

# Cerebrospinal Fluid Rhinorrhea and Otorrhea



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Russell D. Briggs, M.D.

Faculty Advisor: Matthew Ryan, M.D.

The University of Texas Medical Branch

Department of Otolaryngology

Grand Rounds Presentation

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# Introduction

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- Cerebrospinal fluid rhinorrhea/otorrhea
  - Abnormal communication between the subarachnoid space and nose/temporal bone
- Complications high
  - Meningitis/brain abscess
- Challenge for diagnosis and treatment
- Important for otolaryngologists



# CSF Rhinorrhea

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- Connection of SA space to nose/sinuses
- Diverse etiologies
  - Iatrogenic– ESS
  - Blunt trauma– CHI or skull fractures
  - Increased intraventricular pressure
    - **Tumors, post infectious/traumatic hydrocephalus**
  - Arachnoid granulations

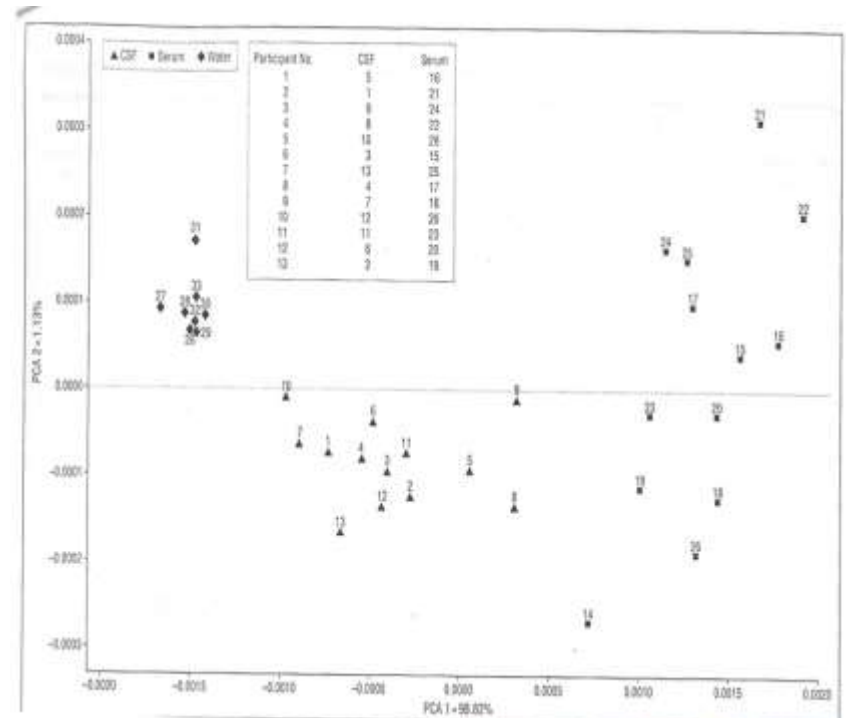
# CSF Rhinorrhea

- History and PE
- Unilateral watery rhinorrhea
- Increases with valsalva and posture
- May see leak/encephalocele with endoscope
- Collect fluid



# CSF Rhinorrhea

- Ensure it a CSF leak
- Testing of secretions
  - **Beta-2-transferrin** – highly specific
  - **Glucose/protein determination**
  - **Electronic nose**



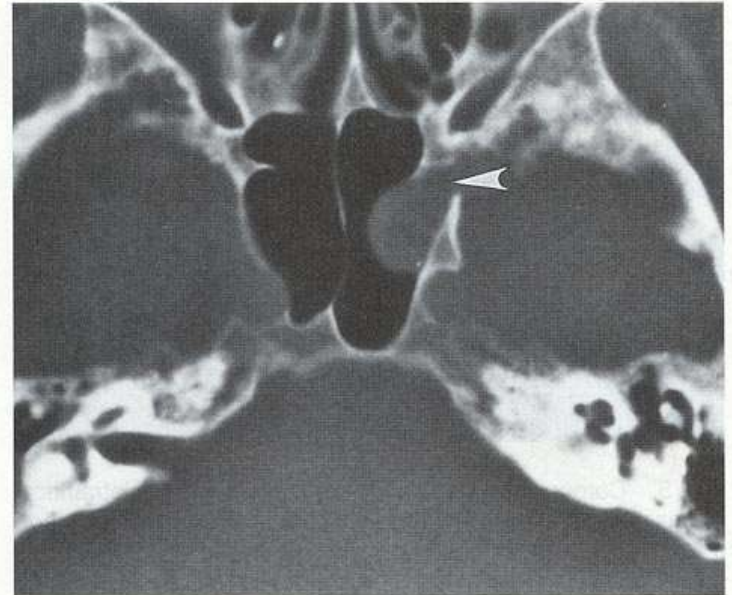
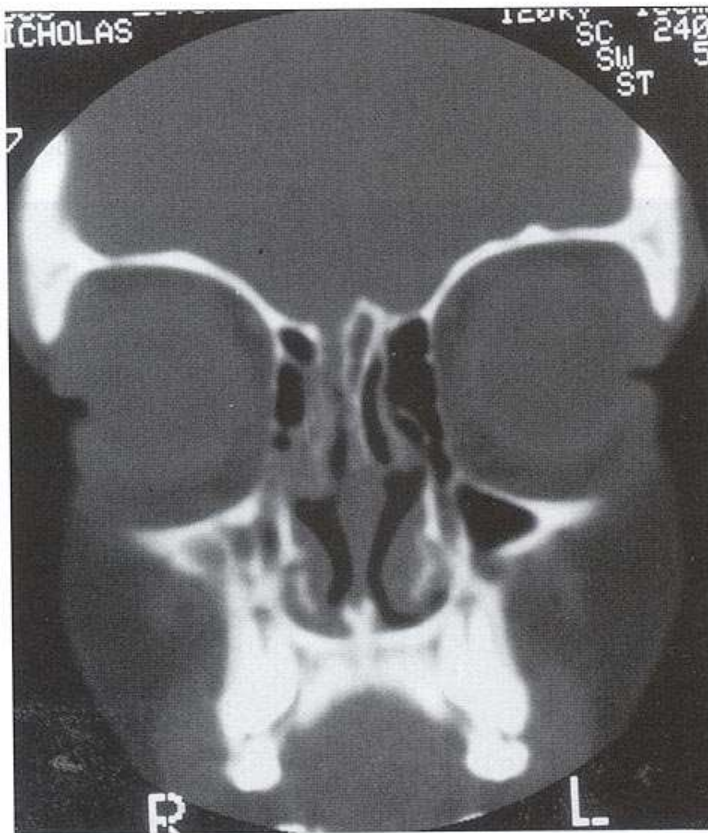


# CSF Rhinorrhea

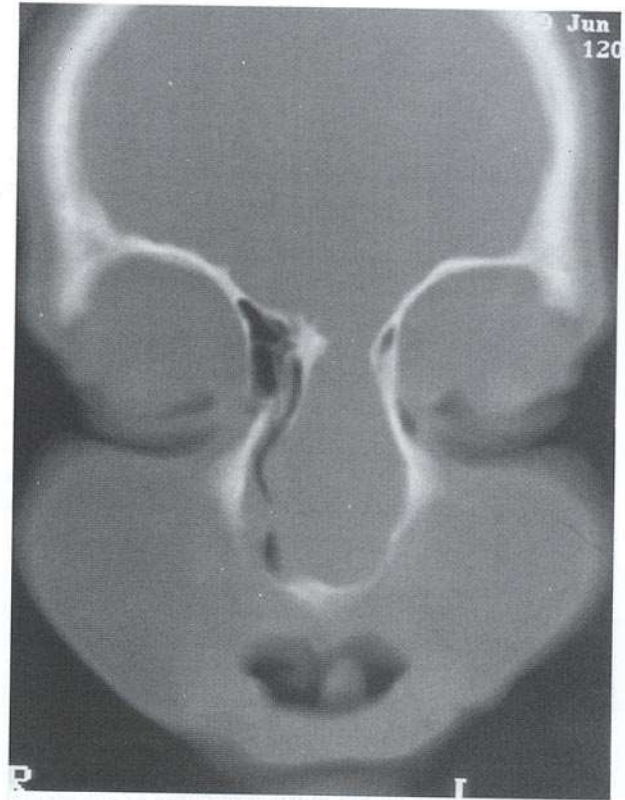
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- Most important step– identify the site
- High resolution CT of sinuses (1mm)
  - Coronal good for anterior skull base
  - Axial good for posterior wall frontal sinus
  - Problem is volume averaging
  - Look in cribriform niche and lateral wall of sphenoid sinus

# High resolution CT



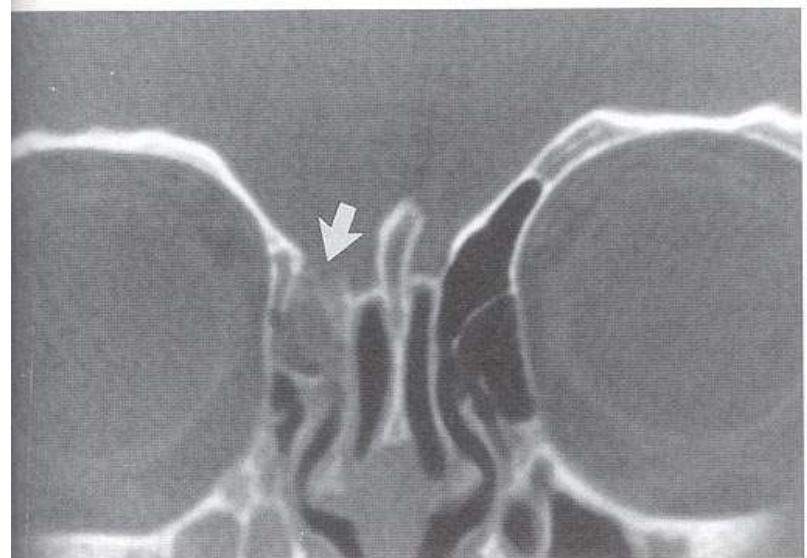
# High Resolution CT





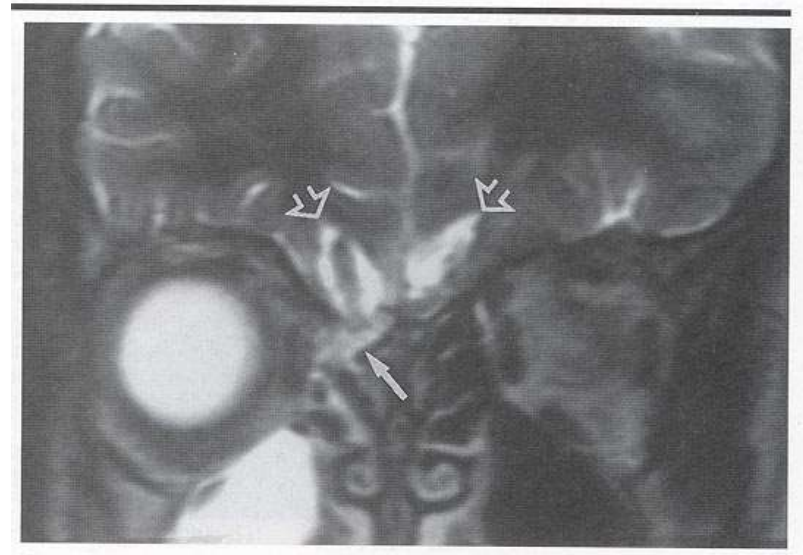
# CT Cisternogram

- Optimal imaging technique
- False negative if no active leak
- Obtain if HRCT fails to show the defect



# Magnetic Resonance Imaging

- **MR cisternography—  
misnomer as no  
intrathecal contrast**
- **Poor bony detail**
  - **Uses highly T2  
weighted images**
- **New method with  
intrathecal gad**
- **Encephaloceles**





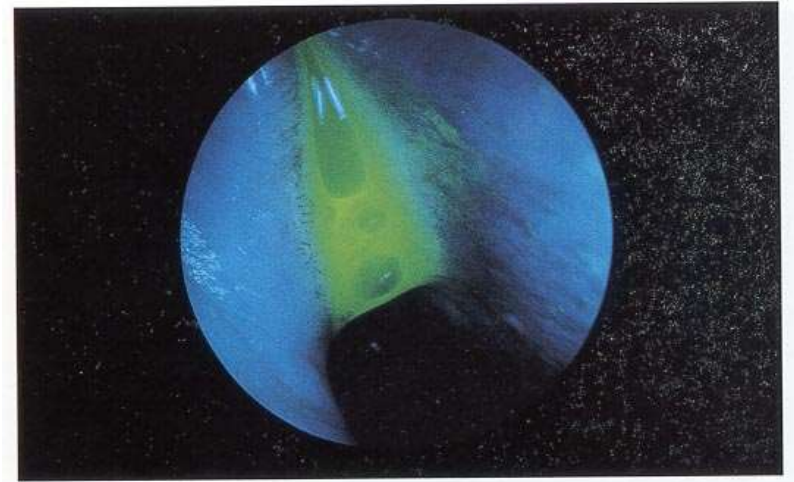
# Radioisotope cisternography

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- Many false positives and negatives
  - Fallen out of favor
- No anatomic detail
- For selected cases when leak not identified
  - Cottonoids in MM, SE recess
  - Removed in 24 hours and tested
  - If positive— intrathecal florescein

# Intrathecal Florescein

- IF leak not identified and strong suspicion
- Combined with endoscopic surgical approach
- Complications
- Topical use





# Treatment of CSF Rhinorrhea

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- Most resolve (after trauma/surgery)
- Bed rest, head elevation, stool softeners
- Possible lumbar drain/spinal taps
- Prophylactic antibiotics
- Surgical repair
  - Extensive intracranial injury
  - Intraoperative identification
  - Do not respond to conservative measures



# Surgical Treatment

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- Intracranial
  - Time tested
  - Allows direct visualization
  - Well vascularized flaps
  - Success about 75%
  - High morbidity (anosmia, edema, hemorrhage, incision, hospital stay)



# Surgical Treatment

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- Extracranial
  - Uses facial incisions for direct visualization
  - Success about 80%
  - Morbidity– facial scarring



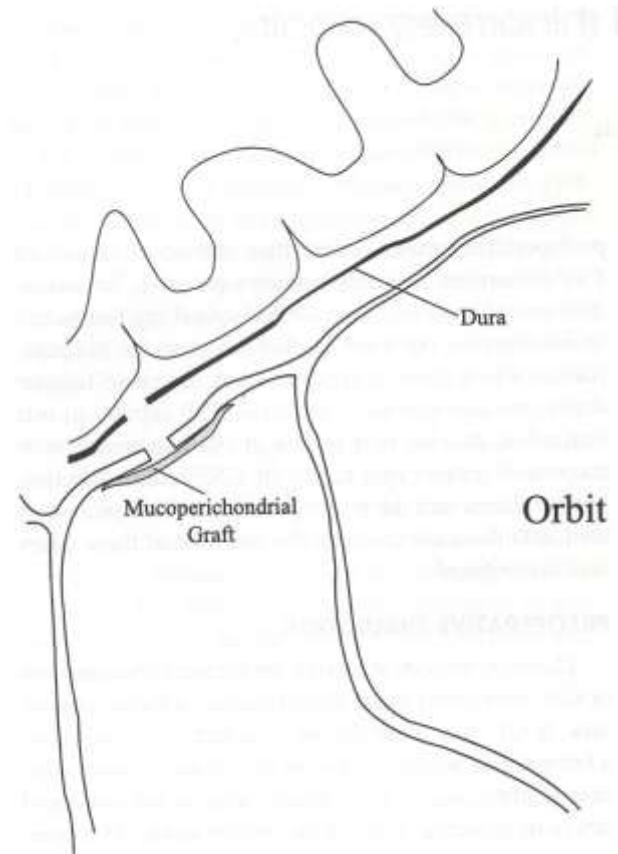
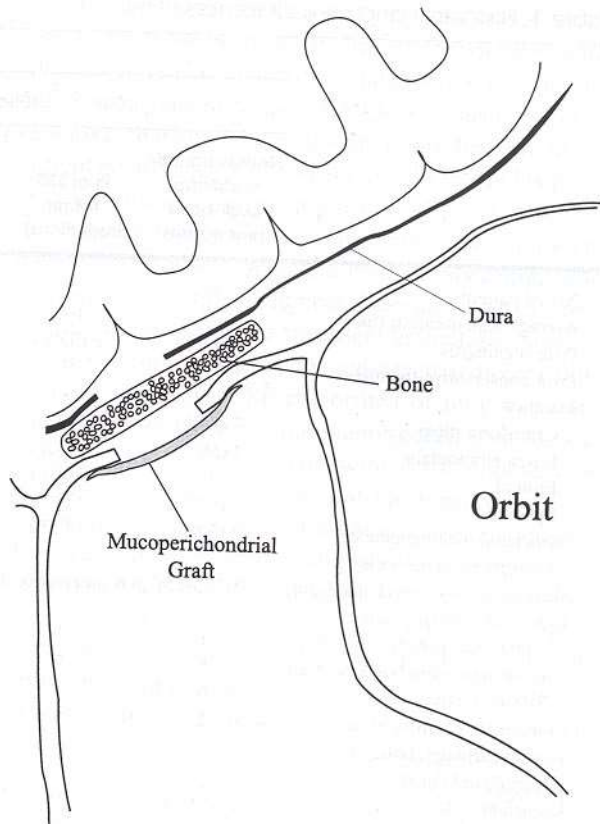
# Surgical Treatment

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- Endoscopic intranasal
  - Preferred method of repair
  - Successful 83-94% (average 90%)
  - Different techniques used
    - **Overlay vs. Underlay techniques**
    - **Composite grafts**
    - **Dependent on size and location of defect**
    - **Sphenoid sinus**

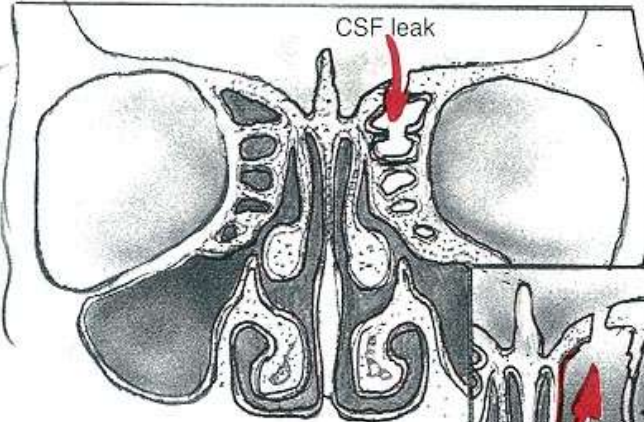


# Surgical Techniques

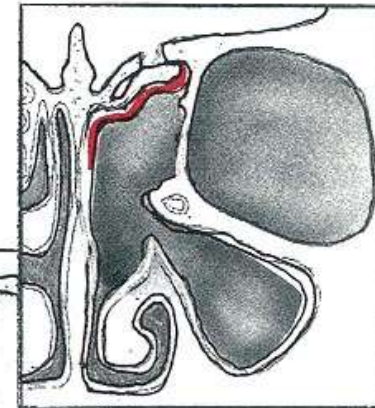


# Surgical Techniques

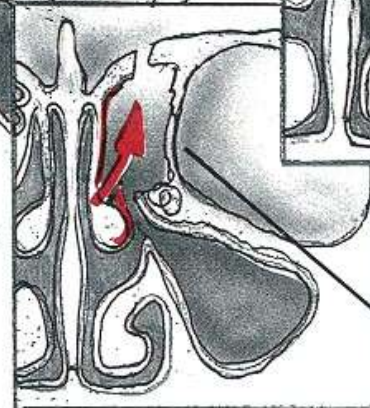
of ethmoid defect



325-4C



325-4B  
Mucosa stripped from turbinate and defect





# Surgical Techniques

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- Use gelfoam and gelfilm (>90%)
- Use nasal packing (100%)
- Consider fibrin glue (>50%)
- Consider lumbar drain
  - 3-5 days
  - Not required
- BR, stool softeners, antibiotics



# CSF Otorrhea

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- Connection of SA space and TB
- Acquired etiology is most common
  - Trauma (temporal bone fracture), post-operative, infections, neoplasms
- Congenital etiologies
  - Mondini deformities, wide CA, patent Hyrtel's fissure, wide fallopian canal
  - Arachnoid granulations ("Spontaneous")



# Temporal Bone Fractures

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- Most common cause of CSF otorrhea
- Longitudinal vs. Transverse
- CSF from ear or nasopharynx
- HRCT
- Send fluid for beta-2-transferrin
- Bed rest, head elevation, stool softeners, occ lumbar drain, sterile cotton, antibiotics (no drops)



# Temporal bone fractures

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- Brodie and Thompson (1997)
  - Review of 820 TB fractures
  - 122 with CSF leak
    - **95 closed in first week, 21 in second week, only 5 drained over two weeks**
    - **Seven patients had surgery**
      - Check scan and audiogram
    - **9 developed meningitis**
    - **?Abx**

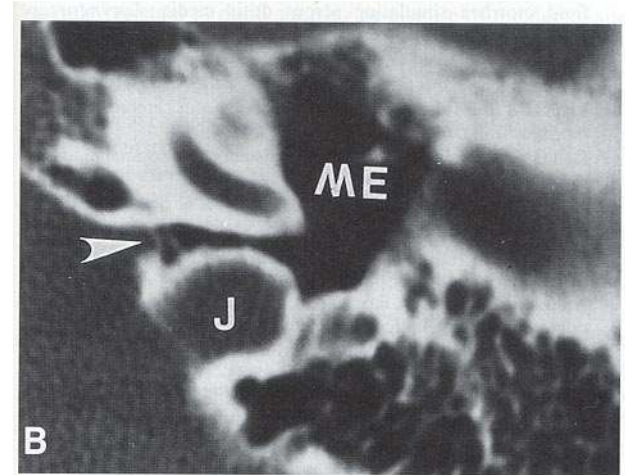
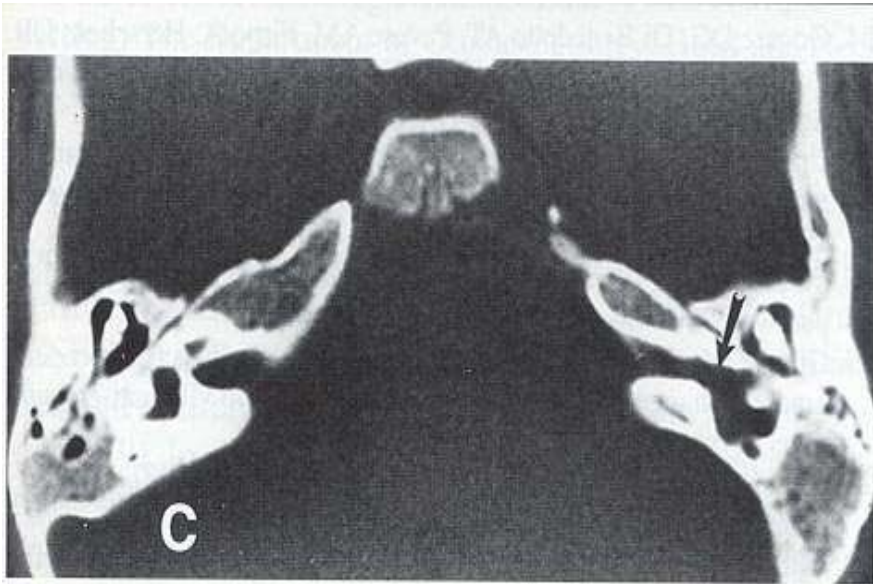


# Spontaneous CSF Otorrhea

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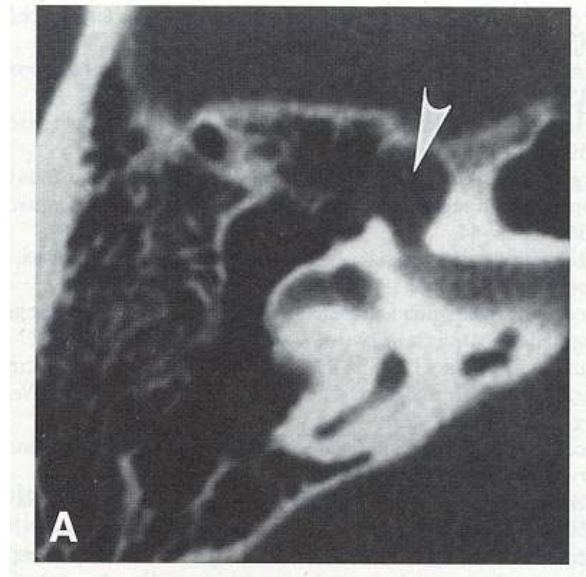
- May be subtle
- Two types
  - Preformed bony pathway– present early
    - **Meningitis after AOM**
    - **Resistant MEE– recognized after MT**
  - Congenital defect (arachnoid granulations)
    - **Villi enlarge, weight of temporal lobe**
    - **Bone erosion– present over age 50**
    - **MEE**

# Spontaneous CSF Otorrhea

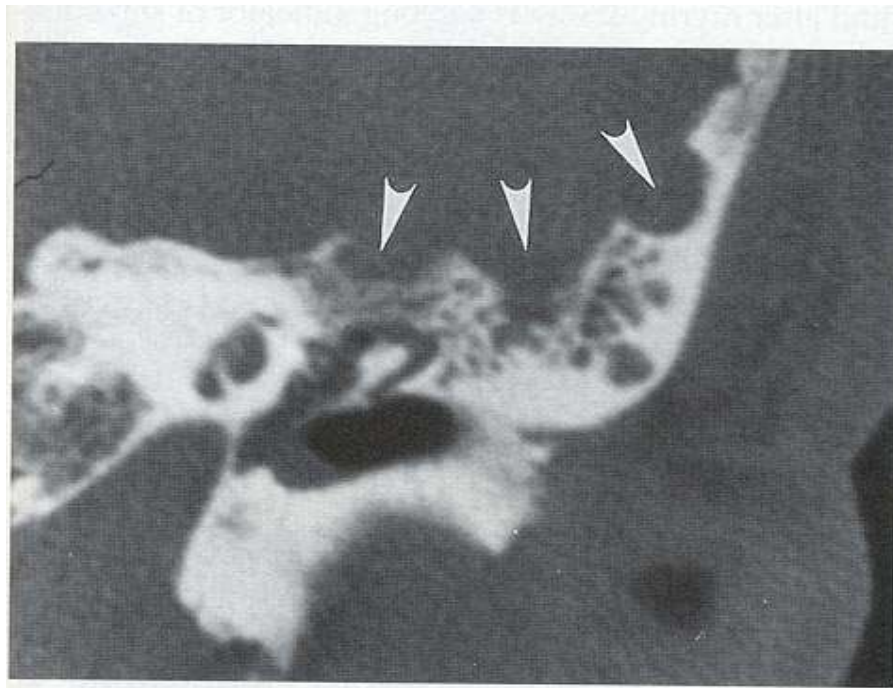




# Spontaneous CSF Otorrhea

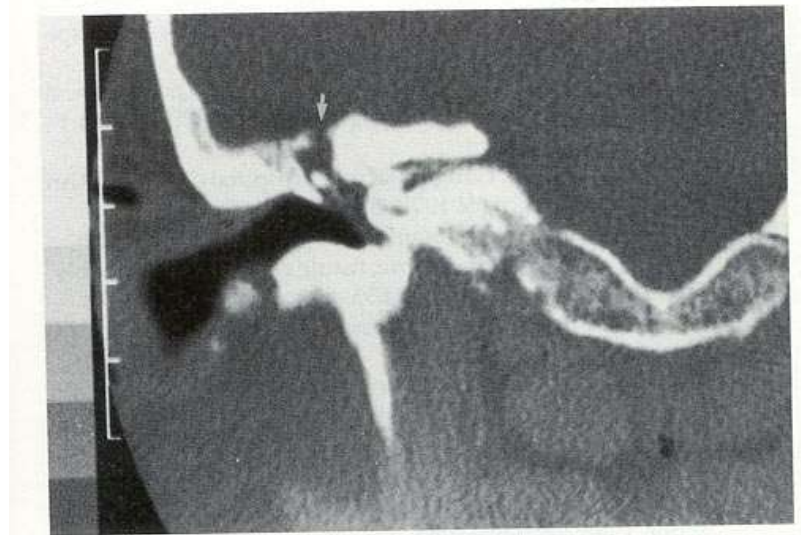


# Spontaneous CSF Otorrhea



# Spontaneous CSF Otorrhea

- Beta-2-transferrin
- HRCT
- CT cisternogram
- MR cisternogram
- Surgical repair





# Surgical Techniques

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- Middle fossa defects
  - Middle fossa craniotomy with extradural elevation– avoids ossicular problems
  - Transmastoid
- Posterior fossa defects
  - Transmastoid/fat obliteration of mastoid
- Others



# Conclusions

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- Get a good history and PE
- Test the fluid (if possible)
- Find the site of the the leak
  - Radiographically
- Treat it surgically if necessary



# Case Report

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- 45 yobf presents with “headache and my neck hurts”



# Case Report

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- Worsening for 2 weeks
- Photophobia, N/V



# Case Report

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- 45 yobf presents with “headache and my neck hurts”
- Worsening for 2 weeks
- Photophobia, N/V
- PMH: meningitis 6 months prior, AR
- PSH: hysterectomy
- Meds: Flonase– not helping– constant drainage
- SH/FH/ROS: NC





# Case Report

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- Physical Exam
  - Positive Kernig's and Brudinski's
  - Some clear rhinorrhea and hypertrophied turbs bilaterally
  - Sits forward and clear fluid from right nare
  - Otherwise normal H/N exam



# Case Report

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- Labs: WBC= 20.2 with left shift, remainder essentially OK

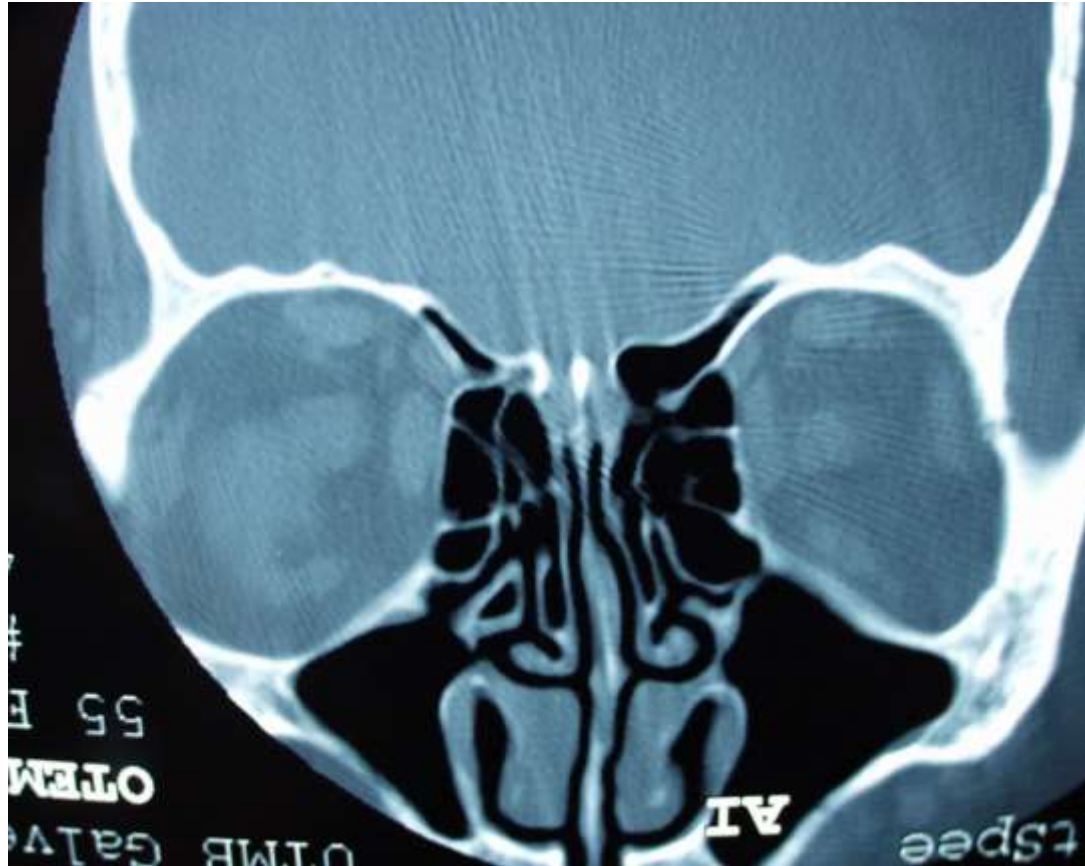


# Case Report

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- Consult to neurology made
- LP– cloudy fluid, many PMN's
- Streptococcus pneumoniae
- Placed on appropriate abx
- Improving

# Case Report



# Case Report



# Case Report





# Case Report

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- Did not respond to conservative measures
- Taken to surgery
- Endoscopically identified leak (3-4mm)
- Three layer repair
- Lumbar drain in for 7 days
- Packing in for 7 days