RECURRENT MENINGITIS
TO HEAR OR NOT TO ERR??!!!
6yrs old boy, previously well child,

- 1st episode (Feb 2010):
  - Fever, headache, vomiting.
  - Meningeal signs with no focal deficit.
  - CSF analysis - s/o pyogenic meningitis.
  - CSF & blood culture - no growth.
  - **CT Brain - normal.**
  - Treated with ceftriaxone for 2 weeks.

- No past history of serious bacterial infections.
- No history of head injury/Neurosurgery.
- No history of CSF otorrhea/rhinorrhea.
2nd episode (Nov 2010):
Fever, headache, vomiting.
Meningeal signs with no focal deficit.
Spine & cranium - normal.
Blood c/s - pneumococcus, CSF c/s - sterile.
Treated with ceftriaxone for 2 weeks.

Mother noticed left ear hearing loss since previous admission.
Otoscopy - normal.
SUMMARY

- Recurrent meningitis.
- No history s/o immunodeficiency.
- No history of trauma.
- No history of CSF otorrhea/rhinorrhea.
- History of deafness noticed by mother recently.
WHAT WILL YOU THINK OF?

Anatomical defects
- Cranial
- Spinal
- Neuroenteric cyst

Immunodeficiency
- Hypogammaglobulinemia
- Complement deficiency
- Asplenia - anatomical/functional
RECURRENT MENINGITIS WITH HEARING LOSS

1. Sensorineural hearing loss
   - ?post meningitis ?congenital

2. Audiological evaluation
   - BERA

3. Imaging to rule out inner ear malformation with associated CSF leak
FURTHER WORKUP

- Immunoglobulin profile - normal.
- HIV ELISA - non reactive.

- **BERA**- profound sensorineural hearing loss in left ear.
- **MRI brain**
  Bony dehiscence in the left tegmen tympani with CSF communication to the mastoid cavity & fluid collection in the left mastoid & middle ear cavity.
  
  **Common cavity deformity** (no separation of cochlea & vestibule) of left inner ear.
A NEW KIND OF BRAIN DRAIN????
MRI BRAIN
WORKUP...

- ENT surgeon, Neurosurgeon consult.
- Advised surgical closure of CSF leak.
- Parents were not willing for surgery.
- Child vaccinated against pneumococcus, meningococcus and H. influenza.
3rd episode (Oct 2011):
Fever, headache and vomiting for 5 days.
Altered sensorium, meningeal signs, no deficit.
CSF analysis- s/o pyogenic meningitis.
CSF gram stain- gram positive cocci.
Started on ceftriaxone/vancomycin.

MRI Brain - early hydrocephalus.
A FEW DAYS LATER.....

- Sudden onset of paraplegia with urinary retention.
- Areflexia with extensor plantar response.

- **MRI Brain with spine:**
  T2 hyperintensity in the anterior aspect of spinal cord at D6-D7 level with diffusion restricting hyperintensities in bilateral globus pallidus, internal capsule, thalamus, midbrain & right side of splenium. ?demyelination ?infarcts.
MANAGEMENT

- Neurologist reviewed.
- Given pulse methylprednisolone.
- Started on clean intermittent catheterisation.
- Physiotherapy.

- Readmitted after 2 weeks,
- Underwent CSF otorrhoea repair with blind sac closure.
A second episode of meningitis is considered as recurrence if resulting from a **different bacterial** pathogen than the first,

or if resulting from the **same organism but occurs >3 weeks** after the completion of therapy for the initial episode.

Reappearance of bacteria in CSF during therapy (recrudescence)

Meningitis within three weeks after antibiotics have been stopped (relapse).
**ORGANISMS...**

- Pneumococcus/H. influenza - cranial dural defect
- E.coli/gram negative bacilli - spinal dural defect
- Meningococci - complement deficiency
- Pneumococcus/H. influenza/meningococci - splenic dysfunction
- CONS - CSF shunt infection
- Pneumococcus - hearing implant
CSF LEAK - CONGENITAL/ACQUIRED

- Cranial /midline facial - cribiform plate
- Middle ear - stapedial foot plate
- Inner ear - oval window, internal auditory canal, cochlear aqueduct
CONGENITAL INNER EAR MALFORMATION

- Inner ear organogenesis - 4th - 8th wk of gestation
- Teratogenic - rubella, thalidomide, genetic errors.

- Malformations limited to membranous labyrinth
  Siebanmann-bing, Scheibe, Alexander
- Malformations involving osseous & bony labyrinth
  complete labyrinthine aplasia (michel)
  cochlear anomalies - mondini (commonest)
  - common cavity
  labyrinthine anomalies
  aqueductal anomalies
  internal auditory canal anomalies
CSF LEAK - FREQUENTLY MISSED

- CSF Rhinorrhea indistinguishable from nasal discharge.
- Middle ear effusion may be mistaken and treated as otitis media.
- CSF may run down the eustachian tube and be swallowed.
- Unilateral deafness may be difficult to diagnose in children.
- CT Brain - details of the vestibular cochlear system may be missed.
RECURRENT MENINGITIS WITH NO CLUES

1. • Audiological evaluation

2. • CT of head including coronal images of sinus with fine cuts through the temporal bone

3. • MRI spine

4. • Immunodeficiency workup
Thank you