

# Disastrous Complications of ETV

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Director & Head

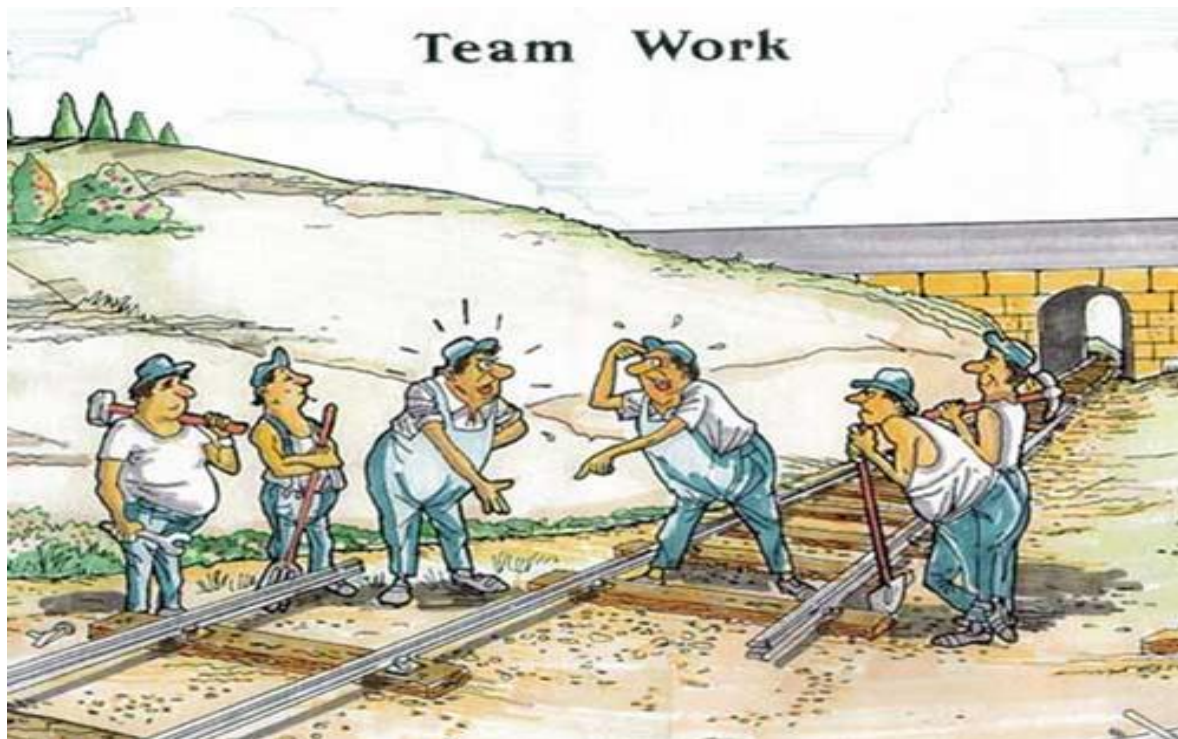
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# Foremost

Accepting the  
complications!!





Any complication is disastrous!!

Whole brain is an 'eloquent'  
organ

Even a 'minor' complication can  
progress and become fatal



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Prevention is better than cure !!

How to avoid complications



Prevention is better than cure !!

How to avoid complications

- Intra-operative



Prevention is better than cure !!

How to avoid complications

- Intra-operative
- Post-operative

# My series



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S. No.	Indication	NO. of cases	%age
1.	Congenital hydrocephalus	166	52.36%
2.	Third ventricular lesions	33	10.41%
3.	MMC, IVH	18	5.67%
4.	Post infectious	35	11.04%
5.	Miscellaneous Posterior fossa tumor/ hematoma/ infarct	65	20.50%
		317	



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# Complications

- Abandoned: **4**
  - Poor orientation within a very large ventricle: **1**
  - Venous hemorrhage: **2**
  - Basilar artery: **1**
- Memory impairment: **5**
- Hypothermia: **7**
- Cardiac arrhythmias: **3**
- Infection: **5**
- Mortality: **2**





# Review of Literature

# Intra-operative

- Complications

- Hemorrhagic 3.72%

- Severe hemorrhage
    - Basilar rupture

- Neural injury 0.24%

- Thalamic
    - Forniceal
    - Hypothalamic
    - Midbrain

- Anesthesia related 0.10%

- Hypotension
    - Bradycardia

} Procedure related



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# Post-operative

- Complications
  - Hematoma 0.81%
  - Subdural hygroma 0.27%
  - CNS infection 1.81%
  - CSF leak 1.61%
  - Systemic complications 2.34%
    - DVT, pneumonia, pulmonary embolism, urinary infection & retention, renal failure, hyponatremia, hypotension, bradycardia



# Summary

Overall complication rate  $\sim 8.5\%$

Permanent Morbidity  $\sim 2.4\%$

Mortality  $\sim 0.28\%$

Disastrous Complications  $\sim 2.68\%$

# Disastrous Complications



Death

Permanent neurological deficit

Permanent hormonal deficit

# Permanent neurological complications



~ 1.44%

Hemiparesis

Gaze Palsy

Memory disorders

Altered sensorium

# Permanent hormonal complications

~ 0.94%

Diabetes insipidus

Weight gain

Precocious Puberty



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# Intra-operative hemorrhage



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~ 3.7%

Severe ~ 0.6%



# Intra-operative neural injury



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~ 0.24%

Thalamic

Forniceal

Hypothalamic

Midbrain



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# Miscellaneous

CNS infections ~ 1.81%

Intracranial hematoma ~ 0.81%

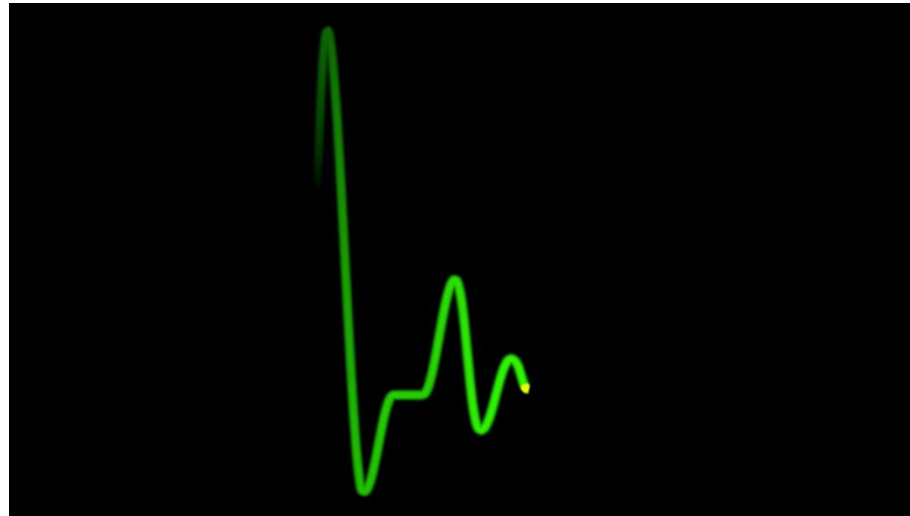
CSF leak ~ 1.61%

# Mortality ~0.28%



- Early
  - Hemorrhage
  - Sepsis
- Late
  - 'Sudden death phenomenon'

# Bradycardia & Asystole





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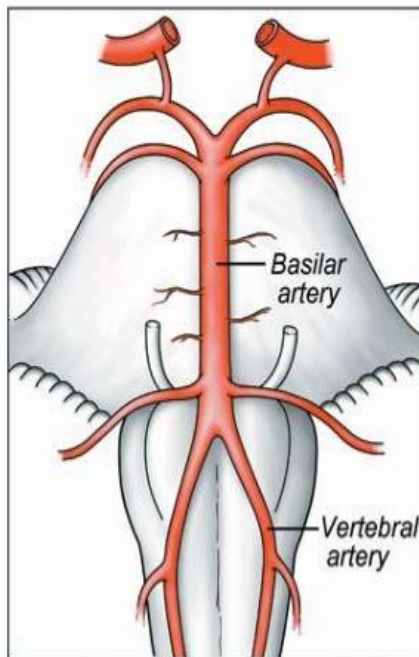
- During manipulation of the third ventricle
  - Introduction of scope
    - May obstruct both FM
  - Irrigation
    - Pressure
    - Osmolality different
    - Cold
  - Pressure on floor
    - Pressure irrigation
    - Traction on floor and walls when making stoma
  -



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vascular injury

## Basilar Artery



- Happens when floor opaque
- While making stoma or while enlarging stoma
- Opening forceps or pulling an inflated balloon back

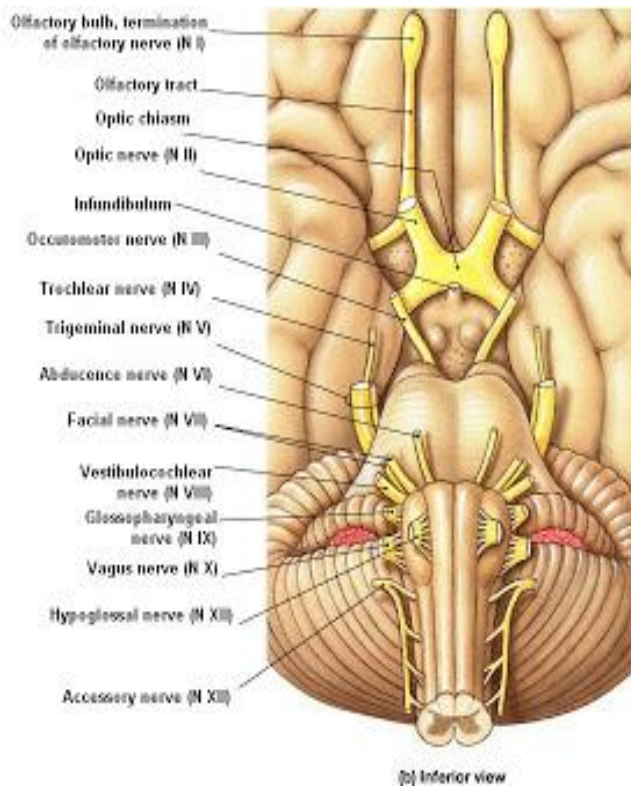




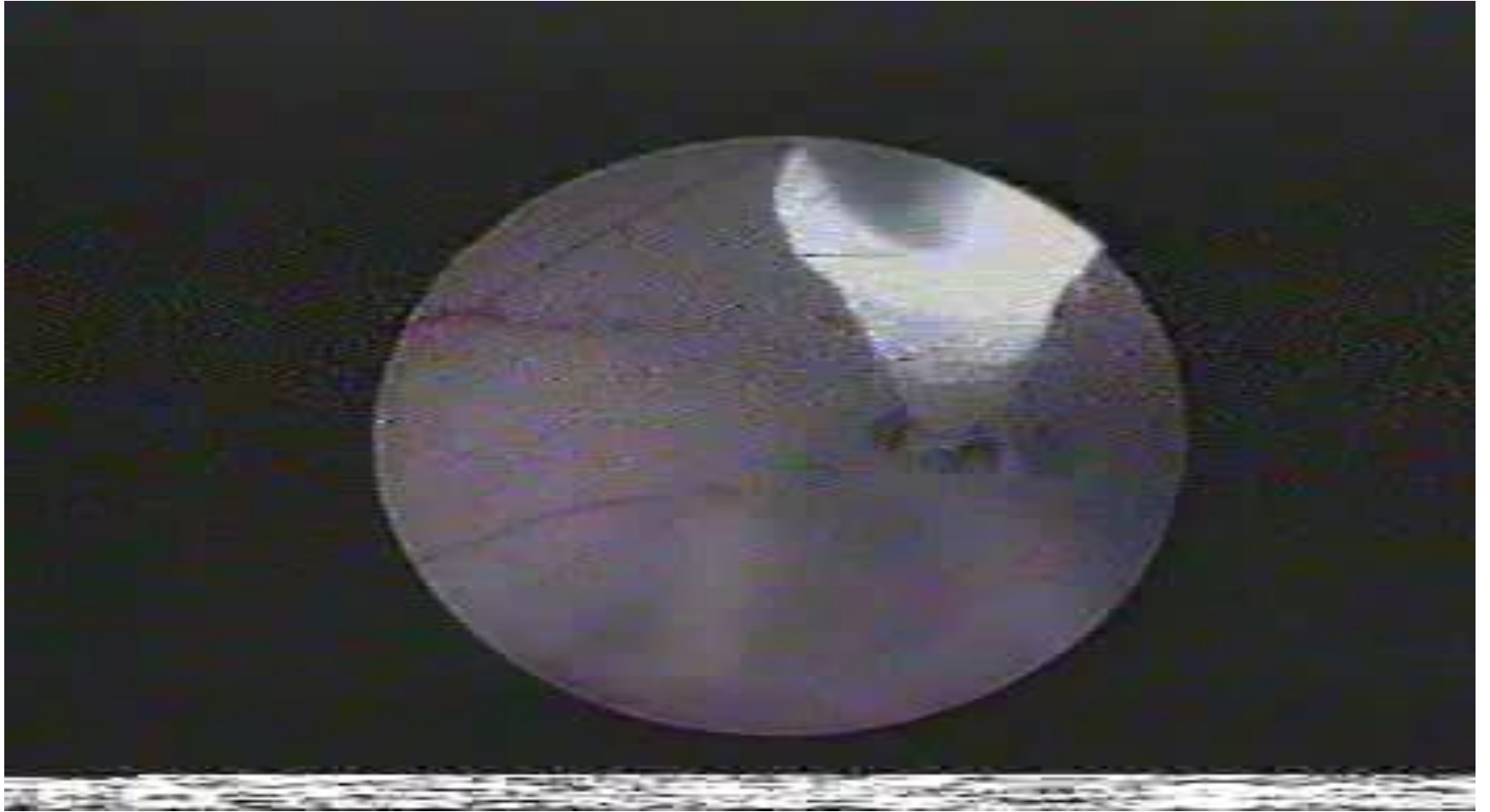


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# Cranial neuropathies



- Oculomotor and abducens most affected
- During perforating the floor





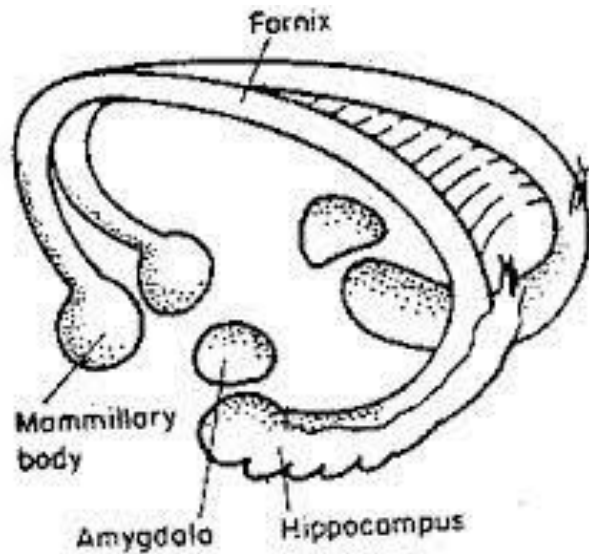
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# Forniceal and hypothalamic injury

# Forniceal Injury

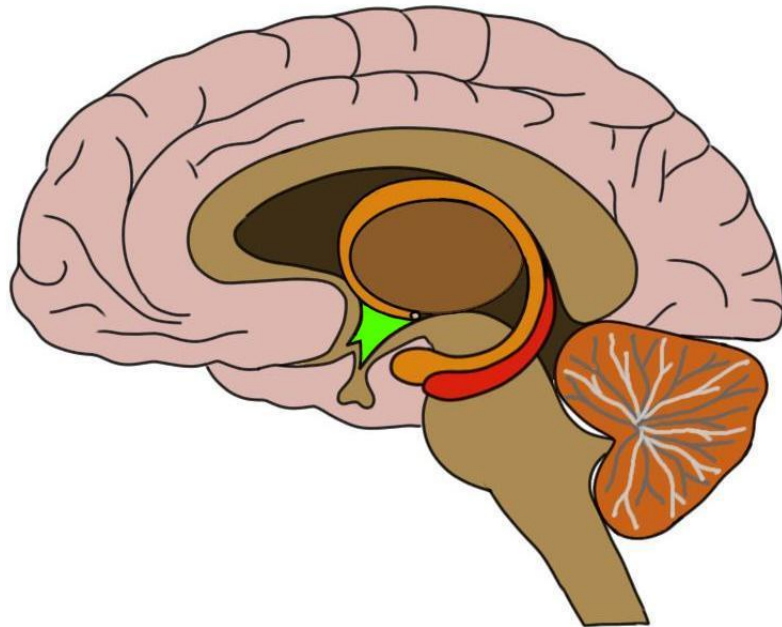


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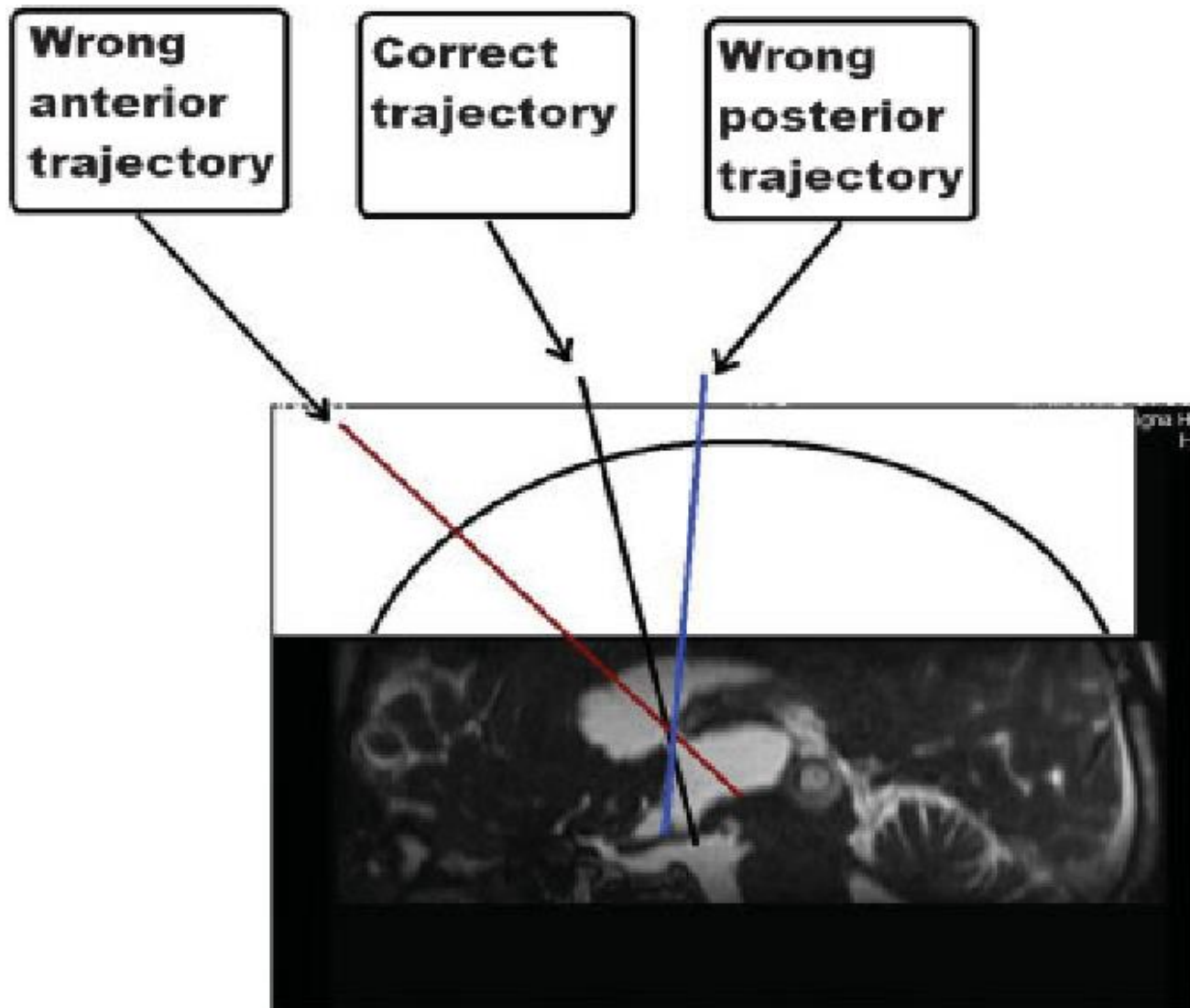


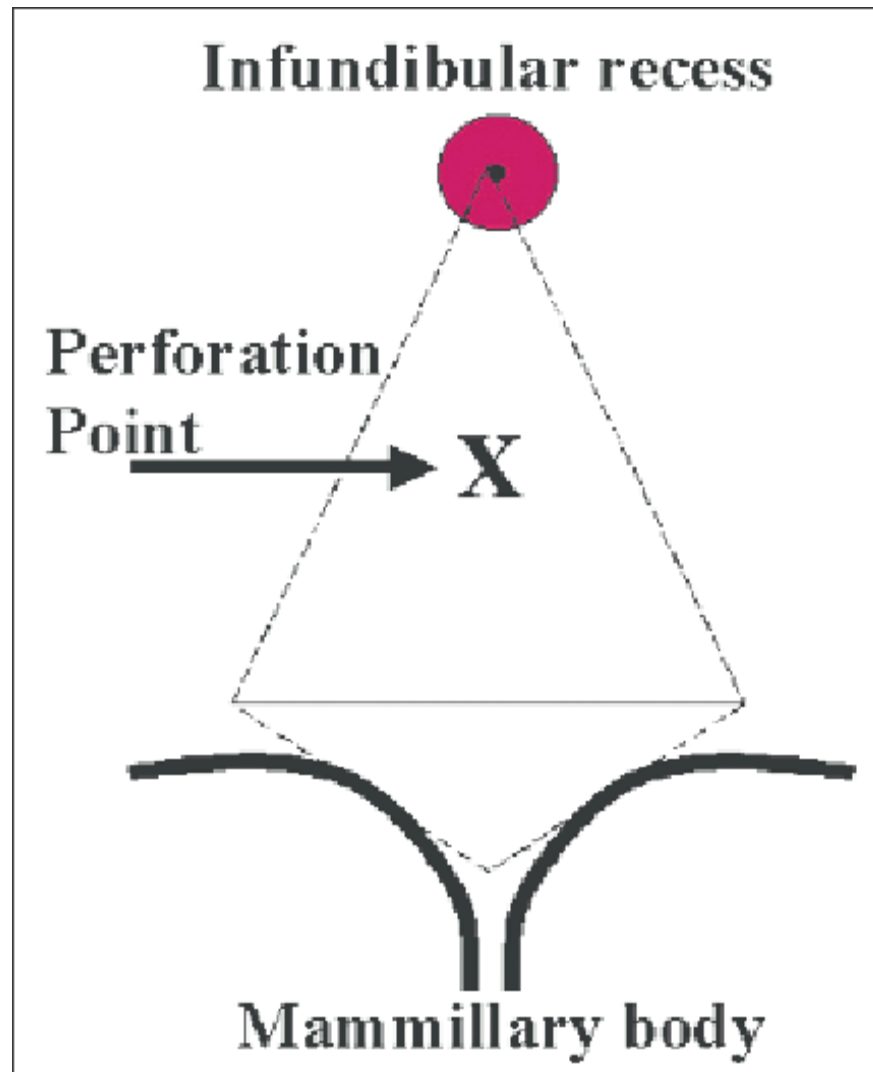
- Happens while negotiating the FM by the scope
- Or manipulation of scope within TV
- Memory disturbances

# Hypothalamic Injury



- Happens when stoma is made
- Presents with
  - DI
  - Amenorrhea
  - Loss of thirst
  - Hyperphagia
  - Drowsiness
  - Hyperkalemia
  - hyponatremia



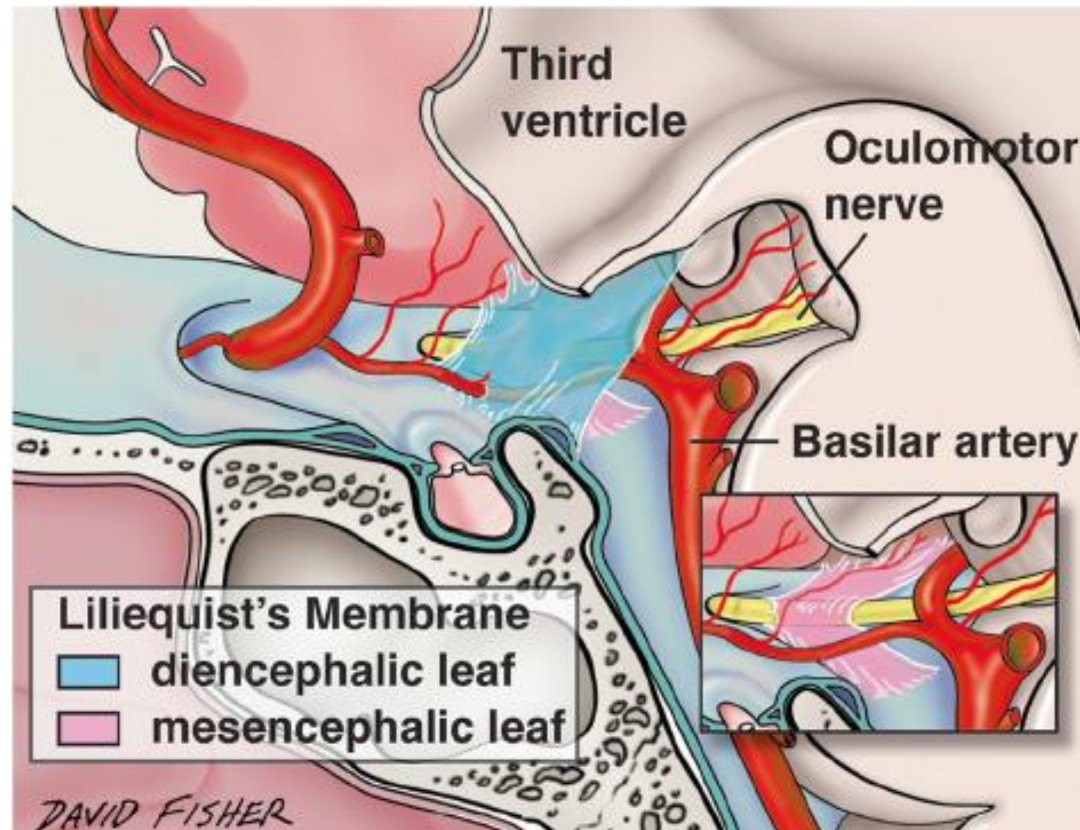


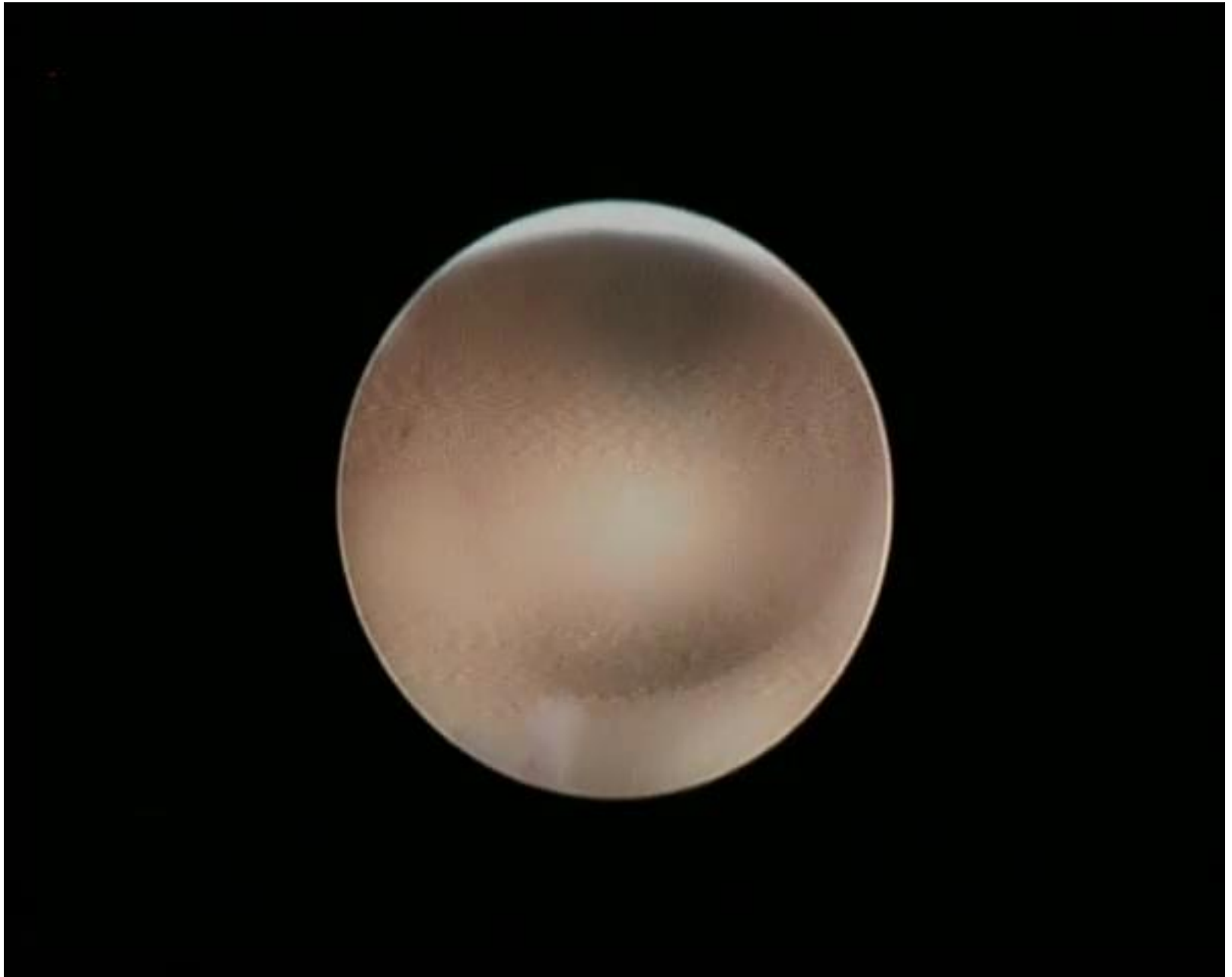


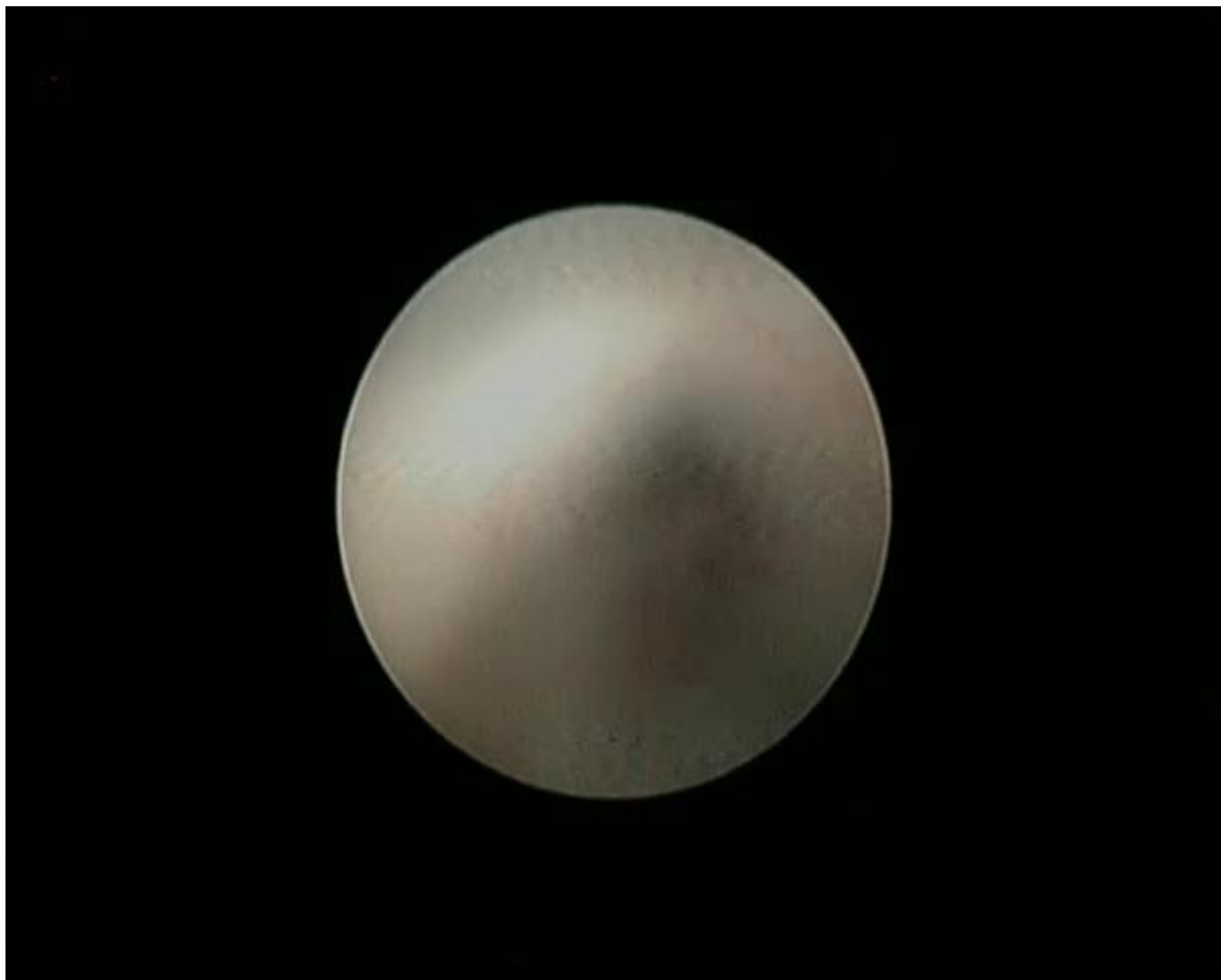
# Anatomy...



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# Miscellaneous

- Subdural hygroma
- CSF leak
- Infections
- ICH
- Seizures



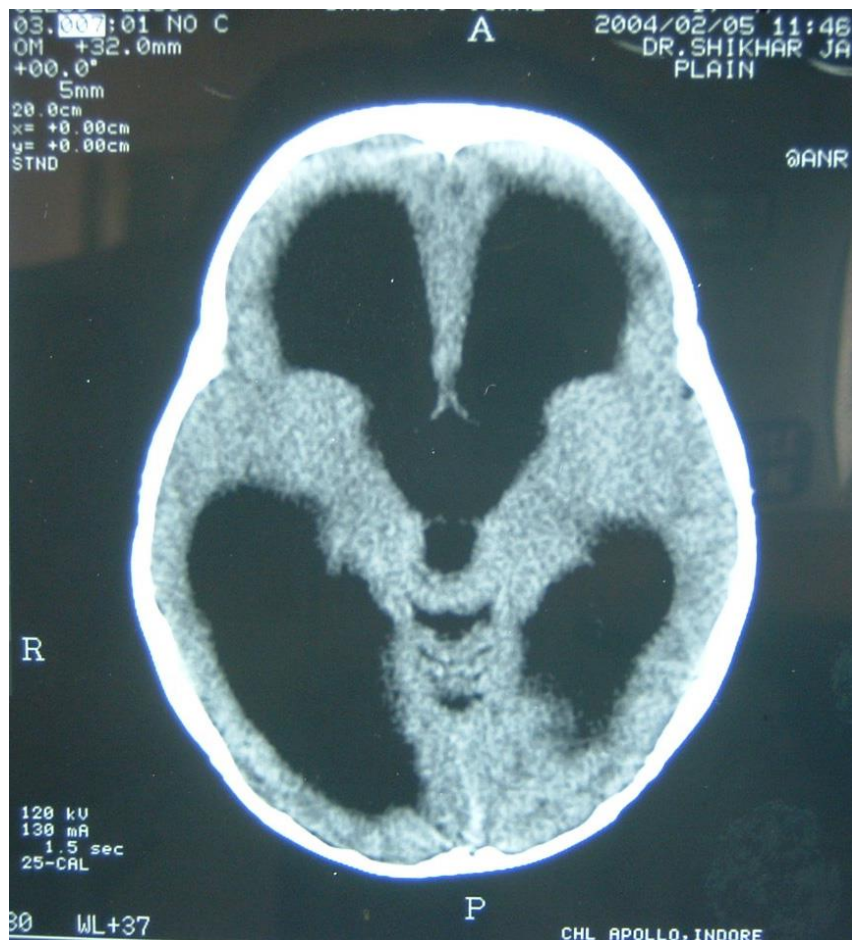
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# Subdural hygroma



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5 months old child with aqueductal stenosis undergoing ETV (Pre & Post Op. Imaging)



PRE OPERATIVE



5<sup>TH</sup> POST OP DAY



AFTER 5 MONTHS



# Complication avoidance pearl



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- Absolute indications
- System check
- Appropriate burr hole site
- Small needle puncture
- Minimal and gentle scope movements
- Avoiding sharp edge instruments
- Orientation within ventricles

# Complication avoidance pearl



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- Avoiding obstruction of both FM
- Appropriate irrigating fluid
- Minimal floor traction
- Appropriate site and area of stoma
- Expand the ventricles post surgery
- Cortical passage to be plugged

# Take home message



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- Complications cannot be avoided but minimized with
  - Meticulous approach
    - Proper case selection
    - Instrument check
    - Proper placement of burr hole and ventriculostomy
  - Patience and gentleness
  - Coordination with colleagues and anesthetists
  - Confidence, but no over confidence
  - Abandoning or switch to open microsurgical approach as and when needed

# Thanks



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