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COMPARISON OF NEONATAL OUTCOME IN FIRST 24-48 HOURS, IN GROUP BETA STREPTOCOCCUS POSITIVE AND NEGATIVE MOTHERS, PRESENTING AT TERM

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Abstract:

In 1970, Group B Streptococcus (GBS) was characterized as the main neonatal septic factor and main agent in infections of genital tract in mothers. According to World Health Organization (WHO) report, the prevalence of GBS colonization is 5 - 40% in different countries. The prevalence varies according to age, parity, race, Body Mass Index (BMI), previous miscarriages or stillbirths and health status in current pregnancy. However, microbial colonization could be transient and periodic.GBS infection is expressed in mother in the form of infection in urinary tract, chorioamnionitis , endometritis, pyelonephritis, osteomyelitis & mastitis after childbirth.

Objectives: *To determine the frequency of mothers who are Group Beta Streptococcus positive at term, to compare the neonatal outcome in first 24-48 hours between Group Beta Streptococcus positive and negative mothers presenting at term.*

Materials and methods: *Department of Gynaecology /Obstetrics ,Combined Military Hospital Lahore. Minimum of 06 months after acceptance of synopsis. Sample size of 260 is calculated by using WHO, sample size calculator, by taking 95 % confidence interval, 6% margin of error & expected prevalence of GBS as 40 %(2). Consecutive , Non-probability sampling technique. Descriptive case series.*

Result*: Out Total sample size of 260, 117 gravidas were GBS positive with 100 NICU admissions and 143 were found negative for the presence of GBS based upon CRP levels with 22 NICU admissions at birth. The prevalence of infection was calculated to be 45%,more than the expected value i.e. 40% and chi square value was 0.70 with a p value of 0.00 (<0.05).Hence, the results are highly significant. Confidence interval was 95% with 6% margin of error in the study.*

Conclusion*: The neonatal outcome in group b streptococcal positive mothers remains poor leading to NICU admissions and large number of early neonatal deaths.Survelliance of infection via markers leads to reduction in fetal complications and neonatal mortality.*

Keywords: *comparison, neonatal outcome, 24-48 hours, group, beta streptococcus, positive and negative mothers.*

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INTRODUCTION:

Despite the advances in neonatal care, early-onset neonatal sepsis remains a serious and potentially life-threatening disease with a mortality rate ranging from 1.5% in term to almost 40% in very-low-birthweight infants [1,2]. The signs and symptoms of neonatal sepsis may be subtle and nonspecific being clinically indistinguishable from various noninfectious conditions such as respiratory distress syndrome or maladaptation. The current practice of starting empirical antibiotic therapy in all neonates showing infection-like symptoms results in their exposure to adverse drug effects, nosocomial complications, and in the emergence of resistant strains.In first few weeks of life , neonatal infections cause a large number of deaths, yet little is known about risk factors and pathways of transmission for early-onset neonatal sepsis worldwide. We aimed to estimate the risk of neonatal infection (excluding sexually transmitted diseases [STDs] or congenital infections) in the first 24 to 48 hours of life among newborns of mothers with bacterial infection or colonization during the intrapartum period at term.

In the last two decades, mortality among children under 5 years old has declined significantly, however, neonatal mortality has not declined as yet. An estimated 3.1–3.3 million newborns die each year, accounting for 40.3% of under-five mortality [1],[2]. The neonatal mortality rate, the number of newborns dying in the first 28 days of life per 1,000 live births, is estimated globally to be approximately more than 23.9 %. In low-middle income African, Eastern Mediterranean, and southeast Asian countries, the neonatal mortality rate ranges from 30.7–35.9 %, which is substantially greater than in high-income countries where it is estimated to be 3.6 % [2].Neonatal infections, in terms of bacteremia /sepsis, pneumonia, and meningitis, cause approximately 23.4% of neonatal deaths worldwide each year [1]. Almost half of the deaths occur during the first week of life caused by sepsis or pneumonia [3]. There has been no measurable reduction in early neonatal mortality over the last few decades [4].

Ascending infections from the mother to the fetus may occur before or during labour when colonized bacteria from the maternal perineum spread through the vaginal canal, amniotic sac, and into the once-sterile amniotic fluid [5],[6]. Amniotic fluid infection, or chorioamnionitis, and bacteremia are additional sources of bacterial transmission from the mother to fetus *in utero*.

In resource-rich settings, interventions such as risk-based antibiotic prophylaxis during labour (based on microbiological screening or risk factors in pregnancy), early diagnosis of sepsis, and neonatal antibiotic treatment have are highly effective in reducing mortality from early-onset neonatal bacterial sepsis [7]. As a result, in regions with low neonatal mortality levels (less than 15 per 1,000 births), such as the Americas, Europe, and western Pacific, sepsis accounts for 9.1%–15.3% of neonatal deaths [1]. Despite the heavy burden of disease in high-mortality settings, modes of transmission and the risk factors for neonatal infections have not been well studied in these settings [8].

Certain reviews have evaluated the effects of antibiotics on maternal Group B streptococcus (GBS) colonization and maternal risk factors of infection in cases of neonatal sepsis [9]–[11]. These reviews are limited to randomized controlled trials, predominantly represented high income settings, and focused on specific maternal factors (GBS colonization, prelabour rupture of membranes [PROM], preterm prelabour rupture of membranes [PPROM]). Antibiotics given to women with PROM reduced the risk of neonatal infection (relative risk [RR]=0.67, 95% CI 0.52–0.85) [10]. Similarly, among women with PPROM, antibiotics reduced the risk of neonatal infection (RR=0.61, CI=0.48–0.77) [9]. The facts for antibiotics given during labour to prevent GBS early-onset neonatal sepsis was inconclusive [11].

This systematic review and meta-analysis estimates the risk of early-onset neonatal infection among newborns of mothers with bacterial infection or colonization compared to newborns of mothers without infection or

colonization.

Pregnant women without infection, reproductive tract colonization, and risk factors for infection were well thought out as the unexposed population. The outcome, early-onset neonatal infection or colonization during the first 7 days of life, was defined in two categories:
(i) Neonatal infection: Laboratory confirmed bacterial infection ("lab", including bacteremia, meningitis, urinary tract infection, i.e., positive culture of blood, cerebrospinal fluid, or urine); clinical signs of infection ("signs", including pneumonia, fever, hypothermia, respiratory distress, bradycardia, tachycardia, irritability, lethargy, hypotonia, seizures, poor feeding, oxygen requirement, increased frequency of apnea, poor capillary refill, metabolic acidosis, elevated white cell count, high immature-to-total neutrophil ratio, elevated C-reactive protein, or physician diagnosis of clinical sepsis using a combination of the above signs); laboratory or clinical infection (hereafter referred to as "lab/lab & signs", including a combination of either laboratory-confirmed infection or clinical signs of infection, or undefined).
(ii) Newborn colonization: positive ear canal, umbilical, axilla, or anal cultures without signs or symptoms of infection.

We use the term "maternal exposure" as an all-encompassing description of exposures and "neonatal outcome" to describe the outcomes.
The larger aim of performing this review was to determine the potential impact of an intrapartum antibiotic prophylaxis intervention by assessing the risk of vertical transmission of bacterial infection acquired through direct maternal-fetal contact by means of maternal reproductive tract colonization, chorioamnionitis, and trans-placental transmission (bacteremia). We decided *already* not to focus on sexually transmitted infections (such as chlamydia or syphilis) and non-bacterial infections, such as viral (HIV, rubella, cytomegalovirus, or herpes simplex) or parasitic (toxoplasmosis) infections, because they have different mechanisms of transmission.

Group B streptococcus (GBS)
GBS is a type of bacterial infection that can be found in a pregnant woman's vagina or rectum. Group B streptococcus (Streptococcus agalactiae) is recognised as the most frequent cause of severe early onset (at less than 7 days of age) infection in newborn infants. However, there is still controversy about its prevention. This bacteria is normally found in the vagina and/or rectum of about **25% of all healthy, adult women**. Women who test positive for GBS are said to be colonized. A mother can pass GBS to her baby during delivery
The Centers for Disease Control and Prevention (CDC) has recommended routine screening for vaginal strep B for all pregnant women presenting at any gestational age. This screening is performed between the 35th and 37th week of pregnancy. Studies show that testing is the most accurate at predicting the GBS status at birth if done within 5 weeks of delivery.
The test involves a swab of both from the lower part of vagina and the rectum or midstream urine sample. The sample is then taken to a lab where a culture is analyzed for the presence of GBS. Test results are usually available within 24 to 48 hours. The American Academy of Pediatrics recommends that all women who have risk factors **PRIOR** to being screened for GBS (for example, women who have preterm labor started before completing 37 gestational weeks) are treated with IV antibiotics until their GBS status is known. There are, however, symptoms that may indicate pregnant women are at increase risk of delivering a baby with GBS.

These symptoms include:
- Labor or rupture of membranes commences before 37 weeks
- Rupture of membranes 18 hours or more than 18 hours prior to delivery
- Intra-partum episode of fever
- A urinary tract infection because of GBS during your pregnancy
- A previous baby affected with GBSs

- Positive results of culture for GBS colonization at 35-37 weeks

GBS TESTING

This testing has served to lower the overall number of early onset GBS infections in newborns by more than 80% since aggressive precautionary measures were instituted in the 1990s. In pregnant women, routine screening for colonization with GBS is strongly recommended. This screening test is mostly performed between 35-37 weeks of gestation. The testing involves using a sterile swab to collect a sample from both the vaginal and rectal areas or urine culture and results usually be obtained within 24-72 hours.

C-reactive protein (CRP) is the most widely studied acute-phase reactant till now, and despite the ongoing increase (and fall) of new infection markers, its wide accessibility and its simple, fast, and cost-effective fortitude make it one of the favored indices in many neonatal intensive care units (NICUs) [7].

CRP had been detected in more than 70 disorders counting acute bacterial, viral, and other infections, as well as noninfectious diseases like acute myocardial infarction, rheumatic disorders, and malignancies [9]. All of these disorders of unlike etiology had in common the subject matter of inflammation and/or tissue injury [10].

The principal ligand to CRP is phosphocholine, which is found in lipopolysaccharide, bacterial cell walls, as well as in most biological membranes [11]. After binding, CRP is recognized by the complement system; CRP activates it, and promotes phagocytosis of the ligand by neutrophil granulocytes, macrophages, and other cells. CRP further activates monocytes and macrophages, and stimulates the production of proinflammatory cytokines [11,12].

CRP is part of the acute-phase response, a physiological and metabolic reaction to an acute tissue injury of different etiologies (trauma, surgery, infection, acute inflammation, etc.) which aims to neutralize the inflammatory agent and to promote the healing of the injured tissue [10].

After a trauma or the invasion of microorganisms, an acute inflammatory reaction is initiated by activation of local resident cells which promote the recruitment and activation of further inflammatory cells, including fibroblasts, leukocytes, and endothelial cells. Once activated, they release proinflammatory cytokines including IL-1, TNF-α, and IL-6. These cytokines induce the production of proteins of the acute-phase response in the liver. These include but are not limited to components of the complement system, coagulation factors, protease inhibitors, metal-binding proteins, and CRP [10,12].

In 1981, Shine et al. [13] evaluated serum concentration of CRP determined through the radioimmunoassay in 468 sera samples from normal adult volunteer blood donors, and reported on a median concentration of 0.8 mg/l with a 90th percentile of less than 3.0 mg/l. More freshly, Rifai and Ridker [15] used three dissimilar high-sensitivity techniques to determine CRP distributions in their cohort consisting of 22,000 healthy adults from the United States. The median CRP values for male and female were 1.5 and 1.52 mg/l; the 90th percentiles were 6.05 and 6.61 mg/l, correspondingly Similarly, Imhof et al. [16] examined CRP values from 13,000 apparently healthy men and women from different populations in Europe. The reported median concentration in the particular cohorts ranged from 0.6 _ 1.7 mg/l, the 90th percentiles from 3.2 _ 8.0 mg/l.

During the acute-phase-response, CRP's hepatic synthesis rate is higher within hours and can go up to 1,000-fold levels [9,11]. Levels remain high as long as the inflammation or tissue damage persists and then decrease rapidly. The half-life time has been reported by Vigushin et al. [17] to be 19 h in any of the diseases studied, being the fractional catabolic rate independent of the plasma CRP concentration. From this information, the synthesis rate of CRP therefore appears as the only significant determinant of its plasma level, supporting the clinical use of CRP measurements to monitor disease activity in all disorders characterized by a major acute-phase response.

The sensitivity of CRP is known to be the lowest during the early stages of infection [22,23,24]. For a single CRP determination at the time of initial evaluation as well as for determinations from cord blood, the CRP diagnostic accuracy varies widely within an unacceptable range of sensitivity [22,23,25,26,27,28,29,30,31,32]. This may be related to the arbitrary choice of optimal cutoff points [27,28,30,33] as well as the insensitive analytic methods with various limits of quantification used in the past [34] to detect the CRP pattern in the earliest course of infection, in particular in the very early neonatal period.

An increased CRP is not essentially diagnostic for sepsis, as elevations can also be happened due to the physiologic rise after birth or non infection-associated conditions. Therefore, concerns were highlighted about the reliability of CRP during the early stage of the disease being neither able to diagnose nor to rule out an infection with confidence [22].

Benitz et al. [22] discovered that the sensitivity in the diagnosis of culture-proven early-onset sepsis increased from 35% (95% confidence interval 30–41%) at the initial sepsis workup to 79% (72–86) after 8–24 h, and 89% (81–94) for the higher of two levels obtained after 8–48 h after the initial workup. Concurrently, they reported a decrease in specificity from 90% (88–92) to 78% (76–81) and 74% (71–77) for CRP levels performed as described above. Pourcyrous et al. [23] evaluated serial CRP levels in a large series of 689 investigations for neonatal sepsis (187 of them with positive blood culture results) in 489 neonates, and determined CRP at the initial sepsis evaluation and 12 and 24 h later. The postnatal age at the time of the initial investigation ranged from less than one day (60%) to 191 days (infants were older than one month in 13%). They reported a higher sensitivity for any of the three CRP values (obtained by three serial determinations at 12-hour intervals) compared to the first value (74 vs. 55%). In general, the sensitivity substantially increases with serial determinations 24–48 h after the onset of symptoms [10,20]. Several studies reported on sensitivities and specificities ranging from 74 to 98% and from 71 to 94%, respectively, for either serial CRP determinations or a single determination at least 12 h after the onset of symptoms [22,23,24,25,26,33]. However, by that point most newborns will be asymptomatic and will have confirmed negative culture results [35].
Philip [36] and later others [37,38,39,40] suggested that serial levels may also be useful for identification of infants who do not have a bacterial infection. A repeat CRP 24–48 h after the initiation of antibiotic therapy has been reported to carry a 99% negative predictive value in accurately identifying, in the early neonatal period, infants not infected [7,20,22,41,42,43].

Serial CRP measurements can be helpful in monitoring the response to treatment in infected neonates, to determine the duration of antibiotic therapy, and to recognize possible complications [23,24,44]. In a cohort of 60 neonates with early-onset sepsis, Ehl et al. [45] established that after commencement of a successful antibiotic therapy, CRP values further increased, peaking and consecutively decreasing after 16 h. A CRP level that returned again to the normal range may indicate that the duration of antibiotic treatment has been sufficient, allowing discontinuation of antibiotics therapy [41], in spite of the clinical condition of the child is better and culture results were negative.

Thus, CRP has been proposed as a key decision parameter for guiding the period of antibiotic therapy [20,22,41,42,43]. However, CRP was not the single criterion evaluated in any infant in these studies. In fact, other criteria explicitly included in the decision of whether or not to discontinue antibiotics were clinical status, culture results, and results of other laboratory tests. Thus, the current literature does not sustain CRP as the single decision parameter to discontinue antibiotics.

The magnitude of the CRP response to sepsis was reported to depend also on the underlying pathogen. In 1974, Sabel and Hanson [46] reported that *Escherichia coli* infection increases CRP levels with impressive consistency. In 1993, Pourcyrous et al. [23] reported the same phenomenon among 187 cases of positive blood

culture in 691 investigations for sepsis in infants aged from birth to 191 days of life. They added evidence on a more distinct CRP increase in Gram-negative compared to Gram-positive strains with CRP levels above 10 mg/l in 92 and 64% of 174 single-organism blood cultures, respectively. Cultures with growth of *Escherichia coli*, group B streptococci, and *Staphylococcus aureus* were associated with abnormal CRP values in 100, 92, and 89% respectively. The percent incidence of abnormal CRP concentrations varied considerably among the organisms recovered with persistently normal CRP levels in 48 of 174 single-organism blood cultures. In 40 of them (36 with Gram-positive strains, mainly group D streptococci, *Streptococcus viridans*, and *Streptococcus epidermidis*), antibiotic therapy was not administered or inadequate. All of them had uneventful clinical courses, and thus these positive blood culture results may be caused by contamination [23]. Other reports on a pathogen-dependent CRP response in neonates consist of that of Rønnestad et al. [47] who evaluated CRP responses from day 1 to day 4 in 121 monomicrobial septic episodes in newborns. They reported significantly lower median values (day 1–4) in coagulase-negative staphylococci (23 mg/l) as compared to *S. aureus*, group B streptococci, and *E. coli* (51–58 mg/l).

OBJECTIVES

- To determine the frequency of mothers who are Group Beta Streptococcus positive at term
- To compare the neonatal outcome in first 24-48 hours between Group Beta Streptococcus positive and negative mothers presenting at term.

MATERIALS AND METHODS:

Setting: Department of Gynaecology /Obstetrics Combined Military Hospital Lahore.

Duration of Study: Minimum of 06 months after acceptance of synopsis.

Sample size: Sample size of 260 is calculated by using WHO, sample size calculator , by taking 95 % confidence interval, 6% margin of error & expected prevalence of GBS as 40 %(2)

Sampling Technique: Consecutive, Non-probability sampling technique.

Sample Selection:

Inclusion criteria

1. All term mothers with ages ranging between 18-40 years either primi or multipara attending antenatal clinics at 37-41completed weeks in the Gynae/Obst. Department of Combined Military Hospital Lahore.
2. All term neonates born through vaginal delivery to these mothers.

Exclusion criteria

Babies born to mothers having other obstetrics complications like gestational diabetes, hypertension and cardiac disorders (on antenatal record).

ETHICAL ISSUES:

- Informed consent was obtained from the patients
- Formal approval of study from hospital ethical committee was also being sought.

Study Design:

Descriptive case series

Data Collection:

A consecutive sample, after obtaining institutional ethical committee approval, of all the pregnant woman of gestational age between 37-41 completed weeks attending the antenatal clinic of Combined Military Hospital Lahore will be enrolled in my study. An informed consent will be taken from every woman participating in study. Urine sample will be taken from pregnant women by me or 2nd year post graduate trainee under supervision of the consultant and will be sent to the Microbiology Department of Combined Military Hospital Lahore, for detection of GBS. Afterwards when these women will undergo vaginal delivery, blood samples of the newborn will be taken and sent to laboratory for measuring serum CRP levels within 24_48 hours. Effect modifiers like gestational age, maternal age and parity will be addressed through stratification. All neonates and their mothers will be managed as per standard management of protocol.

Data Collection Tool:
Data will be collected on the pre-designed Proforma attached as annexure.

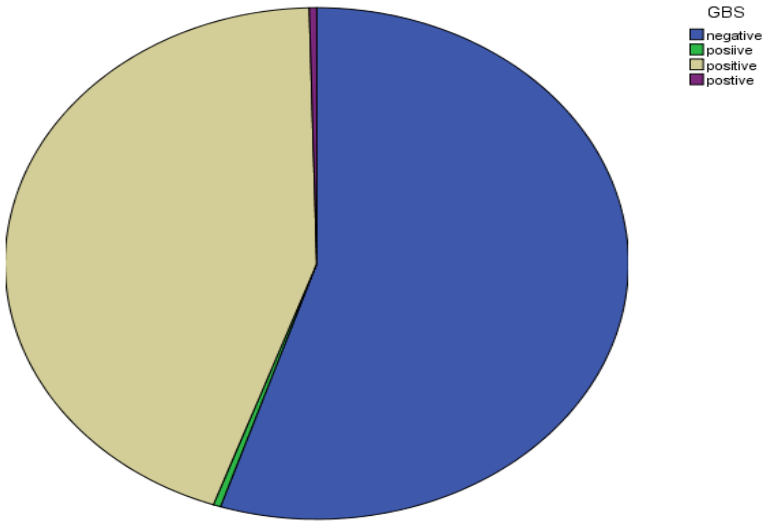
Data Analysis:
All data will be entered and analyzed using SPSS version20.0.For quantitative variables like maternal age and gestational age , mean and S.D will be calculated. For qualitative variables like GBS status (+ / -) and raised CRP levels , frequency and percentage will be measured .Chi square test will be applied to compare the outcome (raised CRP levels) between the two groups .P value < 0.05 will be considered statistically significant. Effect modifiers like gestational age , maternal age & parity will be controlled through stratification. Chi square test will be used post stratification with p value < 0.05 considered as significant.

RESULTS:

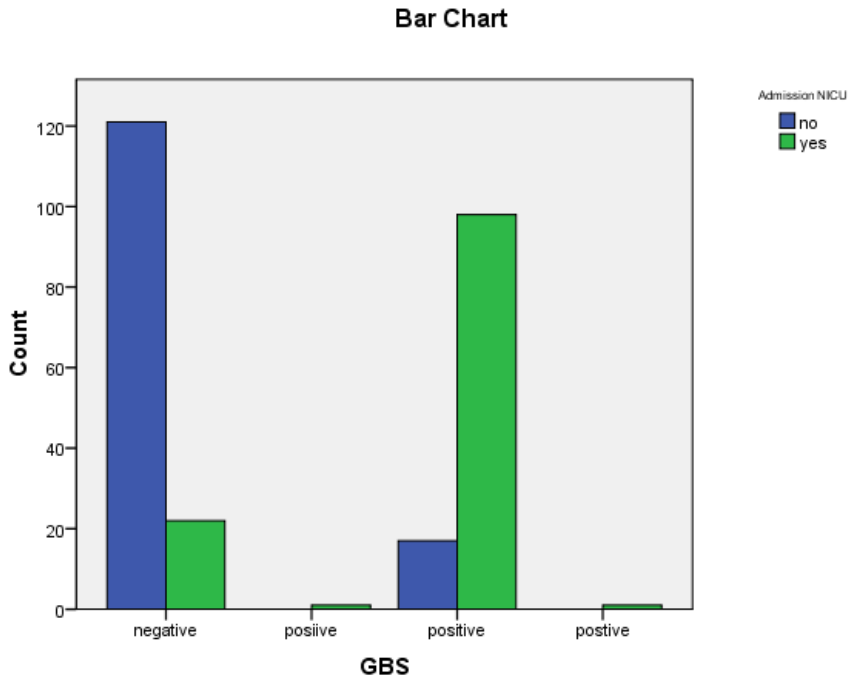
Out Total sample size of 260, 117 gravidas were GBS positive with 100 NICU admissions and 143 were found negative for the presence of GBS based upon CRP levels with 22 NICU admissions at birth. The prevalence of infection was calculated to be 45%,more than the expected value i.e. 40% and chi square value was 0.70 with a p value of 0.00 (<0.05).Hence, the results are highly significant. Confidence interval was 95% with 6% margin of error in the study.

GBS

GBS	frequency
Negative	**143**
Positive	**117**
Total	**260**



CRP	Frequency
<6	243
>6	17
Total	260



Gestational Age in Months	Frequency
35	1
36	1
37	46
37	1
38	43
39	48
40	57
41	53
42	10
Total	260

ENND

ENND	FREQUENCY	PERCENTAGE
No	**250**	**96.2**
Yes	**10**	**3.8**
Total	**260**	**100**

DISCUSSION:

when the mother was infected. Disease in the affected fetus is systemic, and during the first trimester, fetal death andmiscarriage, or profound damage to developing organ systems may result. The extended acronym 'TORCHES' is used as an aide-memoire to recall those organisms, which may be transmitted via this route: Toxoplasma gondiNeonatal sepsis is a significant cause of both morbidity and mortality in preterm and term infants. Early onset neonatal sepsis (EONS) is variably defined as having an onset within the first 3-7 days of life, with late onset neonatal sepsis (LONS) referring to infections acquired after this time. The incidence and microbiology of neonatal sepsis show geographical diversity. EONS groups the transplacental haematogenous spread of infection alongside agents transmitted (in the main) via inhalation or aspiration during the perinatal period. LONS is comprised of postnatal and nosocomial infections. Aetiology Transplacental spread of infection is rare, with the risk to the developing fetus dependent upon the organisminvolved and the gestational agei, “Other” (includes: Varicella Zoster virus/VZV, Parvovirus B19, HIV, Listeria monocytogenes and TB), Rubella virus, Cytomegalovirus/CMV, Herpes Simplex virus/HSV, Enteroviruses and Syphilis/Treponema pallidum. Perinatal infections encompass those occurring secondary to ascending infection from the mother's genitourinary tract, and transvaginal acquisition during labour. Documented risk factors include: maternal group B Streptococcal (GBS) colonisation, premature rupture of membranes (especially if prolonged), the development of chorioamnionitis, maternal urinary tract infection, fetal intrapartum hypoxia, fetal instrumentation and repeated vaginal examinations during labour. The major organisms responsible for perinatally acquired EONS are GBS and E. Coli, which together account for around 70% cases. E.

Coli is of particular concern in very low birth weight (VLBW) infants. Other Streptococcal sp., Listeria monocytogenes, Enterococci, N. Gonorrhoeae and Chlamydia sp. may also cause

EONS. LONS is chiefly caused by coagulase-negative Staphylococci (VLBW premature infants are most at risk), Staph. aureus, Gram negative Enterobacteria, Candida sp., and HSV types I and II. Prolonged stays in the neonatal unit, invasive support apparatus and procedures, prolonged and repeated prescription of broad spectrum antibiotics, episodes of necrotizing enterocolitis (NEC), gastric acid suppression (via H2 blockers or H+-pump inhibitors), and damage to skin and mucosal surfaces, all increase the risk of LONS. Such problems are compounded by the immaturity of the neonatal immune system and in premature infants, the reduced transplacental passage of maternal immunoglobulins. Clinical manifestations Unfortunately, the clinical symptoms and signs of both EONS and LONS are generally non-specific.

The infant may develop pyrexia or hypothermia, feeding intolerance, listlessness, pallor, apnoea or tachypnoea. Rashes, thick respiratory secretions, abdominal distension, refusal to move a limb or seizures may be observed with more focal sources of sepsis. Hepatosplenomegaly, jaundice and ptechiae can be seen soon after birth in growth retarded infants who may have 'TORCHES'-type infections. CNS involvement may be heralded by microcephaly, hypotonia and seizures (CMV). Limb defects (VZV) and cardiac anomalies (Rubella) may be apparent. Diagnosis Prompt diagnosis and treatment are imperative to decrease the mortality rates from neonatal sepsis; a high index of clinical suspicion is vital. Blood cultures (obtaining adequate sample volumes can be an issue) from central and peripheral sites, surface culture when clinically indicated and lumbar puncture when meningitis/encephalitis is suspected, are necessary. Other laboratory investigations are less reliable and need to be cautiously interpreted. Full blood count-an increased immature-tototal neutrophil ratio may be present. Serial CRP levels over 24-48 h; if normal, this has a high negative predictive value, but elevated levels are present physiologically in the first days of life, and also in association with other complications of prematurity. Currently, the measurement of serum procalcitonin levels, mannose-binding lectin, cytokine profile and neutrophil/monocyte surface protein marker assay remain predominantly research tools to evaluate septic neonates.

Herpes DNA polymerase chain reaction (PCR) from blood and CSF is required to confirm a diagnosis of suspected HSVencephalitis. Management and treatment Vaccination programmes to prevent maternal disease and serological screening in the antenatal clinic are important. New vaccines, for example against GBS, are in development. Infected mothers should be treated with appropriate antibiotic/viral therapy and immunoglobulins, per local policies. Fetal wellbeing needs to be monitored by the obstetricians, and delivery may need to be planned. GBS screening remains controversial and in the UK is currently only performed in high risk cases, such as women with (prolonged) premature rupture of membranes. In culture positive cases, intra-partum antibiotics are administered to the mother. Scrupulous attention to hygiene in the neonatal unit is vital to prevent nosocomial infection and cross contamination. Hand washing protocols, the use of gloves and aprons, and regular testing of water supplies are required. Strict asepsis is necessary during line/catheter insertion, with local policies to determine how lines should be managed and for how long they must remain in situ. The administration of probiotics has been shown to prevent the development of NEC. Lactoferrin is suggested as helpful to reduce both bacterial and fungal infections in VLBW babies. Antifungal prophylaxis with oral nystatin or fluconazole is of benefit to LBW infants who are at high risk of fungal sepsis. Antibiotics, whilst absolutely necessary to treat sepsis, must be utilised judiciously, to prevent multi-drug resistant organisms developing, and complications such as NEC and disseminated fungal infections. Local prescribing policies must be drawn up and adhered to.

Definitive therapy is based upon sensitivity per culture results. Complications of neonatal sepsis Complications may be generic to all organism, and occur early on in the course of the disease, such as chronic lung disease as a consequence of prolonged ventilation. Septic infants are at risk of intracerebral haemorrhage and periventricular leukomalacia, which may manifest later in

childhood with varying degrees of neurodisability and cognitive impairment. Disease specific complications are also recognised; congenital CMVinfection is one of the commonest causes of sensory neural hearing loss, which may likewise be the result of Rubella infection.Whilst EONS is far less common than LONS, its mortality rates are far greater. Despite early diagnosis and optimal management strategies, up to 40% or infants succumb to the former, whilst less than 5% die from LONS. Radiology involvement imaging investigation will be instigated by the neonatologists in an attempt to confirm a diagnosis of sepsis and so guide therapeutic options. The algorithm will be individualized and obviously depend upon clinical findings.A chest radiographmay suggest a diagnosis of pneumonia in the appropriate scenario, but is not specific for any particular organism, and the findings-isolated or combined interstitial and air space disease- often overlap with other respiratory conditions of the neonatal period. However, the presence of a pleural effusion, cardiomegaly or hyperinflation are reported more likely to represent pneumonia.

For suspected focal infection, abdominal radiographs and ultrasound (US), extremity films and MR each have a role. Cranial US may add diagnostic weight in suspected 'TORCHES' cases, and is invaluable to assess for intracranial complications of sepsis such as haemorrhage and later PVL. Neuroimaging is necessary for suspected meningitis/encephalitis. Intraamniotic infection is a common (2-4%) event in labor. The predictors of IAI include preterm labor or rupture of membranes, abnormal vaginal flora (e.g., GBS, sexually transmitted disease, bacterial vaginosis), obstetric manipulations (e.g., vaginal exams, internal fetal monitoring) in the presence of ruptured membranes, and diminished host response (due to smoking, drug abuse, obesity, immunodeficiency states, etc.). Group B Streptococcus and Enterobacteriaceae are the most important organisms associated with the polymicrobial infection. Anaerobes predict post-cesarean section complications. Neonatal pneumonia (2-5%) and early neonatal sepsis (1-4%) are the outcomes of the greatest concern and are caused by group B streptococcal or aerobic gram-negative rod infections. These outcomes are kept to a minimum if maternal antibiotic chemotherapy is started interpartum with agents that are safe, cross the placenta, and are active against GBS and Escherichia coli (e.g., ampicillin plus gentamicin). Anaerobic coverage should be added (clindamycin) if a cesarean section is performed. Antipyretics such as acetaminophen will reduce the hyperthermic stress on the fetus, and persistent fetal tachycardia after antipyretics may indicate fetal infection. Continuous electronic fetal monitoring is appropriate in cases of IAI, and providers should be prepared for neonatal resuscitation.

CONCLUSION:

The neonatal outcome in group b streptococcal positive mothers remains poor leading to NICU admissions and large number of early neonatal deaths.Survelliance of infection via markers leads to reduction in fetal complications and neonatal mortality**.**

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