NEONATAL SEPSIS

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OBJECTIVES

1. Definition of terms and classification of neonatal sepsis.
2. To review the risk factors, clinical presentation, investigations, treatment and follow up for babies with neonatal sepsis.

Neonatal sepsis

Definition:

-Is defined as the presence of a serious bacterial infection such as **meningitis, pneumonia, pyelonephritis, or gastroenteritis** in the setting of fever occuring in the first **30 days** of life.

-Also includes serious **fungal and viral** infections.

Classification

- Neonatal Sepsis is categorised as:
- **early onset** presenting at **within 24-72 hrs** of life
- **late onset:** with symptoms presenting at **4-90** days of life

ENOS -**Risk Factors**

- Maternal colonization with microorganisms. This can be:

  -**Transplacental infection** if mother has Chorioamnionitis –maternal fevers, foul smelling liqour thus causing bacteraemia

  - **an ascending infection** from the cervix may be caused by organisms that colonize the mother's genitourinary tract

  -**at delivery** through acquisition of the microbes as the baby passes through a colonized birth canal especially GBS

EONS - Risk factors cont...

- Premature rupture of membranes (PROM): ROM before onset of labour but at term
- Preterm rupture of membranes: ROM before 37 weeks gestation
- Prolonged rupture of membranes: ROM for 18 - 24hrs or more
- Maternal urinary tract infection
- Prematurity

ENOS- **causative organisms**

The microorganisms most commonly associated with early-onset infection include:

- Group B *Streptococcus* (GBS)
- Escherichia coli
- coagulase-negative *Staphylococcus (CONS)*
- *Haemophilus influenzae*
- *Listeria monocytogenes*

NB: Pneumonia is more common in EONS

LONS - **Risk factors:**

-contamination from the caregiving environment especially due to lack of or poor hand washing techniques

- vascular or urinary catheters, other indwelling lines

-prematurity

-central venous catheterization (duration of >10 days)

LONS - **Causative organisms**

- coagulase-negative staphylococci (CONS)
- Staphylococcus aureus
- *E coli*
- *Klebsiella*
- *Pseudomonas*
- *Enterobacter*
- *Candida*
- *Lesser extent GBS*

NB: Meningitis and bacteraemia are more common in LONS

Clinical presentation

- The clinical signs of neonatal sepsis are **nonspecific** and are associated with characteristics of the causative organism and the body's response to the invasion.
- These signs are associated with other neonatal diseases such as

- respiratory distress syndrome (RDS)
- metabolic disorders
- intracranial hemorrhage
- traumatic delivery

Clinical features

- NB: A systematic physical assessment of the infant is best performed in series and should include **observation, auscultation, and palpation** in that order to obtain the most information from the examination.

Clinical features –systemic features

- Refusal to breast feed or feed intolerance
- Temp instability: hypothermia or fever
- irregular respirations, respiratory distress, apnea, cyanosis, and grunting
- Tachycardia/ bradycardia, features of poor perfusion(cold extremities)
- Reduced urine output
- Convulsions, depressed neonatal reflexes, bulging anterior fontanelle & neck stiffness (late sign of meningitis in neonates)

Metabolic features

- Hypoglycemia
- Hyperglycemia
- Metabolic acidosis
- Jaundice.

LABORATORY TESTS

- Total blood count (Hemoglobin, WBC and differential count, platelet count)
- Microscopy, culture and sensitivity:

  -Blood

  -urine

  -stool

  -CSF
- C- reactive Protein (Serial)

Imaging

- **Chest radiography-** pneumonia/pleural effussion
- Cranial ultrasonography in neonates with meningitis may reveal the progression of complications

Treatment

- When neonatal sepsis is suspected, treatment should be initiated immediately because of the neonate's relative immunosuppression.
- Combined intravenous (IV) aminoglycoside and expanded-spectrum penicillin antibiotic therapy..

Treatments (WHO guidelines)

1st line antibiotics:

- IV Crystalline Penicillin (50,000iu/kg) twice daily in babies aged < 7 day and 6 hourly > 7 days old

in combination with

- IV Gentamicin (3mg/kg <2kg, 5mg/kg ≥ 2kg) OD

2nd line Antibiotics

- IV Ceftriaxone (50mg/kg) OD

In combination with

IV Amikacin 15mg/kg OD

Duration: **7-10 days**

CONT..

ADD

- IV Metronidazole (7.5mg/kg) 8 Hourly if anaerobes are suspected
- IV Flucloxacillin (50mg/kg) 8 Hourly if staph is suspected or proven

Treatment cont...Meningitis

- Infants with bacterial meningitis require higher dosages of antibiotics and longer courses of treatment.
- These infants may also require an antimicrobial that has better penetration of the blood-brain barrier to achieve therapeutic drug concentrations in the CSF.

Neonatal Meningitis

1st line antibiotics

- IV Crystalline Penicillin **(100,000iu/kg)** twice daily in babies aged < 7 day and 6 hourly > 7 days old

in combination with

- IV Gentamicin (3mg/kg <2kg, 5mg/kg ≥ 2kg) OD

2nd line Antibiotics

- IV Ceftriaxone (100mg/kg) OD

In combination with

IV Amikacin 15mg/kg OD

Duration: **2 weeks for gram positives, 3 weeks for gram negatives**

Supportive Treatment

- Oxygenation if in respiratory distress
- Perfusion: IV fluids with strict input/output charting
- “Thermoneutral” environment: maintain temperature within limits
- Feeding: trophic feeds and increase as tolerated

Complications

- Electrolyte imbalances: na+, K+, ca2+, mg2+
- Hypoglycaemia
- Metabolic acidosis
- Meningitis: prolonged hypoxia, hydrocephalus or brain abscess, cerebral palsy

questions

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Summary

- A high index of suspicion is needed to avoid missing neonatal sepsis
- Comprehensive history taking to obtain maternal risk factors is vital
- Appropriate workup, treatment and follow-up are key to successful management of the infected neonate.