NEONATAL INFECTION
SEPSIS

DEFINITION

NEONATAL SEPSIS IS DEFINED AS

A CLINICAL SYNDROME OF *BACTEREMIA*

WITH

SYSTEMIC SIGNS AND SYMPTOMS

OF INFECTION

IN THE FIRST 4 WEEKS OF LIFE

CLASSIFICATION

ACCORDING TO THE ONSET OF SYMPTOMS

THE NEONATAL SEPSIS CAN BE CLASSIFIED INTO

TWO SUB-TYPES

EARLY ONSET SEPSIS < 72 HOURS

LATE ONSET SEPSIS > 72 HOURS

ACCORDING TO THE ONSET OF SYMPTOMS

EARLY ONSET SEPSIS < 72 HOURS

85% OF EARLY-ONSET SEPSIS APPEAR WITHIN 24 HOURS

5% PRESENT AT 24-48 HOURS

AND A SMALLER PERCENTAGE PRESENT WITHIN 48-72 HOURS

THE ONSET IS MOST RAPID IN PREMATURE NEONATES

LATE ONSET SEPSIS > 72 HOURS

OCCURS

AT 4-90

DAYS OF LIFE

TRANSMISSION

EARLY-ONSET INFECTIONS

ARE ACQUIRED THROUGH THE COLONIZED BIRTH CANAL

MATERNAL GENITAL TRACT

OR

IN THE DELIVERY AREA

TRANSPLACENTAL INFECTION

OR

ASCENDING INFECTION

EARLY-ONSET INFECTIONS

ARE ACQUIRED

FROM

THE CAREGIVING ENVIRONMENT

ETIOLOGY

EARLY-ONSET SEPSIS

- ***GROUP B STREPTOCOCCUS***
- ***GRAM-NEGATIVE***
- ***ORGANISMS***
- ***STAPH. AUREUS***
- ***LISTERIA MONOCYTOGENES***

LATE-ONSET SEPSIS

<u>TERM:</u>

- ***GROUP B STREPTOCOCCUS***
- ***GRAM-NEGATIVE ORGANISMS***

<u>PRETERM:</u>

- ***COAGULASE NEG. STAPH.***
- ***GRAM-NEGATIVE ORGANISMS***
- ***GROUP B STREPTOCOCCUS***
- ***STAPH. AUREUS***
- ***ENTEROCOCCUS***
- ***FUNGAL***

SINGS AND SYMPTOMS

RISK FACTORS

EARLY-ONSET SEPSIS

LOW BIRTH WEIGHT

PROLONGED RUPTURE OF MEMBRANES

FOUL SMELLING LIQUOR

MULTIPLE PER VAGINUM EXAMINATIONS

MATERNAL FEVER

DIFFICULT OR PROLONGED LABOUR

ASPIRATION OF MECONIUM

LATE-ONSET SEPSIS

LOW BIRTH WEIGHT

LACK OF BREASTFEEDING

SUPERFICIAL INFECTIONS (PYODERMA, UMBILICAL SEPSIS)

ASPIRATION OF FEEDS

DISRUPTION OF SKIN INTEGRITY WITH NEEDLE PRICKS AND USE OF INTRAVENOUS FLUIDS

CLINICAL MANIFESTATIONS OF NEONATAL SEPSIS

LETHARGY
REFUSAL TO SUCKLE
POOR CRY
NOT AROUSABLE, COMATOSED
ABDOMINAL DISTENSION
DIARRHEA
VOMITING
HYPOTHERMIA
POOR PERFUSION
SCLEREMA
POOR WEIGHT GAIN
SHOCK
BLEEDING
RENAL FAILURE

CYANOSIS*
TACHYPNEA*
CHEST RETRACTIONS*
GRUNT*
APNEA/GASPING*
FEVER+
SEIZURES+
BLANK LOOK+
HIGH PITCHED CRY+
EXCESSIVE CRYING/IRRITABILITY+
NECK RETRACTION+
BULGING FONTANEL+

* PARTICULARLY SUGGESTIVE OF PNEUMONIA

+PARTICULARLY SUGGESTIVE OF MENINGITIS

CLINICAL MANIFESTATIONS

EARLY ONSET SEPSIS

MANIFESTS FREQUENTLY AS

RESPIRATORY DISTRESS

(*PNEUMONIA)*

AND LESS COMMONLY AS

SEPTICEMIA OR MENINGITIS

LATE-ONSET SEPTICEMIA

IS CAUSED BY THE ORGANISMS THRIVING IN THE EXTERNAL ENVIRONMENT OF THE HOME OR THE HOSPITAL

THE INFECTION IS OFTEN TRANSMITTED THROUGH

THE HANDS OF THE CARE-PROVIDERS

THE PRESENTATION IS THAT OF

SEPTICEMIA

PNEUMONIA

MENINGITIS

DANGER SIGNS AND SYMPTOMS OF INFECTIONS IN THE NEWBORN

DANGER SIGNS

- UNABLE TO FEED
- CONVULSIONS
- DROWSINESS OR ALTERED CONSCIOUSNESS (EXCLUDE HYPOGLYCAEMIA !)
- RR < 20/MIN OR APNOEA (>15 SEC)
- RR > 60/MIN
- GRUNTING (PROLONGED > 4 HRS)
- SEVERE CHEST IN-DRAWING
- CENTRAL CYANOSIS

OTHER SIGNS OF INFECTION

- DEEP JAUNDICE
- SEVERE ABDOMINAL DISTENSION
- PERI-UMBILICAL REDNESS OR UMBILICUS DRAINING PUS
- BULGING FONTANELLE
- HYPOTHERMIA OR FEVER
- IRRITABLE
- PAINFUL JOINTS, SWELLING OF THE JOINTS, REDUCED MOVEMENT AND IRRITABILITY IF HANDLING THESE JOINTS
- MANY OR SEVERE SKIN PUSTULES

A large WHO study published in 2003 identified *nine clinical* features which predict severe bacterial illness in young infants

1. FEEDING ABILITY REDUCED

2. NO SPONTANEOUS MOVEMENT

3. TEMPERATURE >38 C

4. PROLONGED CAPILLARY REFILL TIME

5. LOWER CHEST WALL IN DRAWING

6. RESP RATE > 60/MINUTE

7. GRUNTING

8. CYANOSIS

9. CONVULSIONS

DIAGNOSIS

DIRECT METHOD

- **ISOLATION OF MICROORGANISMS FROM *BLOOD***
- ***CSF***
- ***URINE***
- ***PLEURAL FLUID OR PUS***

IS DIAGNOSTIC

INDIRECT METHOD I

THERE ARE A VARIETY OF TESTS WHICH ARE HELPFUL FOR SCREENING OF NEONATES WITH SEPSIS THE MOST USEFUL AND WIDELY USED IS

- **THE *WHITE BLOOD CELL COUNT AND DIFFERENTIAL COUNT***

LEUKOPENIA (TLC <5000/cmm)

NEUTROPENIA (ABSOLUTE NEUTROPHIL COUNT ANC <1800/cmm)

IMMATURE NEUTROPHIL TO TOTAL NEUTROPHIL

I/T RATIO > 0.2

- ***PLATELET COUNT* OF LESS THAN 100,000 PER cmm**

.

INDIRECT METHOD II

- ***C-REACTIVE PROTEIN*** **(CRP) +**
- ***ERYTHROCYTE SEDIMENTATION RATE***

ESR > 15mm 1ST HOUR

- ***LUMBAR PUNCTURE***

SHOULD BE DONE IN ALL CASES OF LATE ONSET SESPSIS (>72 HOURS)

BECAUSE

10-15 % OF THEM MAY HAVE ASSOCIATED MENINGITIS

MANAGEMENT

IF DANGER SIGNS ALWAYS TREAT

EMERGENCY MANAGEMENT

- O2 (NASAL PRONGS) IF RESPIRATORY DISTRESS OR CYANOSIS
- MASK VENTILATION IF RR < 20/MIN
- CHECK GLUCOSE IF < 45 MG/DL OR < 2.5 MMOL/L 2 ML/KG G 10% IV; IF YOU CANNOT CHECK GLUCOSE AND CHILD IS DROWSY OR CONVULSING TREAT FOR HYPOGLYCAEMIA (IF NO IV ACCESS GIVE G 10% OR BREAST-MILK VIA NG TUBE)
- IF CONVULSING: GIVE PHENOBARBITAL 20 MG/KG IV OR IM STAT
- IF SUSPECTED MENINGITIS PERFORM A LUMBAR PUNCTURE IF CLINICAL CONDITION ALLOWS AND BEGIN TREATMENT
- ANTIBIOTIC TREATMENT OF NEONATAL SEPSIS (AMPICILLIN + GENTAMYCIN OR AMPICILLIN + CEFOTAXIME (CEFTRIAXONE IF CEFOTAXIME NOT AVAILABLE)
- CHECK CHILD RECEIVED VITAMIN K
- ENSURE PROPER NUTRITION & FLUID MANAGEMENT. MONITOR THE CHILD CLOSELY.

NO DANGER SIGNS BUT *RISK FACTORS* OR OTHER *SIGNS OF INFECTION*

- **CONSIDER TREATMENT**

(ACCORDING TO CLINICAL JUDGEMENT)

IF UNSURE OR SEVERAL RISK OR OTHER FACTORS EXIST

- **“PROPHYLACTIC TREATMENT” RECOMMENDED**

DRUGS

- **ANTIBIOTIC TREATMENT IV**

WITH AMPICILLIN + GENTAMYCIN

OR

CEFOTAXIME + AMPICILLIN

(USE CEFTRIAXONE IF CEFOTAXIME NOT AVAILABLE)

REPLACE

AMPICILLIN WITH CLOXACILLIN IF EXTENSIVE SKIN PUSTULES OR ABSCESSES

- **GIVE VITAMIN K IM IF NOT GIVEN BEFORE OR UNCLEAR**

- **G 10% FOR TREATMENT OF HYPOGLYCEMIA**

DOSAGES OF ANTIBIOTICS

➢ AMPICILLIN

Age < 1 week 50 mg/kg x 2 IV

Age > 1 week 50 mg/kg x 3 IV

(meningitis: increase dose: < 1 week 150 mg/kg/day, > 1 week 200 mg/kg/day, see meningitis protocol)

➢ GENTAMYCIN

5 mg/kg OD IM or slowly IV (< 2.500 g 3 mg/kg OD IM or slowly IV), **Duration 3-5 days**

➢ CEFOTAXIME

Age < 1 week 50 mg/kg x 3 IV (premature infants x 2)

Age > 1 week 50 mg/kg x 4 IV

➢ CEFTRIAXONE

Age < 1 week 50 mg/kg OD IV

Age > 1 week 100 mg/kg x 1 IV or IM or 50 mg x 2 IV

(cefotaxime preferred for neonates)

➢ CLOXACILLIN

Age < 1 week: 50 mg/kg x 2 IV

Age > 1 week: 50 mg/kg x 3 IV

DURATION OF ANTIBIOTIC TREATMENT

IF TREATMENT WAS A PRECAUTION

BECAUSE OF RISK FACTORS (SEE ABOVE) AND NEWBORN NEVER SHOWED ANY SIGNS OF SICKNESS, IS ACTIVE AND DRINKS WELL

DISCONTINUE AFTER MINIMUM OF THREE FULL DAYS OF PARENTERAL TREATMENT

IF INFANT WAS SICK

TREAT AT LEAST 7 DAYS, AIM AT 10 DAYS **OF ANTIBIOTIC TREATMENT**

AT LEAST 5 FULL DAYS PARENTERAL TREATMENT FOLLOWED BY ORAL TREATMENT **IF BABY IS TAKING ORAL FLUIDS, AND HAS BEEN FREE OF FEVER FOR AT LEAST 24 HOURS AND THERE ARE NO NEUROLOGICAL SIGNS.**

IF THE CONDITION IS NOT IMPROVING WITHIN 48-72 HOURS

THE TREATMENT MAY NEED TO BE CHANGED. (CONSIDER OTHER OR ADDITIONAL CAUSES OF INFECTIONS INCLUDING MALARIA, FUNGAL INFECTION ETC

➢ SUPPORTIVE CARE

THE PURPOSE OF SUPPORTIVE CARE IS

TO NORMALIZE THE TEMPERATURE

TO STABILIZE THE CARDIOPULMONARY STATUS

TO CORRECT HYPOGLYCEMIA

TO PREVENT BLEEDING TENDENCY

THERMOREGULATION

THANKS