Meningitis in pregnancy
A case report

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• Mrs. X, 25 yrs female, primigravida
• LMP: 22/01/11
• EDD: 29/10/11
• Booked case with GA: 35 – 36 Wks on admission (30/09/11).
Presented with

- Fever
- Vomiting
- Headache

One week duration.
Menstrual History
   Regular cycles, 3-4/30
Marital History
   One year, NCM.
Past History
   Nil specific.
Family History
   Nil specific.
General examination

- Conscious and oriented
- Febrile Temp: 99.6 F
- No pallor
- No pedal edema
- Pulse: 108 /mt, BP: 90/60 mm Hg.
- Height: 140 cm, weight: 50 kgs
- CVS: S1S2+, no murmur.
- RS: NVBS, clear, no added sounds.
- CNS: NFND.
• Abdomen examination
  • Uterus 36 weeks
  • Relaxed
  • Cephalic
  • FH:140-150 /mt
Investigations

- Hb-11.4 g/dl
- Pcv 36%
- RBS 57mg/dl
- Platelets-3,69,000
- TC-9,600, P-77,L-18,E-01,M-04.
- ESR-26mm.
- Urine examination - alb-trace,Sug-nil,M/E:NAD.
- MP/MF-Neg.
• Strict temperature chart maintained
• Blood & urine culture sent
• Pt. was started on
  • I.v. fluids
  • inj. Cefotaxime 1g i.v b.d
  • inj. Emeset 4mg i.v b.d
  • Tab Dolo 650mg t.d.s
• Physician opinion sought
• Pt had continuous low grade fever and headache inspite of treatment

• Developed **neck rigidity** the next day

• Severe tenderness over both maxillary and frontal sinuses.
Physician opinion

- CNS examination revealed
  - neck rigidity
  - Brudzinski sign positive
  - Plantar flexor
- Imp:
  - ? Meningitis

Suggested
- neurologist opinion
- inj. Ceftriaxone 1 gm i.v b.d
- L.P for CSF analysis
- ICU care
Neurologist opinion in IMCU

- Acute febrile meningeal syndrome
- Suggested:
  - Inj. Ceftriaxone 2 g i.v b.d
  - I.V. Mannitol 100mg tds×5 days.
  - IVF 2 pints DNS with 5 ml Kcl
  - CSF analysis along with other fever investigations
  - Ophthalmal opinion to r/o papilloedema
• Ophthalmic opinion: no evidence of papilloedema
• Other investigations:
  – Dengue - negative
  – Lepto - negative
  – Widal - negative
  – Blood & urine culture - no growth
  – Obstetric scan: SLIUG - 34 wks
• Under aseptic precautions lumbar puncture done

• CSF analysis showed:
  – Polymorphs 80%
  – Lymphocytes 20%
  – Protein 94 g/dl
  – Glucose 24 mg/dl

– Imp: ACUTE PYOGENIC MENINGITIS

Csf culture-no growth.
Treatment given

- Inj ceftriaxone 2 g i.v bd
- Inj Vancomycin 1 g i.v b.d ATD
- IVF 2 pints
- I.V. Mannitol 100mg tdsx5 days.
- Inj. Dexamethasone 4 mg i.v tds
- Vitals monitored
2 days after admission (3:10:11)

- Pts G.C improved
- Head ache decreased
- No neck rigidity
- Temperature normal
- Pt was transferred to O&G ICU the next day
- The same treatment continued
5th day (5.10.2011)

• Pt had draining p/v
• Pt taken up for emergency LSCS under GA in view of PROM with failed induction.
• Baby
  – Borderline preterm
  – Boy
  – 2.67 kg
  – 6/10, 8/10
Post op period

- Uneventful
- Antibiotics continued for 2 weeks
- Steroids tapered gradually
- S/R done on 8\textsuperscript{th} POD
- Wound was healthy
- Baby was fine, given preterm care in NICU.
- Pt was discharged with the following advise
  - T. cefixime 200mg B.D x 1 wk
  - Continue FST and T. calcium x 3 months
  - To review after 1 wk
IN A NUT SHELL...

• 25yrs primigravida, 36 wks GA.
• Had bacterial meningitis.
• Treated with cephalosporins.
• Mode of delivery - LSCS, when she was on treatment.
• Admission delivery interval 120 hrs.
• Hospital stay for 18 days.
• Both mother and baby fine.
Discussion

• Meningitis is the infection of the arachnoid membrane, subarachnoid space, and cerebrospinal fluid.

• Meningitis may have a focal origin (sinusitis, mastoiditis, brain abscess, penetrating injury, congenital defect), but more commonly results from hematogenous dissemination.
Predisposing factors

• Most cases of meningitis occur when colonization by potential pathogens is followed by mucosal invasion of the nasopharynx

• However, some patients develop disease by direct extension of bacteria across a skull fracture in the area of the cribiform plate
• Other patients develop meningitis following systemic bacteremia as with endocarditis or a urinary tract infection or pneumonia.

• Other predisposing conditions include asplenia, complement deficiency, corticosteroid therapy.
• Overall incidence of bacterial meningitis 4-6 /1 ,00,000.

• App.1,35,000 deaths occur world wide each year.

• *S.* Pneumonaie - most common

• Fatality rate 19 -37 %
• Acute infection of the meninges presents with
  • Pyrexia
  • Headache
  • Meningism - consists of stiffness of the neck along with other signs of meningeal irritation.
    - Kernig's sign: ext. at the knee with hip joint flexed causes hamstring muscle spasm.
    - Brudzinski's sign: passive flexion of the neck causes flexion of hips and knees.
Causes

Infective
1. Bacteria
2. Viruses
3. Protozoa and Parasites
4. Fungi

Non-Infective
1. Malignancy
2. Inflammatory
Classification

- Acute pyogenic (bacterial) meningitis
- Acute aseptic (viral) meningitis
- Acute focal suppurative infection (brain abscess, subdural and extradural empyema)
- Chronic bacterial infection (tuberculosis).
# Bacterial Causes

<table>
<thead>
<tr>
<th>Age</th>
<th>Common</th>
<th>Less Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonate</td>
<td>E.Coli, Proteus, etc.</td>
<td>Listeria monocytogenes</td>
</tr>
<tr>
<td></td>
<td>Group B Streptococci</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>H. Influenza</td>
<td>M. tuberculosis</td>
</tr>
<tr>
<td></td>
<td>N. Meningitidis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S. pneumoniae</td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>S. pneumoniae</td>
<td>Listeria monocytogenes</td>
</tr>
<tr>
<td></td>
<td>N. Meningitidis</td>
<td>M. tuberculosis</td>
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<tr>
<td></td>
<td></td>
<td>S. Aureus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H. Influenza</td>
</tr>
</tbody>
</table>
Morphology

• Grossly, pyogenic meningitis shows a thick layer of suppurative exudate covers the leptomeninges over the surface of the brain.

• Exudate in basal surface--- H. INFLUENZAE

• Exudate in covexity surface--- P. MENINGTIS

• Microscopically: neutrophils in the subarachnoid space
Gross Pathology
## CSF - ANALYSIS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CELL TYPE</th>
<th>CELL COUNT</th>
<th>GLUCOSE</th>
<th>PROTEIN</th>
<th>GRAM STAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL</td>
<td>Lymphocytes</td>
<td>0-4 cu.mm</td>
<td>&gt;60% of blood glucose</td>
<td>Up to 0.45 g/l</td>
<td>_</td>
</tr>
<tr>
<td>VIRAL</td>
<td>Lymphocytes</td>
<td>10-2000</td>
<td>Normal</td>
<td>Normal</td>
<td>_</td>
</tr>
<tr>
<td>BACTERIAL</td>
<td>Polymorphs</td>
<td>1000-5000</td>
<td>Low</td>
<td>Normal/Elevated</td>
<td>+</td>
</tr>
<tr>
<td>TUBERCULOUS</td>
<td>Polymorphs/Lymphocytes/Mixed</td>
<td>50-5000</td>
<td>Low</td>
<td>Elevated</td>
<td>Often _</td>
</tr>
<tr>
<td>FUNGAL</td>
<td>Lymphocytes</td>
<td>50-500</td>
<td>Low</td>
<td>Elevated</td>
<td>+ _</td>
</tr>
<tr>
<td>MALIGNANT</td>
<td>Lymphocytes</td>
<td>0-100</td>
<td>Low</td>
<td>Normal</td>
<td>_</td>
</tr>
</tbody>
</table>
Treatment

- Stabilize the patient.
- Drug of choice
  - Ceftriaxone 2gm iv 12 hrly x 10-14 days.
    - or
  - Cefotaxime 2gm iv 6 hrly x 10-14 days
    - Add
  - Vancomycin 1 gm iv 12 hrly
    - or
  - Rifampicin 600 mg iv 12 hrly.

Adjunctive dexamethasone therapy.
COMPLICATIONS

- Seizures
- Hearing loss
- Impaired mental status
- Aphasia
- Hemiplegia
- Septicemia
A literature review of other cases of pneumococcal meningitis in pregnancy.
• LUCAS described 26 cases of pneumococcal meningitis (1958-1962) in Nigeria.

• N=15 during preg.

• N=11 Immediate post partum.

• Over all fatality 27 % (7/26)

• Neurological sequelae 53 % (10/19), included hearing loss, severe emotional disturbance, aphasia, hemiplegia.

• Fetal loss rate - spontaneous abortion, still birth, and neonatal death was 47% (7/15).
<table>
<thead>
<tr>
<th>Reference</th>
<th>Age</th>
<th>Gestational age at presentation</th>
<th>Parity</th>
<th>Presenting symptom</th>
<th>Maternal outcome</th>
<th>Fetal outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutchison et al.</td>
<td>27</td>
<td>30 weeks</td>
<td>G2 P1</td>
<td>Premature rupture of membranes</td>
<td>Preterm vaginal delivery, followed by maternal death 36 hours later</td>
<td>Preterm female infant, 1750 g; <em>S. pneumoniae</em> sepsis; neonatal death 7 days later</td>
</tr>
<tr>
<td>Probst and Viviano</td>
<td>21</td>
<td>6 weeks</td>
<td>G3 P2</td>
<td>Fever, neck pain, and headache</td>
<td>Hospitalized 17 days, followed by normal antepartum recovery and term delivery</td>
<td>Term female infant, 3040 g</td>
</tr>
<tr>
<td>Rennard</td>
<td>23</td>
<td>27 weeks</td>
<td>G2 P1</td>
<td>Mental status changes</td>
<td>Hospitalized 16 days, followed by normal antepartum recovery and term delivery</td>
<td>Term female infant, 3180 g</td>
</tr>
<tr>
<td>Reference</td>
<td>Age</td>
<td>Gestational age at presentation</td>
<td>Parity</td>
<td>Presenting symptoms</td>
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<td>Fetal outcome</td>
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</tr>
<tr>
<td>Tempest</td>
<td>35</td>
<td>40 weeks</td>
<td>G2P1</td>
<td>Fever, uterine contractions and cough</td>
<td>Vaginal delivery 36 hours after admission, followed by 10-day hospitalization, normal recovery</td>
<td>Term male infant, 3100 g; <em>S. pneumoniae</em> meningitis; neonatal death 3 days later</td>
</tr>
<tr>
<td>Steiner et al.</td>
<td>35</td>
<td>8 months</td>
<td>G5P4</td>
<td>Mental status changes, fever, nuchal rigidity</td>
<td>Maternal death with postmortem cesarean delivery, 8 hours after admission</td>
<td>Preterm female infant; 2400 g; normal development at 5 years of age</td>
</tr>
<tr>
<td>Reference</td>
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<tr>
<td>Lisa et al</td>
<td>38</td>
<td>35 wks</td>
<td>G2 p1L1</td>
<td>Fever, Mental status changes, preterm contractions</td>
<td>V BAC at 38 wks gestation.</td>
<td>Male 8/10, 9/10 3623gms Mother &amp; child doing well</td>
</tr>
</tbody>
</table>
ROLE OF VACCINE?

• The Connecticut Pregnancy Exposure Information Service (CPEIS), a statewide nonprofit organization based at the Health Center with affiliates across North America, is taking part in a new study that will assess the safety of the meningitis vaccine in pregnancy.

• The launch coincided with World Meningitis Day on April 24 2011.
• The meningitis vaccination is recommended to those ages 16 through 21 years, because this group has the highest rates of meningococcal disease.

• Through evidence-based clinical information, CPEIS aims to educate women about exposures during pregnancy and breastfeeding through a toll-free phone service as well as observational research studies.
• The organization’s parent national non-profit, the Organization of Teratology Information Specialists (OTIS) study group, is looking for the help of pregnant women to collect information on exposures like the meningitis vaccine in pregnancy, with a goal of enrolling pregnant women who have received the meningitis vaccine during their first few weeks of pregnancy.

• The study will continue through 2015.
CONCLUSION

• Meningitis is a medical emergency for which prompt diagnosis and treatment are imperative to reducing the rate of death and long-term neurologic compromise.

• Few cases of meningitis have been reported during pregnancy, many of which had devastating outcomes for mother, neonate, or both.
With the scant literature available

- An extended interval between the onset of maternal illness and delivery provides an important window of time for maternal and neonatal well being.
TAKE HOME MESSAGE

ALWAYS HAVE MENINGITIS AS A POSSIBLE DIAGNOSIS IN YOUR MIND WHEN A PATIENT PRESENTS WITH FEVER AND HEADACHE, EVEN THOUGH IT IS RARE.
THANK YOU & HAPPY DIWALI