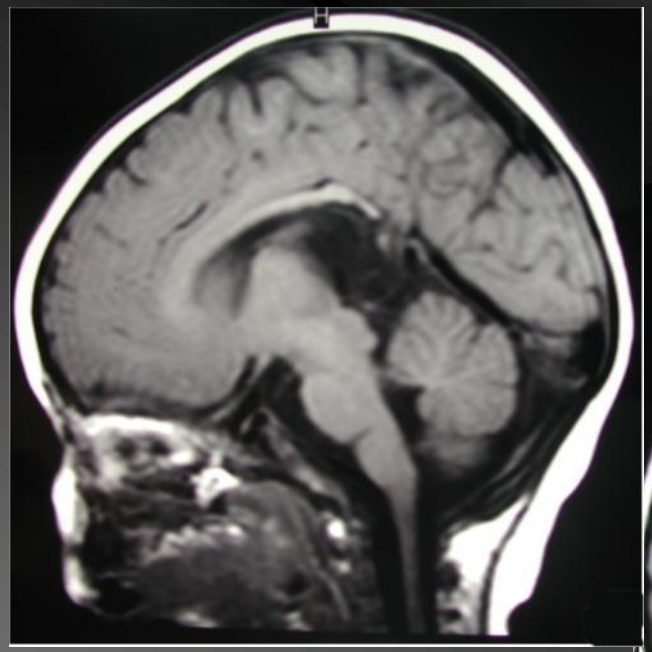


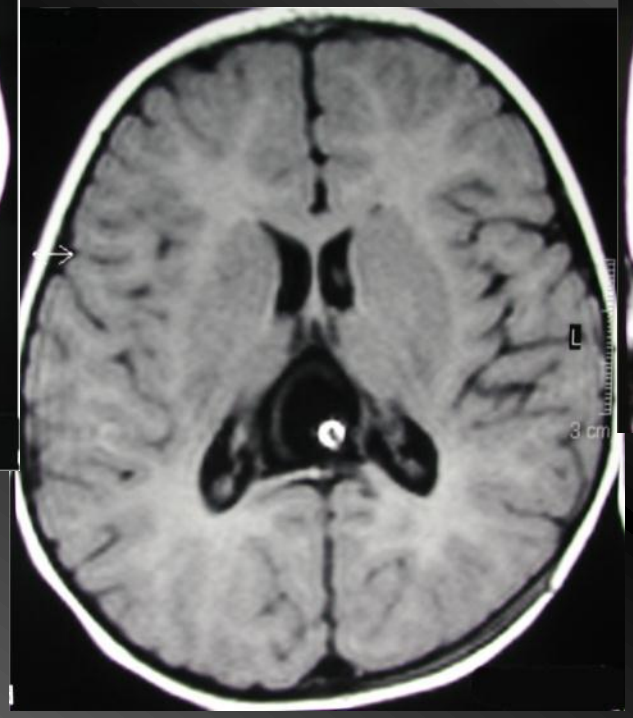


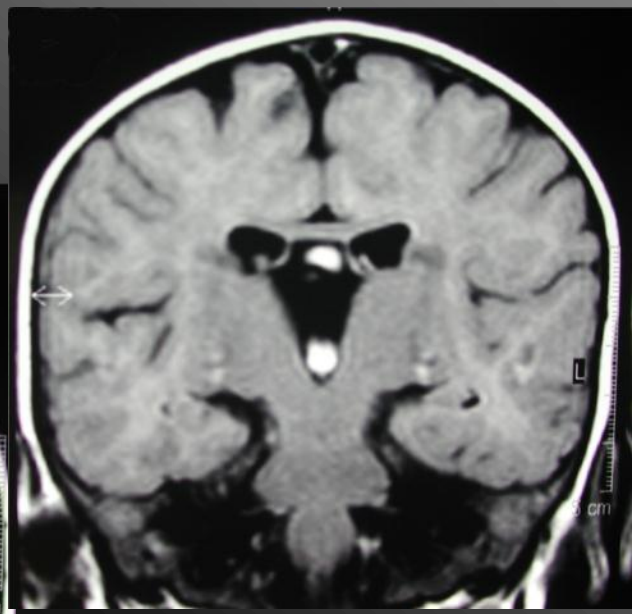
LIMITED VENTRICULAR ACCESS DOES NOT REPRESENT A CONTROINDICATION



LIMITED VENTRICULAR ACCESS DOES NOT REPRESENT A CONTROINDICATION

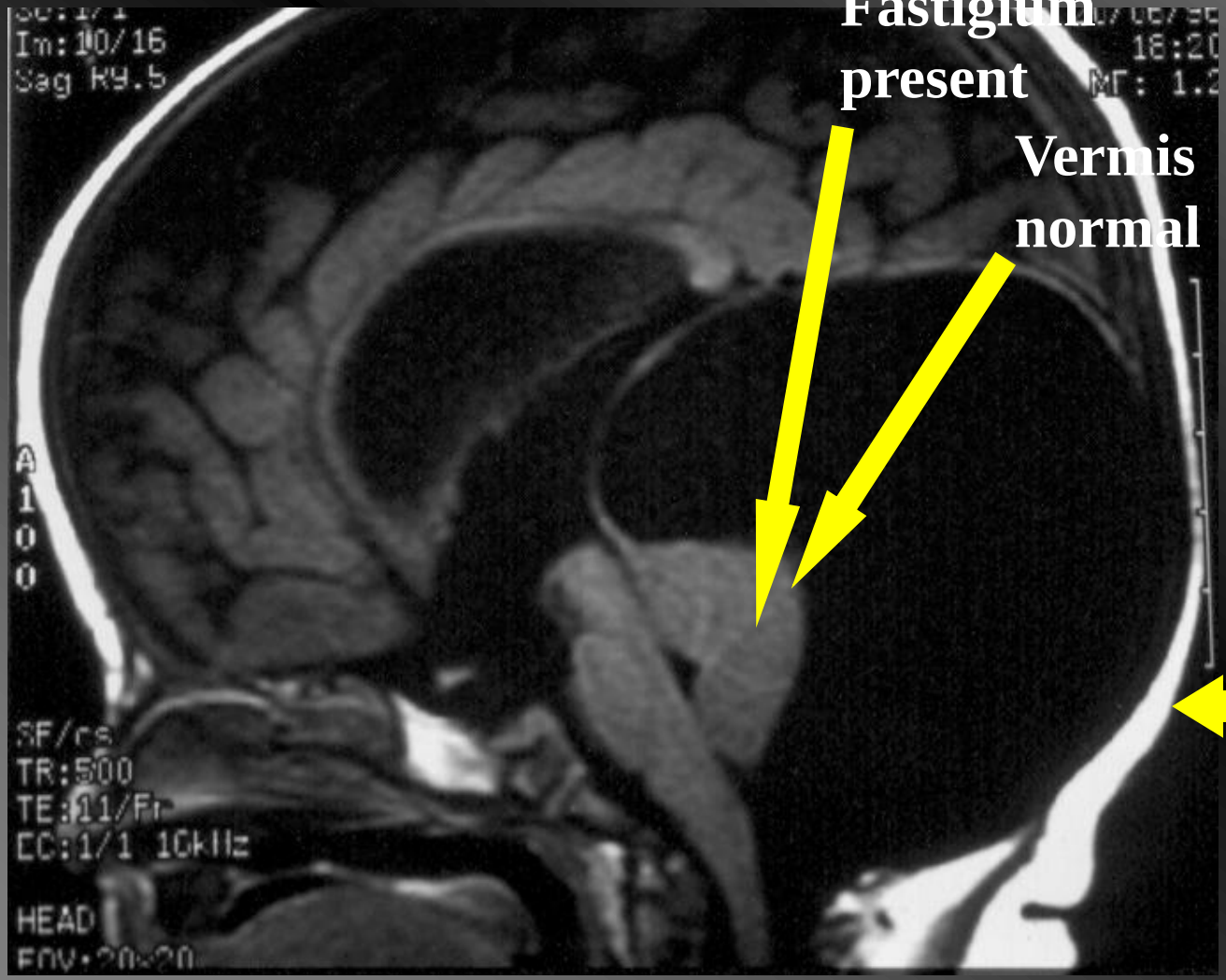






INFRATENTORIAL

Retrocerebellar: DD from DWC



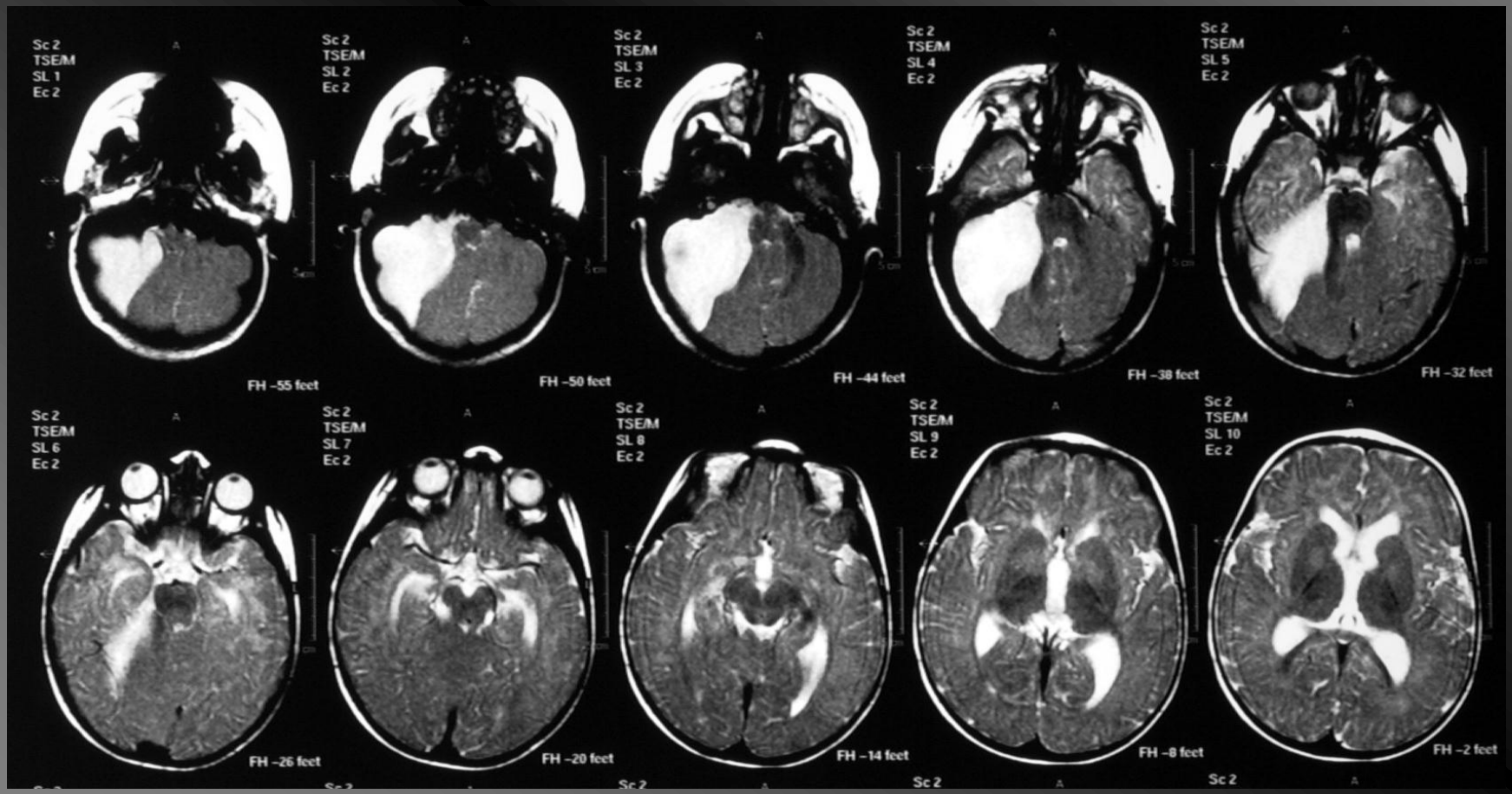
Fastigium present

Vermis normal

Scalloping of occipital bone

INFRATENTORIAL

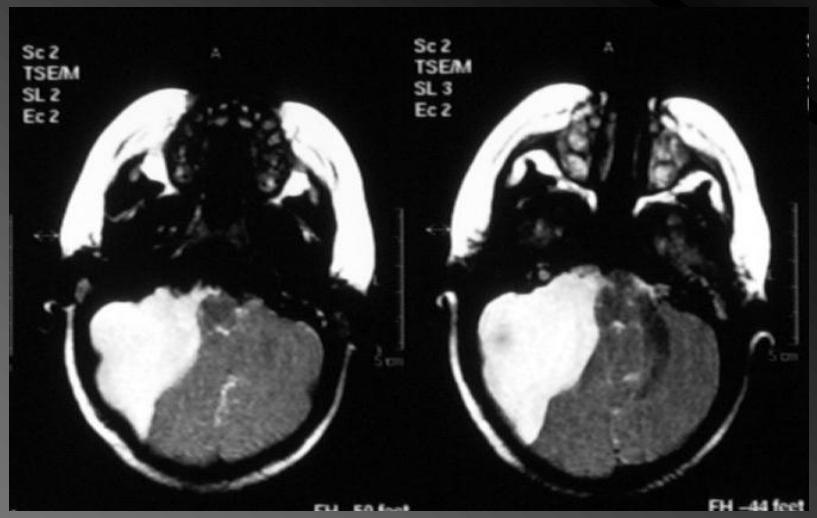
Laterocerebellar



INFRATENTORIAL

Clinical symptoms

Retrocerebellar



Laterocerebellar

11y

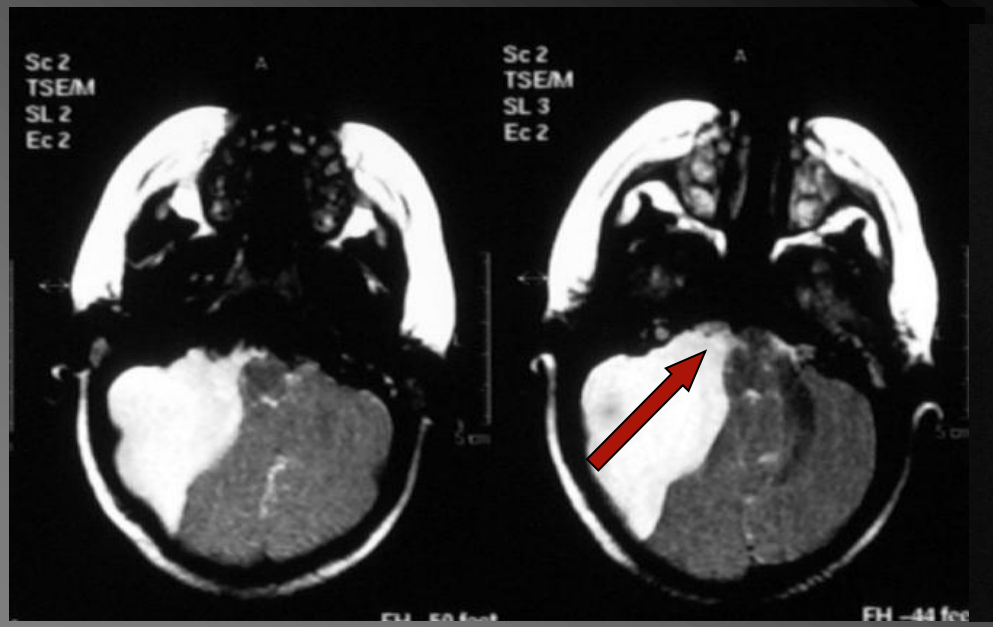
INFRATENTORIAL

Management options

Retrocerebellar

Laterocerebellar

- Endoscopic cysto-ventriculostomy whenever possible



INFRATENTORIAL

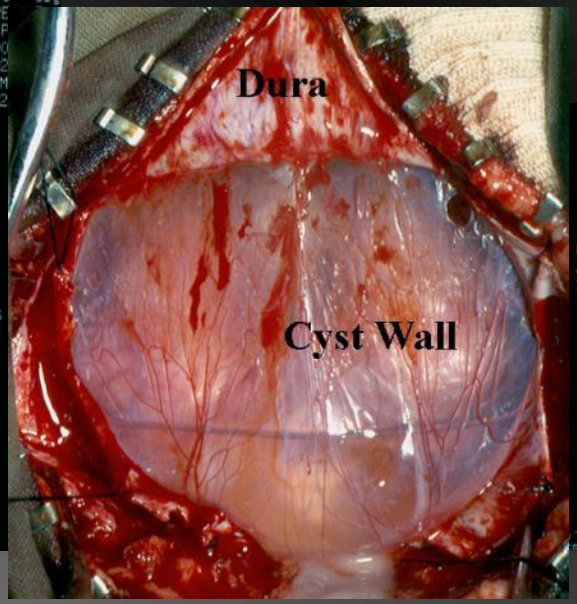
Management options

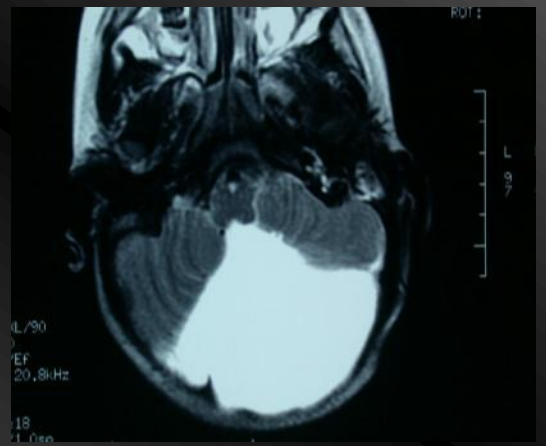
Retrocerebellar

Laterocerebellar

•Cyst excision

(open or endoscopic/endoscopic assisted)





Avoid CP shunt

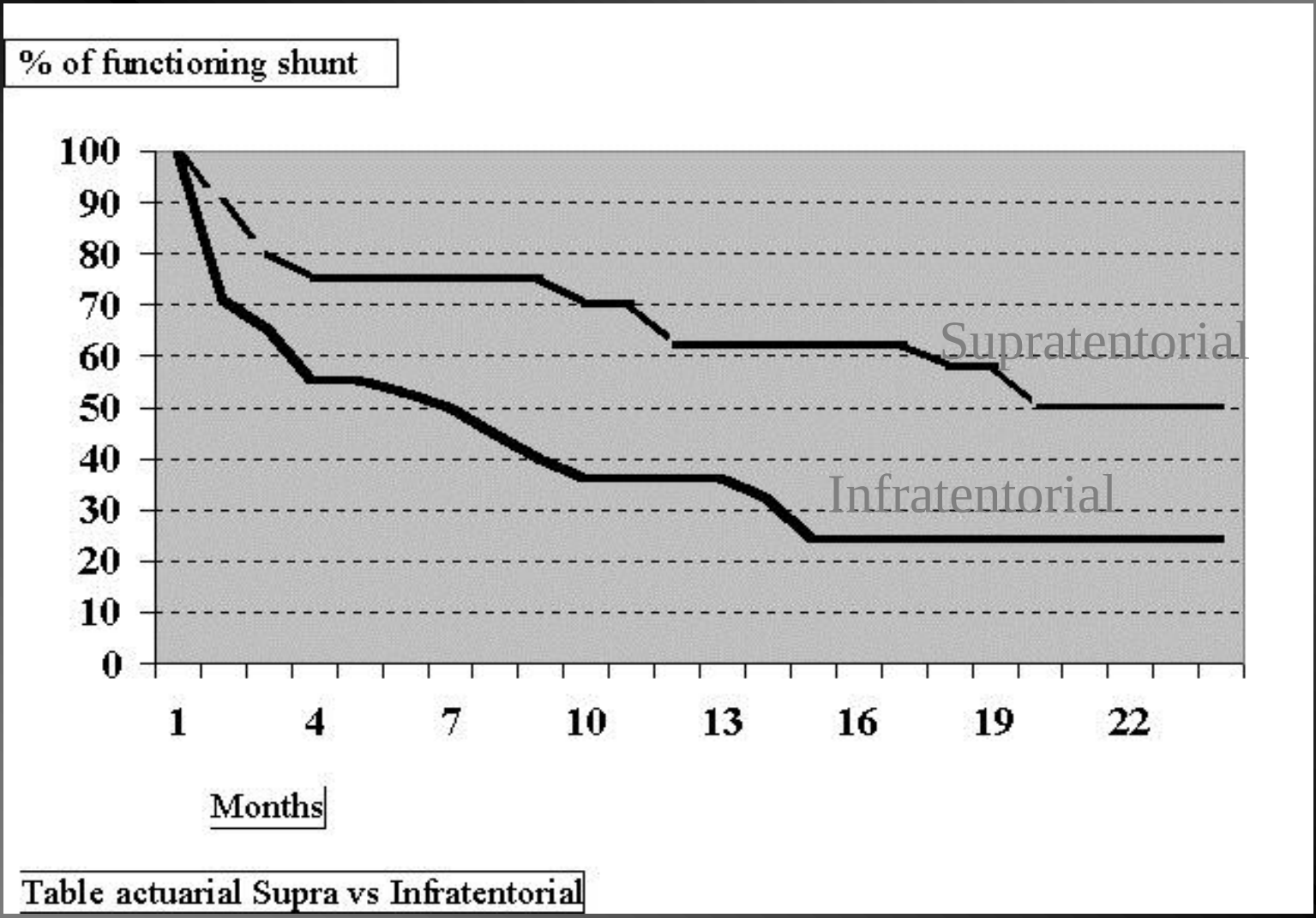


Table actuarial Supra vs Infratentorial