



NEONATAL SEPSIS AND PROLONGED RUPTURE OF MEMBRANES

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ABSTRACT

Background: Prolonged rupture of membranes (PROM) is considered when the duration of rupture of amniotic membranes is more than 18 hours prior to delivery. PROM is one of the common risk factors for early-onset neonatal sepsis. Timely identification of sepsis is important. The aim of the study was to determine the outcome and requirement of prophylactic use of antibiotics in newborns born to PROM. **Materials & methods:** A retrospective study on neonates born to mothers with PROM was conducted from December 2019 to December 2020. Total of 54 neonates fulfilling the inclusion criteria were included and their case records were evaluated for clinical and laboratory records as well as diagnosis and outcomes. **Results:** Out of 54 neonates, 30(55%) were males and 24(45%) females. 28 (51%) were full term and 26(49%) were pre term. Mode of delivery was vaginal in 32 (59%), and LSCS in 22 (41%). Clinical features suggestive of sepsis were present in Twenty-eight neonates (52%). Fever was the most common symptom seen in 13(46%) neonates followed by poor feeding in 9 neonates and tachypnoea in two neonates. C- reactive protein was positive in 20 (37%) neonates with a mean CRP value being 30 mg/dl. from which 14 (70%) had clinical signs. Twelve (22%) neonates required NICU admission and culture-positive sepsis was seen in five (9%) neonates. E. coli was isolated in three neonates while *Acinetobacter baumannii* in two. Only one neonate succumbed. **Conclusion:** Confirmed sepsis was seen in a very low proportion of neonates born to mothers with prolonged rupture of membranes. Hence early sepsis screening and follow-up of neonates with clinical features suggestive of sepsis might decrease the use of prophylactic antibiotics.

KEYWORDS :

INTRODUCTION

Prolonged rupture of membranes (PROM), is defined as rupture of membrane lasting for more than 18 hours prior to delivery. (1) The worldwide incidence is 8% as reported by WHO (2) to 19 % in China(3). The report of association of neonatal sepsis and PROM was done in 1963. (4) PROM is an important risk factor for both early-onset sepsis and preterm births. Many studies have determined that, besides prematurity being the most common problem, infection was the most serious event and potential complication following PROM. (5,6) According to the World Health Organization, approximately four million neonates die annually. The global neonatal mortality rate 23/1000 live births. The incidence of neonatal sepsis is approximately 1-10/1000 live births in developed countries, but it was reported as high as three times. (7)

Neonatal sepsis is defined as a systemic condition of bacterial, viral or fungal(yeast) origin that is associated with hemodynamic changes and other clinical manifestations and results in substantial morbidity and mortality. (8) The clinical presentations of neonatal sepsis are nonspecific. This includes symptoms like fever, respiratory distress, lethargy/irritability, convulsions, bulging fontanel, refusal to feed, jaundice, bleeding, abdominal distension and temperature dysregulation.

MATERIALS AND METHODS

This study was a hospital-based retrospective study conducted for a period of one year from December 2019 to December 2020 in Smt. Kashibai Navale Medical College and General Hospital, Pune. All the neonates born with a maternal history of prolonged rupture of membranes more than 18 hours prior to the delivery including preterm were included in this study. Those With a PROM of less than 18 hours were excluded from the study.

hours was obtained from the medical records. Clinical features pertaining to sepsis-like hypoglycemia fever, poor feeding lethargy were documented. Sepsis screen (complete hemogram, c-reactive protein, blood culture) reports of all the subjects if sent were noted.

Antibiotic treatment if initiated was recorded. Data was collected and entered in the excel sheet. Analysis for the comparison of various variables and its significance of association was done with chi square test. P value less than 0.05 was considered to be significant.

RESULTS

1) Maternal characteristics

MATERNAL CHARACTERISTICS

	CHARACTERISTICS	NUMBER (%)
Maternal age	>30	4(7.4)
	<30	50(92.6)
Gestational Age	Extreme preterm (<28 weeks)	0(0)
	Early preterm (28 to 33+6)	11(20)
	Late preterm (34 to 36+6 weeks)	10(18.5)
	Term (>37 weeks)	33(61)
Prolonged rupture of membranes (duration)	18-36 hours	33(61)
	36-54 hours	13(24)
	54-72 hours	4(7.4)
	More than 72 hours	4(7.4)
Parity	Primigravida	33(61)
	Multigravida	21(38)
Mode of delivery	Normal	32(59)
	LSCS	22(41)

In our study maternal age of 92% mothers of neonates was less than 30 years. Surprisingly in our study majority of the

Data of 54 neonates born to mothers with PROM more than 18

neonates were born full term (61%). PROM duration of 61% of mothers was between 18 to 36 hours, while was least more than 54 hours.

Primi mothers were more affected than multi. Majority of the mother delivered spontaneously vaginally while 41% of them had caesarean section.

2) Neonatal Characteristics

NEONATAL CHARACTERISTICS		
	Characteristics	Number (%)
Gender	Male	29(53)
	Female	25(46)
Birth weight	ELBW	1(1.8)
	VLBW	5(9.2)
	LBW	13(27)
	Normal	35(61)
Clinical features of sepsis	Present	27(50)
	Absent	27(50)
Deranged TLC	Leukocytosis	14(25)
	Leucopenia	3(5.5)
	Normal	36(66)
C reactive protein	Positive	18(33)
	Negative	36(66)
Blood culture	Positive	5(9.2)
	Negative	49(90.8)
Birth asphyxia	Present	(6)11.11
MSL	-	(3)5.5
Required NICU admission	-	(12)22
Outcome	Death	2(3.8)
	Discharged	52(96.2)

In our study males outnumbered females. 33 neonates were born with normal birth weight, fifteen were low birth weight, while six of them were less than 1.5kg. Other risk factors which were seen were meconium-stained delivery and birth asphyxia. Deranged TLC was seen with Leukocytosis in 45% of neonates and leucopenia in 5.5%. C reactive protein was positive in 33% of neonates. Culture positive sepsis was seen in five neonates (9.2%). Only one neonate succumbed. Twenty-two percent of neonates required NICU admission.

1) Sepsis in neonates with history of PROM (n=54) (Fig.1) Out of 54 neonates in our study, clinical with culture-positive sepsis was seen in only five neonates. Clinical features of sepsis were seen in only 22 neonates. But there were no features of sepsis in almost 50% of the neonates.

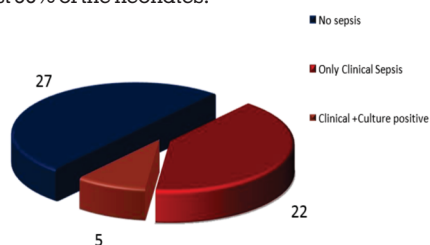
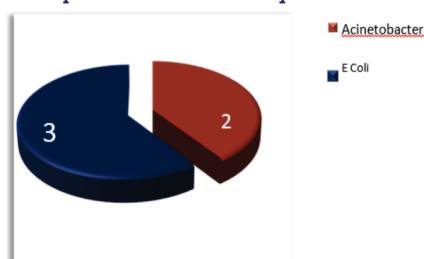


Figure no.1- Sepsis with PROM history



2) Isolated Organisms-

1) Gender dominance

Parameters		Features of sepsis				Chi-Square	P value	Sig
		Present		Absent				
		No.	%	No.	%			
Clinical sepsis	Male (n=29)	14	48.27	15	51	0	1	NS
	Female (n=25)	13	52	12	48			
Culture positive sepsis	Male (n=29)	3	10.3	26	89	0.03	0.8	NS
	Female (n=25)	2	8	23	11			

Males were more affected than females.

2) Association of other risk factors with PROM and sepsis

Parameters		Features of sepsis				Chi-Square	P value	Sig
		Present		Absentent				
		No.	%	No.	%			
Birth weight	<2.5kg (n=19)	14	73.68	5	26.31	9.2	0.02	Sig
	>2.5 kg (n=35)	13	37.14	22	62.85			
Gestatio nal Age	Preterm (n=21)	14	66.66	7	33.33	0.09	0.87	NS
	Term (n=33)	13	39.39	20	60.60			
Duration of PROM	18-36 hours	12	36.36	21	63.63	-4.8	-	-
	>36 hours	15	71.42	6	28.57			

In our study those neonates who had other associated risk factors like low birth weight and duration of PROM more than 36 hours had more chances of sepsis.

DISCUSSION

The incidence of PROM was 3.5% amongst all pregnancies in our hospital. It was similar compared to studies done in Pakistan which ranged between 2.7% to 9.8%. (6,9) In our study majority of the neonates were born full-term (61%) and 39% of them were born preterm. Out of them, 18% were also born late preterm.

Slightly a male predominance was found in our study. Features of clinical sepsis and culture-positive sepsis were also seen more in males than females however it was not significant in our study. Similarly, a study conducted on 321 neonates also reported that males are predominantly affected than females. (10) This sex difference might be due to a gene located on the x chromosome and involved in the function of the thymus. Another reason might be due to the synthesis of immunoglobulins in males conferring less immunological protection compared to females. (11)

In this study, 62% of mothers labored spontaneously within 18-36 hours after PROM where the average duration of PROM was 23 hours. Thirteen percent of them delivered within 54 hours and 7.4 % of them delivered after 72 hours where the average was 63 hours. The highest duration recorded in our study was 100 hours. Those neonates born after more than 36 hours showed features of sepsis. Hence longer the duration of PROM higher is the neonatal sepsis rate. There is an incidence of documented sepsis in neonates born to mothers with PROM <24 hours in 0.9%, with an increase to 2.4% and 3.54% in > 24 hours and > 36 hours respectively. (12)

A similar study conducted in Iran reported the spontaneous labor of 87% of women within 18-72 hours of PROM. (13)

Almost 50% of the neonates had clinical features of sepsis. These features included fever, poor feeding, decreased activity, icterus asymptomatic hypoglycemia, respiratory distress. The majority of them presented with tachypnoea and respiratory distress. Chaudhari et al (14) reported refusal to feeds in 77.4% followed by lethargy in 67% as the commonest features of their study.

The incidence of culture-positive early-onset sepsis in this study was found to be 9.2% which was slightly more than the previous study done in Pakistan (4%). (15) A much higher incidence was reported from Thailand with 27.9%. (16) While in Bangladesh it was reported that about one-third of all septicemia in neonates was attributable to PROM. (17) The most common isolates in our study were *E. coli*. Gram-negative organisms were commonly isolated by Verma et al (18). and Dalal et al. (19) Galhotra et al isolated gram-positive organisms. (20)

One of the most significant cofactors associated with increased perinatal morbidity and mortality is prematurity. (21) Many of the etiological associations such as inflammatory infectious and maternal and uterine vascular diseases have been proposed to contribute to prematurity and PROM. (22) The incidence of culture-positive sepsis with prematurity and PROM in our study was 7.4%. It was similar to the previous study in Pakistan which reported a 4-6% in combination with prematurity. (15) Another Risk factor that was found to be significant was low birth weight. Patients with low birth weight and PROM had a high risk of sepsis. Birth weight is inversely related to sepsis. It is known that low birth weight neonates have low IgG levels which make them more prone to infections. (23)

In our 66% of neonates had normal leucocyte count while rest of them had leukocytosis or leucopenia. C reactive protein was found positive in 33% of the patients. It was documented only on day one of life within 6 -12 hours after birth hence cannot be said as a completely reliable investigation. Serial CRP readings are more useful and have value also to follow up the neonates who did not receive antibiotic treatment. (24) Out of 54 neonates, 12 neonates (22%) of them required NICU admission. Most of them had associated risk factors like Prematurity, low birth weights, fever with hypoglycemia, tachypnoea and distress. The mortality rate in our study was 3.9%.

CONCLUSION

The clinical features and culture positive rate in our study was equivocal to most of the studies. majority of the neonates who had clinical features of sepsis had associated risk factors like prematurity and low birth weight and longer duration of PROM. Fifty percent of neonates had no features of sepsis clinically and Laboratory proven. Though PROM contributes to risk of neonatal sepsis, Isolated PROM has less risk for early onset sepsis. Follow up of these neonates for 72 hours can avoid the use of antibiotics empirically.

Limitations

As this was a retrospective study, we could not evaluate the history of maternal antibiotics in this study. We could not address all the variables. There was variability in the data and was sample size small.

Abbreviations

PROM- Prolonged rupture of membranes

EOS- Early onset sepsis

LOS- Late onset sepsis

NICU-Neonatal Intensive care unit CRP- C-reactive Protein

TLC- Total leucocyte count

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