

Cerebrospinal Fluid Rhinorrhea and Otorrhea



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

- 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

- 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

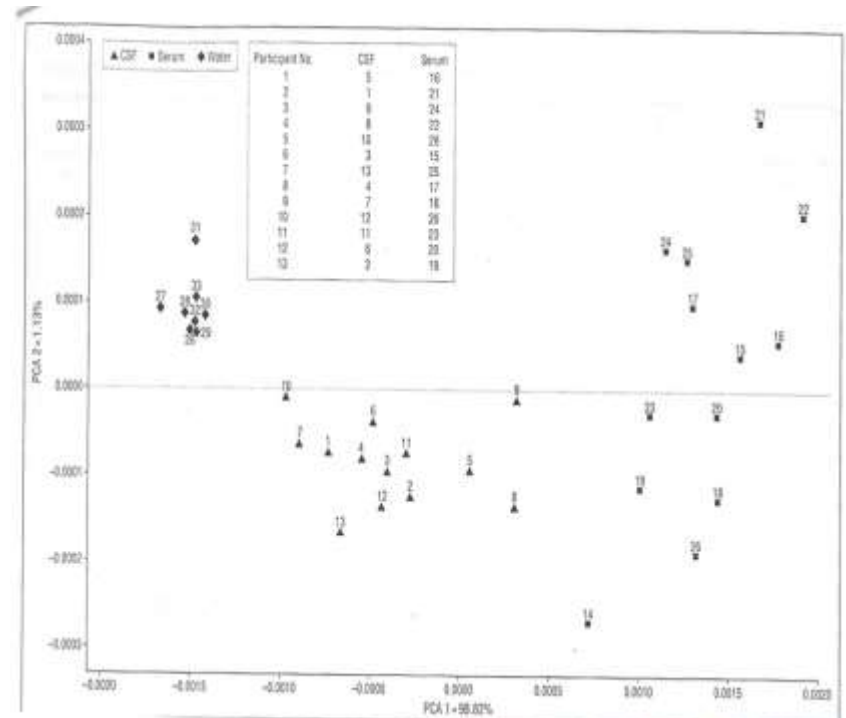
CSF Rhinorrhea

- 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**

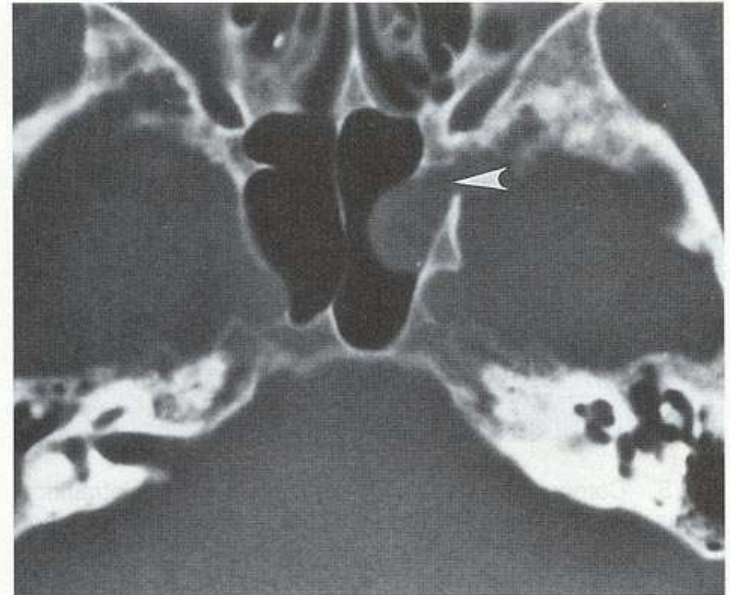
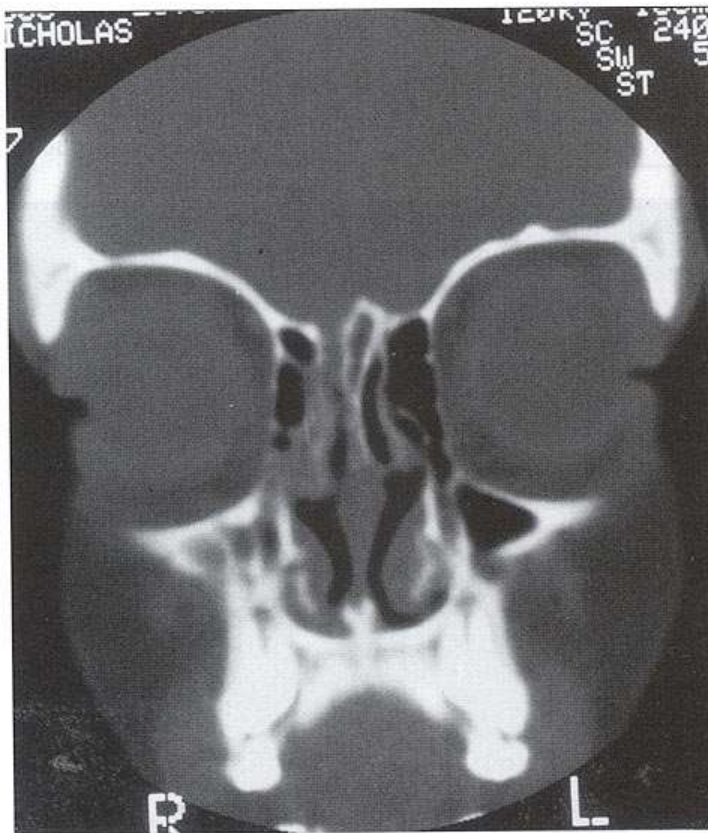




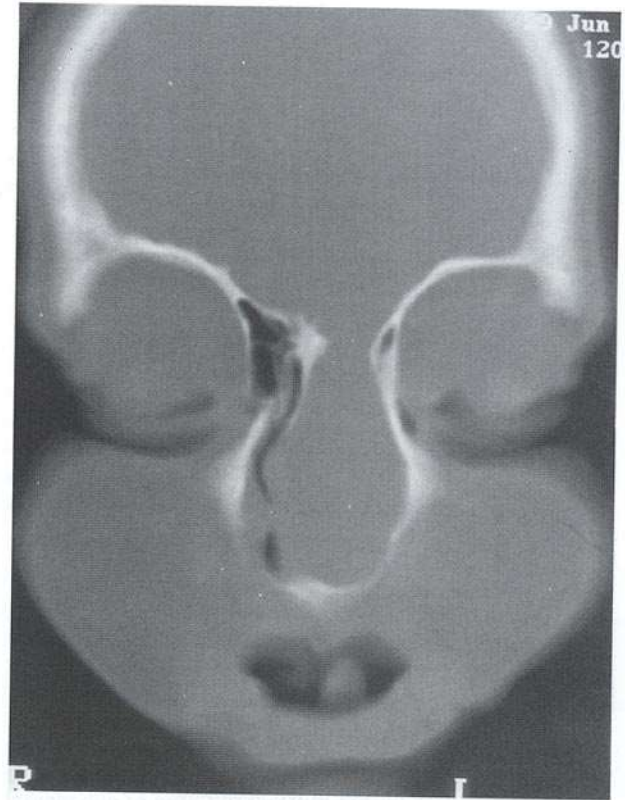
CSF Rhinorrhea

- 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

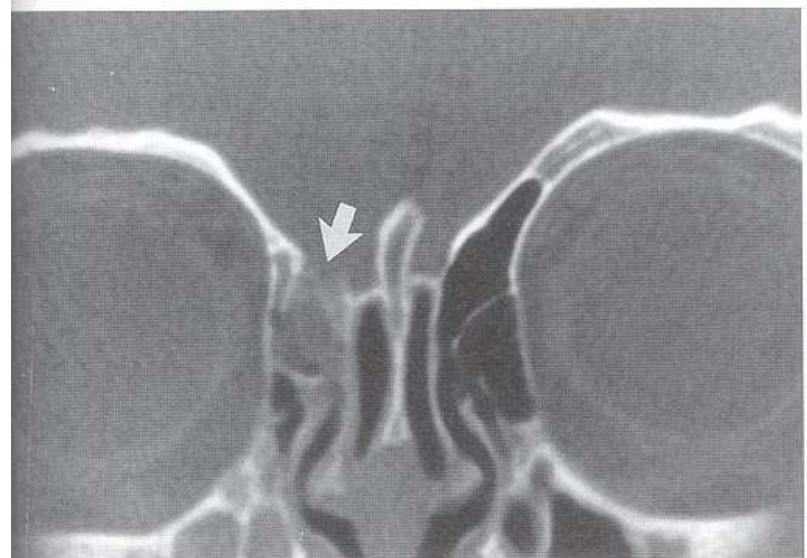


High Resolution CT



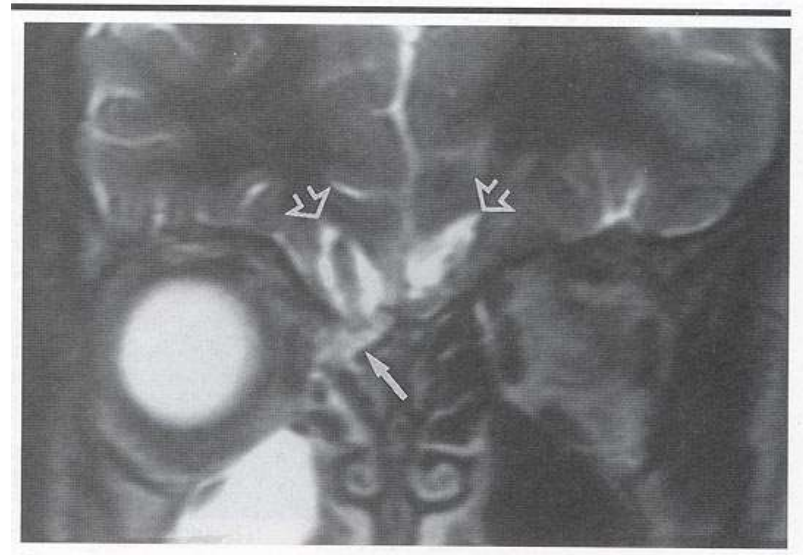
CT Cisternogram

- 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**



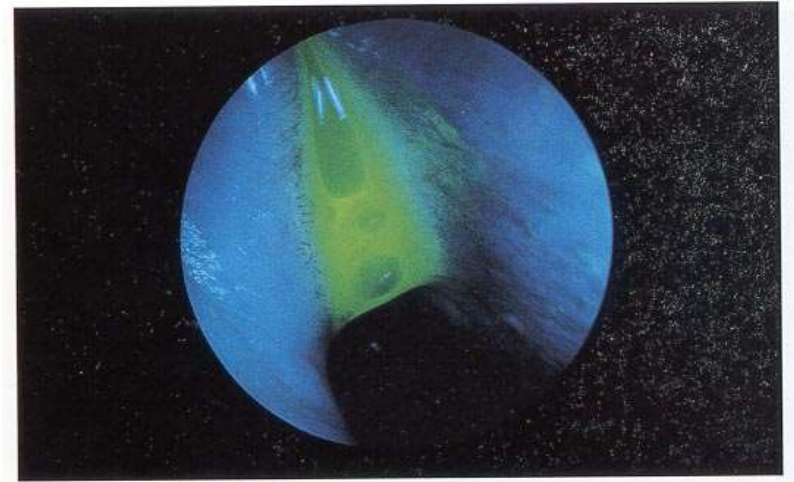


Radioisotope cisternography

- 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

- 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

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



Surgical Treatment

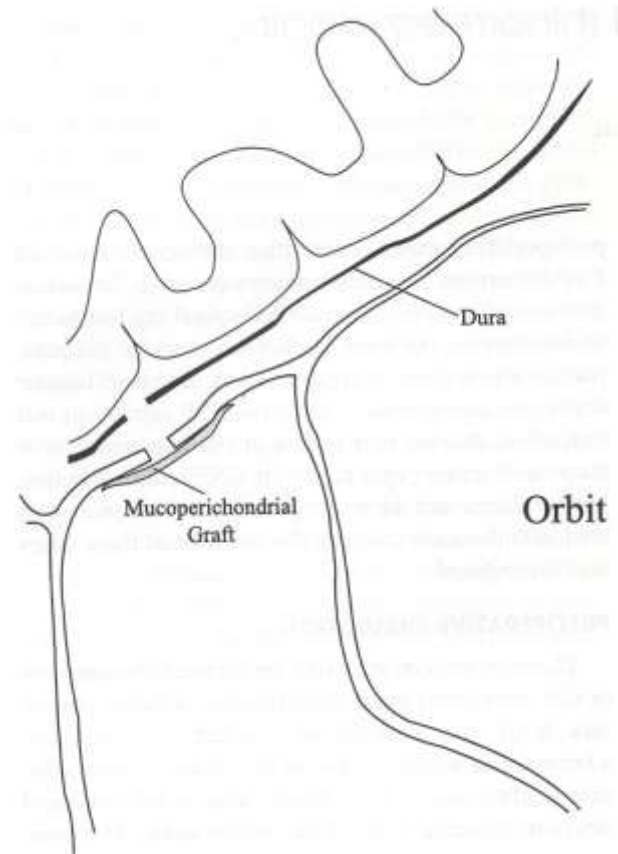
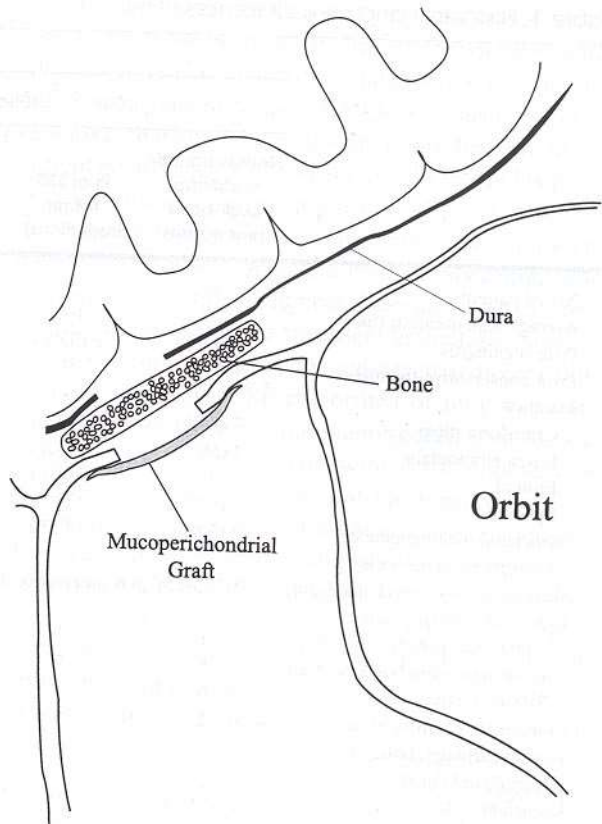
- Extracranial
 - Uses facial incisions for direct visualization
 - Success about 80%
 - Morbidity– facial scarring



Surgical Treatment

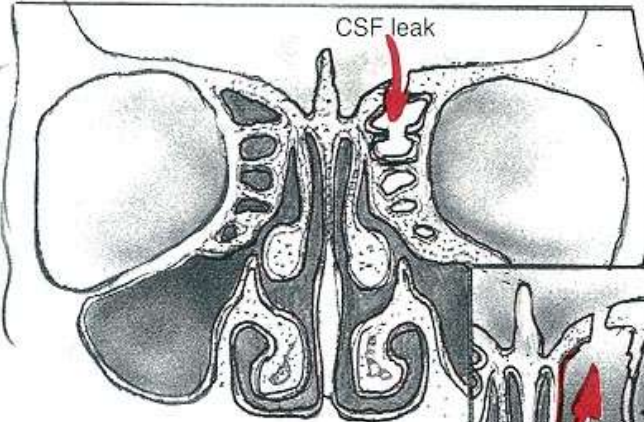
- Endoscopic intranasal
 - Preferred method of repair
 - Successful 83-94% (average 90%)
 - Different techniques used
 - **Overlay vs. Underlay techniques**
 - **Composite grafts**
 - **Dependent on size and location of defect**
 - **Sphenoid sinus**

Surgical Techniques

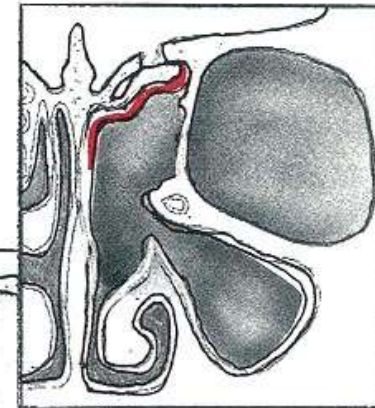


Surgical Techniques

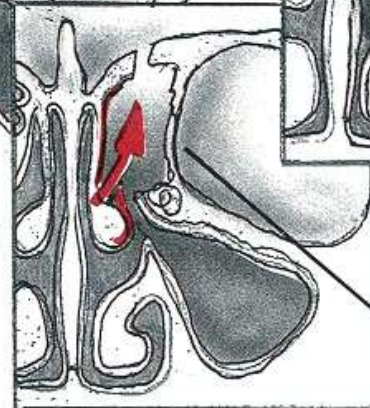
of ethmoid defect



325-4C



325-4B
Mucosa stripped from turbinate and defect





Surgical Techniques

- 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

- 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

- 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

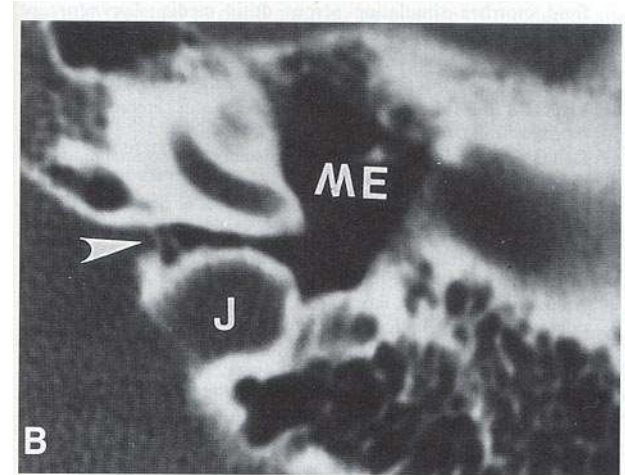
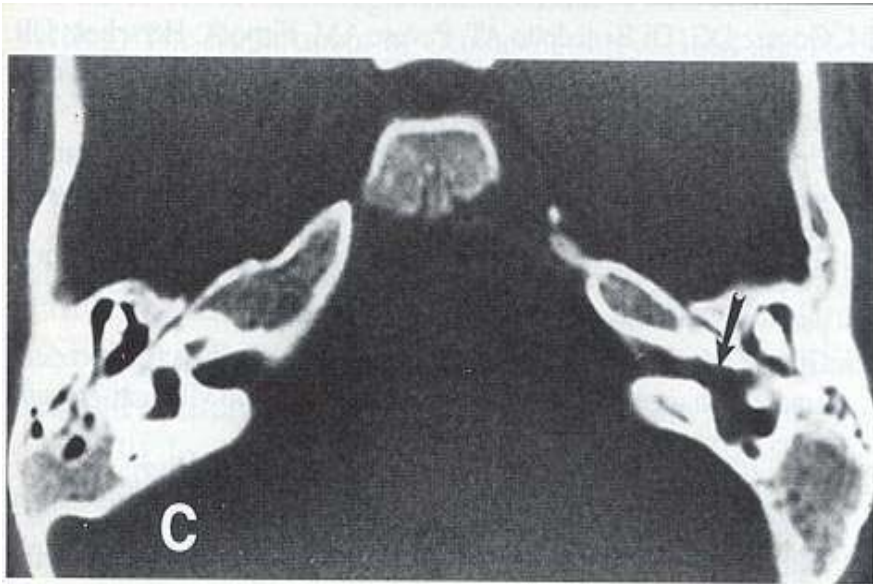
- Brodie and Thompson (1997)
 - Review of 820 TB fractures
 - 122 with CSF leak
 - **95 closed in first week, 21 in second week, only 5 drained over two weeks**
 - **Seven patients had surgery**
 - Check scan and audiogram
 - **9 developed meningitis**
 - **?Abx**



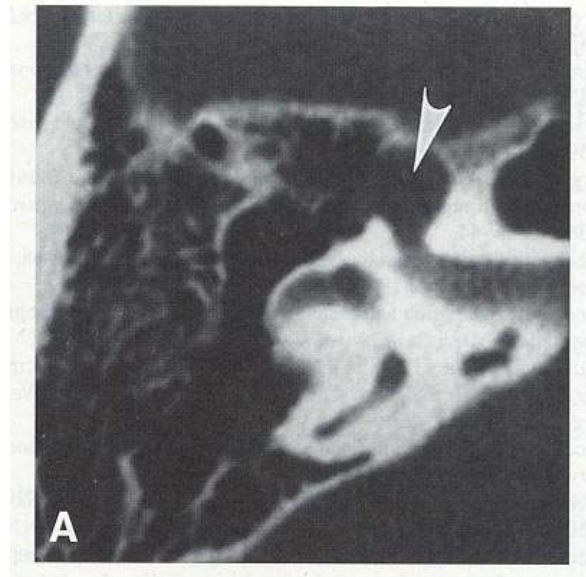
Spontaneous CSF Otorrhea

- 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**

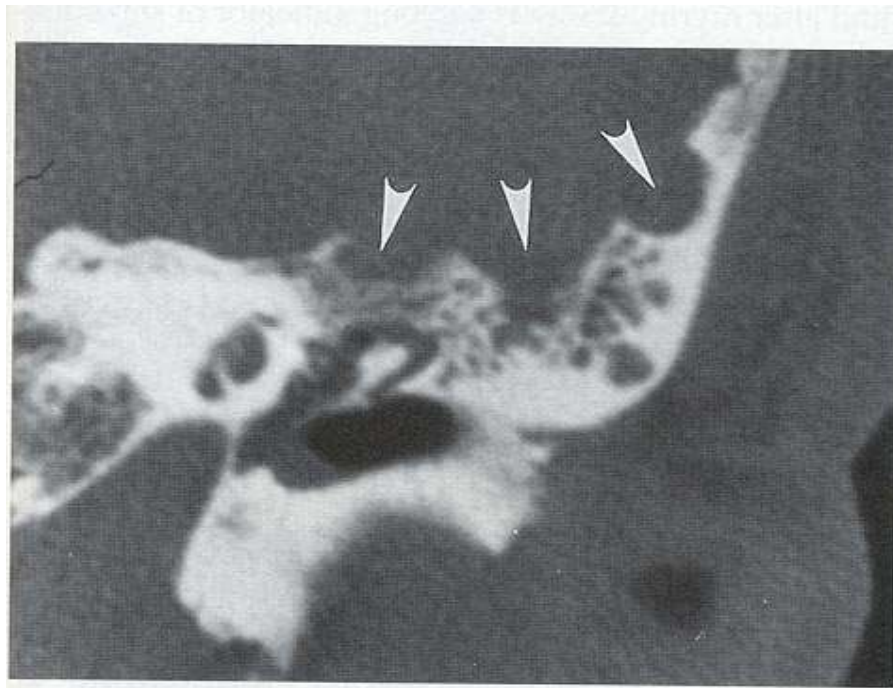
Spontaneous CSF Otorrhea



Spontaneous CSF Otorrhea

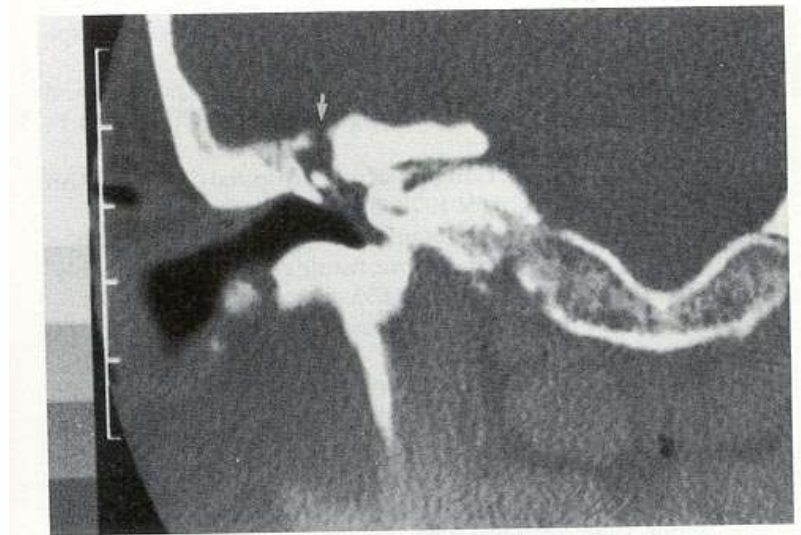


Spontaneous CSF Otorrhea



Spontaneous CSF Otorrhea

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





Surgical Techniques

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



Conclusions

- 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

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



Case Report

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- Worsening for 2 weeks
- Photophobia, N/V



Case Report

- 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

- 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

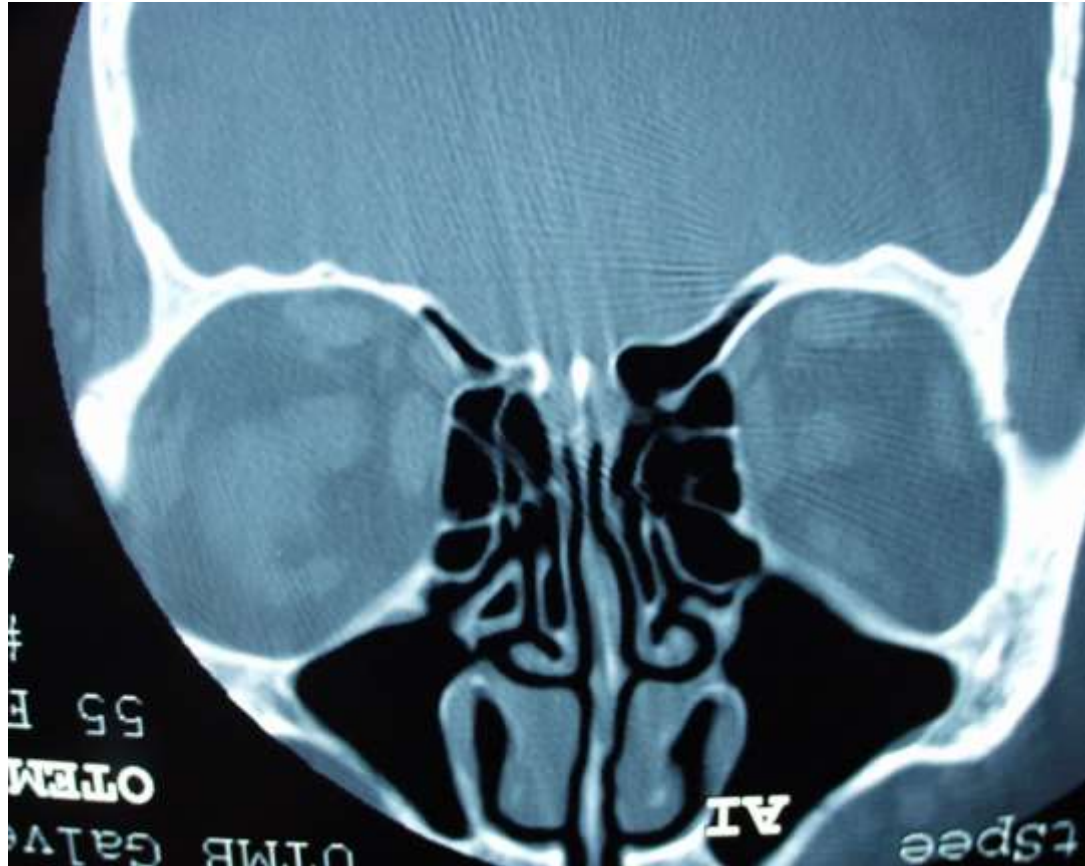
- Labs: WBC= 20.2 with left shift, remainder essentially OK



Case Report

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

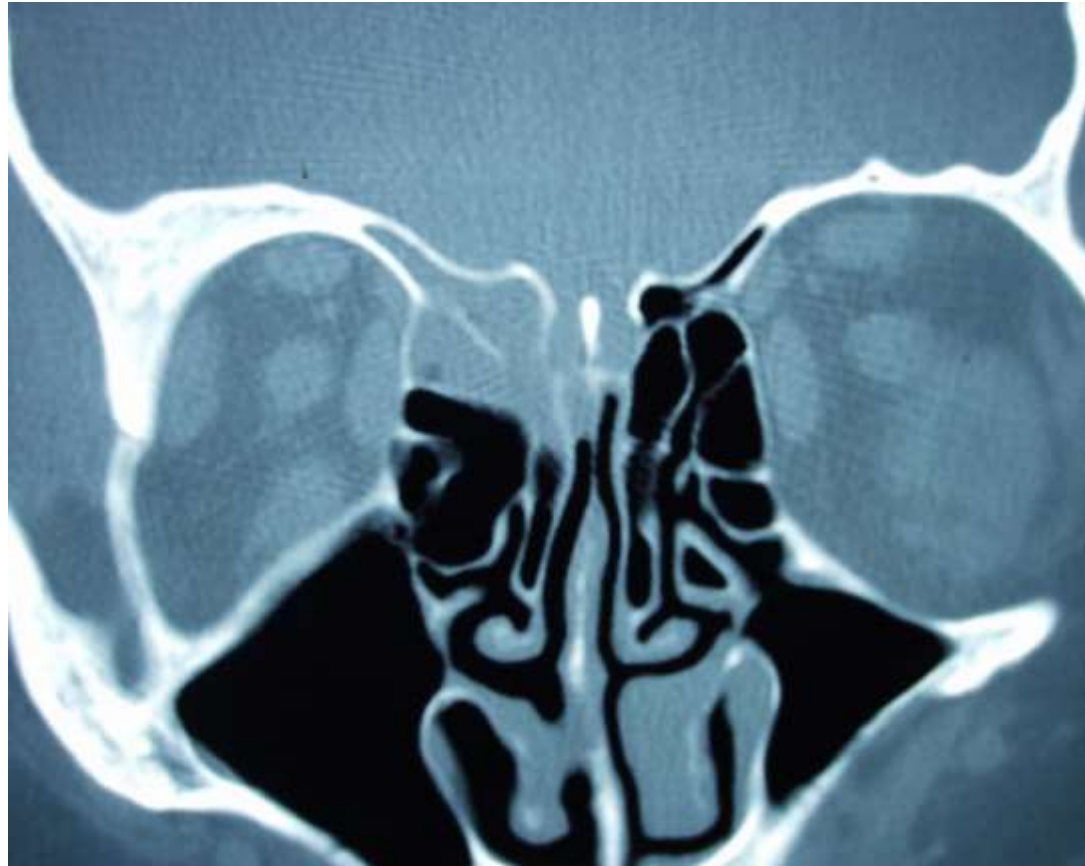
Case Report



Case Report



Case Report





Case Report

- 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