

Incidence of Early Onset Neonatal Sepsis Following Premature Rupture Of Membranes (PROM)>18 Hours

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ABSTRACT

INTRODUCTION:

PROM is an important risk factor for early onset neonatal sepsis (EONS). It is associated with increased neonatal morbidity and mortality. It also results in long term complications and sequelae in survived neonates. So the evaluation of neonatal sepsis is important so as to institute early treatment and prevent complications.

OBJECTIVES: To determine incidence of early onset neonatal sepsis in mothers with PROM >18 hours.

MATERIAL AND METHODS:

The present prospective observational study was conducted from January 2020 to December 2020 in Government Victoria Hospital, Visakhapatnam.. The study was conducted in neonates born to 200 pregnant women with history of PROM>18 hrs. A detailed history regarding age, parity, obstetric history of the mother with emphasis on exact time of rupture of membranes, duration, antibiotics before labor were evaluated.

RESULTS:

The incidence of EONS in present study was found to be 14%. In the present study the incidence of sepsis is higher in low birth weight neonates(64%) compared to normal birth weight neonates(36%). Incidence is higher in preterm (61%) than in term (39%) neonates. Most common organism isolated was Escherichia coli(45%) followed by Klebsiella(25%) and Pseudomonas(20%). Majority in EONS were found to have positive CRP and this was statistically significant($p<0.05$).

CONCLUSION:

In conclusion evaluation of neonatal sepsis helps in early institution of treatment and to prevent long term complications.

KEYWORDS: Neonatal sepsis, Prolonged rupture of membranes (PROM), Early Onset Neonatal Sepsis(EONS), Neonatal Mortality.

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I. Introduction

PROM is defined as rupture of amniotic membranes before the onset of labour¹. It occurs in approximately 10% of all pregnancies and when this occurs less than 37 weeks of gestation it is called as PPROM which occurs around 3 - 4.5% of all the deliveries². PROM is an important risk factor for Early-onset neonatal sepsis (EONS) and preterm births³. It is associated with increased neonatal mortality and morbidity.

According to WHO statistics approximately 4 million neonates die annually with global neonatal mortality of 23 per 1000 live births⁴. About 1 million of these deaths are attributed to neonatal infections.⁶

Incidence of neonatal sepsis according to data from National Neonatal Perinatal Database (NNPD 2000-03) is 30 per 1000 live births. It was reported as high as three times this number in developing countries compared to developed countries⁵.

PROM exposes the sterile intrauterine environment to pathogens in vagina. Most common microorganisms are staphylococcus aureus, klebsiella and pseudomonas.

.PROM is significant not only in neonatal mortality and morbidity but also has longterm neonatal complications and sequeale⁶.Hence the knowledge of incidence of EONS in relation to PROM and its effect on neonatal outcome is essential in order to prevent neonatal mortality and morbidity. Treatment of EONS by close observation for early signs of sepsis and early treatment has reduced the incidence of EONS associated with PROM.

Objectives:

To determine the incidence of neonatal sepsis in cases with PROM >18 hrs .

II. Materials and Methods:

The present prospective observational study was conducted from January 2020 to December 2020 in Government Victoria hospital, Visakhapatnam.. The study was conducted in neonates born to 200 pregnant women with history of PROM>18 hrs. A detailed history regarding age, parity ,obstetric history of the mother with emphasis on exact time of rupture of membranes, duration, antibiotics before labor were evaluated.

Inclusion criteria:

Neonates born to mother with PROM more than 18 hours

Exclusion crietra:

- APH
- Toxemia of pregnancy
- Major medical illness to the mother other than infections
- Mother with PROM <18 hrs
- Neonates with major congenital malformations
- Neonates presenting with symptoms after 72 hrs after birth
- Neonates who underwent any mode of resuscitation other than routine care.

Data:

Detailed History including Age, Parity, Gestational age at delivery, Obstetric History of mother with emphaisis on time of ROM, duration, antibiotics given before labour were noted.

Birth H/o: Mode of Delivery, Resuscitation details, APGAR score, Gestational age were noted

EXAMINATION DETAILS: PR, RR, Temp, Birth weight, APGAR, Treatment with antibiotics, length of stay in hospital

Lab investigations: WBC count (<5000/mm³ or more than 25,000mm³),Absolute Neutrophil count(<1800 /mm³), Micro ESR(>15 mm in the first hour), CRP(>6 mg /dl), blood culture.

Diagnosis criteria:Diagnosis of neonatal sepsis is made with neonates having clinical signs and symptoms consistent with sepsis along with

1. Two parameters of sepsis screen positive or
2. Neonate with positive blood culture.

CRP: Latex test (AVITEX)

It's a rapid agglutination test for the detection of CRP in human serum when the latex suspension is mixed with serum containing elevated CRP levels in a slide ,clear agglutination is seen within 2 minutes.

Positive result is indicated by agglutination of latex. The result is obtained at CRP concentration >6 mg/litre.

Negative result is indicated by no change in latex agglutination.(CRP<6 mg/Litre)

Blood Culture:

Blood was drawn before starting antimicrobial agent with aseptic precautions from a peripheral vein. This was then sent to department of microbiology for culture and sensitivity.

Statistical analysis:

Incidence of Neonatal sepsis in cases of PROM was calculated.

Descriptive statistics like mean ,sd and percentage was used to present the data.

Data analysis was done by using Microsoft Excel and SPSS version 20

III. Results :

Out of 200 neonates 70 neonates had clinical signs and symptoms consistent with sepsis and are included in 'clinical sepsis'.

Out of 200 neonates ,28 neonates had confirmed sepsis i.e ., clinical features + either sepsis screen and /or blood culture positive and are included in 'confirmed sepsis'

Table 1: Demographic profile:

	Variable	Total cases (200)	Clinical sepsis (70)	Confirmed sepsis (28)
Sex	Male child	109 (54.5%)	43 (61.42%)	16 (57.14%)
	Female child	91 (45.5%)	27 (38.57%)	12 (42.85%)
Birth weight	>2.5 kg	71 (35.5%)	46 (65.71%)	18 (64.28%)
	<2.5 kg	129 (64.5%)	24 (34.28%)	10 (35.71%)
Gestational Age	>37 wks	74 (37%)	40 (57.14%)	17 (60.71%)
	<37 wks	126 (63%)	30 (42.85%)	11 (39.28%)
Mode	Normal vaginal delivery	121 (60.5%)	48 (68.57%)	18 (64.28%)
	Caesarean section	79 (39.5%)	22 (31.42%)	10 (35.71%)
Duration of PROM	18 – 24 hrs	119(59.5%)	31 (44.28%)	12 (42.85%)
	24 – 72 hrs	81 (40.5%)	39 (55.71%)	16 (57.14%)

In the present study it was observed that neonatal sepsis is more in male neonates compared to female neonates. Incidence is high in low birth weight neonates compared to normal birth weight . Higher rate in preterm than in term neonates. Incidence is more in normal vaginal delivery than cesarean section . There is no much difference in duration of PROM and sepsis because the present study takes into account only PROM 18 hours to 72 hrs as PROM> 72 hrs causes late onset neonatal sepsis.

Table 2: Distribution of cases in reference to sensitivity patterns of various sepsis screen parameters

Variable	CULTURE POSITIVE(n=22)	CULTURE NEGATIVE(n=6)
TOTAL WBC count	12(70.6%)	5(29.4%)
Neutropenia	14(77.8%)	4(22.2%)
ESR	15(75%)	5(25%)
CRP	22(84.6%)	4(15.4%)

Total number of neonates with clinical sepsis was 70 . Number of neonates with confirmed sepsis i.e either 2 parameters of sepsis screen positive or blood culture positive was 28.

Blood culture is done on all neonates with clinical signs and symptoms, it was positive in 22 neonates . Among all parameters ,CRP was highly sensitive.

Table 3: Bacterial pathogens isolated in blood culture of neonates

Bacterial isolate	No of cases(n)	Percentage(%)
E.COLI	10	45.5%
Klebsiella	5	22.7%
Pseudomonas	4	18.1%
Staph aureus	2	9.1%
CONS	1	4.6%
Total	22	100%

Most common bacterial isolate in the present study was E.coli(45%) followed by klebsiella(22.7%) ,pseudomonas(18.1%) and staph aureus(9.1%) .

IV. Discussion:

- **Incidence of early onset neonatal sepsis among PROM mothers:** Incidence of EONS in present study is 14.%. Nili AA, Shams Ansari study shows 18.5% which is slightly above the present study [7]. These differences are probably due to use of different criteria for diagnosis of neonatal sepsis.
- **Sex distribution:** In present study male babies(57.4%) have more incidence of early onset neonatal sepsis compared to female babies(42.85%), which is consistent with Hitesh J Assudani study [8]. Bias for male sex, place of study, sample including other factors may be responsible for increased number of male cases in these studies.
- **Birth weight:** In present study there was statistical significance in the incidence of neonatal sepsis which was more in low birth weight neonates(64.28%) compared to normal birth wt(35.71%) [p<0.05]. Similar results were obtained in other studies such as Yasmeen J et al., 76.3% in LBW neonates vs 23.7 % in normal birth weight neonates [9] .LBW babies are mostly also premature and are predisposed to sepsis due to multiple reasons like immune incompetence at various levels of defense etc.
- **Gestational age:** In present study incidence is more in preterm (60.71%) than in term neonates(39.28%), there was significant difference in preterm neonates compared to term babies .(p value <0.05) . Kifah Al-Q Fatin –Al awayshah study had similar results as the present study 61.5% in preterm babies compared to 38% in term babies [10]. Due to immature immune function, premature babies are more prone to infections compared to term.
- **Mode of delivery:** In present study there was significant difference in the incidence of neonatal sepsis in neonates born by normal vaginal delivery (64.28%) vs caesarean section (35.71%) (p value<0.05%). Other studies which are consistent with the present study are Kifah Al-Q Fatin – Al awayshah study, in which incidence of neonatal sepsis in neonates born by NVD are (54%) compared to neonates born by caesarean section (20%) [10].
- **Duration of PROM:** EONS was observed in 42.85% with Duration of PROM between 18-24 hours and it was 57.14% among those with duration of PROM between 24-72 , but there was no significant difference between incidence of sepsis between 18 to 24 hours and 24 to 72 hours (p value >0.05). In Woranart et al study percentage of cases with sepsis during 18 to 24 hours period is more compared to 24 to 72 hours period which is not consistent with present study [11].
- **Sensitivity of CRP:** The sensitivity of CRP in present study is higher with 100 % and it is statistically significant(p value<0.05). The present study is consistent with Chauhan S et al study with a sensitivity of 92.30%[12]. On the other hand, a raised CRP is not necessarily diagnostic for sepsis, as elevations may as well occur due to the physiologic rise after birth or non-infection associated conditions..
- **Presenting symptom:** In present study Respiratory distress (54.5%) was the commonest presenting symptom followed by refusal of feeds (47.5%) and lethargy (43.5%). In Jain N K et al study also, respiratory distress (42.6%) was the commonest presenting symptom [13]. Earliest clinical features of neonatal sepsis are often subtle and nonspecific therefore a high index of suspicion is needed for early diagnosis.

Positive blood culture:

- Blood culture was done in all the 70 neonates with clinical sepsis. Out of 70, 22 neonates had positive blood culture with percentage positivity of about 36.66%. Compared to other studies, blood culture positivity is slightly lower with 36.66% in the present study. In Kayange et al study[14], positive blood culture was seen in 57 among 121 clinical sepsis cases. Low blood culture positivity in the present study may be due to small sample size compared to other studies.

Isolates in early onset neonatal sepsis:

- In the present study, out of 70 cases with signs and symptoms of EONS, culture was positive in 22 cases. Out of which Ecoli (45.5%) were observed to be the majority followed by Klebsiella (22.7%), Pseudomonas (18.1%), Staph Aureus (9.1%), CONS (4.6%).
- E.coli was the commonest isolate in a study done by Kerur Basavaraju et al study [15] Staph aureus was the commonest pathogen (48.7%) followed by coliforms in study conducted by university of Calabar, Nigeria 2005 by Martin. M. Meremikwu and Chuckwumek study [15].

NEONATAL OUTCOME: In the present study out of 200 cases ,70 with clinical sepsis needed NICU admissions,42(21%) were discharged within 5 days as their sepsis screen was normal,28(14%) cases of confirmed sepsis needed prolonged admission with mean duration of hospital stay 21 days . There were 2 cases of neonatal mortality in which preterm birth(<34wks) and low birth weight (<2kg) are the additional factors present along with PROM.

LIMITATIONS: Further studies in large number of patients is required to comment regarding incidence rates, associated risk factors for EONS.

V. Conclusion:

Our data suggests that PROM is an important risk factor for EONS .As well as lowbirth weight, prematurity, raised CRP, neutropenia are identifiable risk factors for EONS in PROM. Therefore management strategy should focus on identification of these risk factors ,recognition of clinical conditions with prompt laboratory screening for sepsis and early institution of empirical antibiotic treatment.

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