

Maternal and Neonatal Outcome of Spontaneous Preterm Pre Labor Rupture of Membrane

Turaia AbdAlmaksoud^{@1} and Soad Erhuma²

¹Department of Gynecology and Obstetrics, Faculty of Medicine, University of Tripoli

²Department of Gynecology and Obstetrics, Faculty of Medicine, Sirte University

Received 18 August 2019/Accepted 19 December 019

ABSTRACT

Preterm premature rupture of membrane (PPROM) is a known complication of pregnancy as it is associated with significant perinatal complication. The study aimed to determine the frequency of PPRM among pregnant women at EbenSena Hospital and to study neonatal and maternal outcomes. This prospective longitudinal study was conducted at department of obstetrics and gynecology, EbenSena Hospital in Sirte, between January 2012 and December 2014; 906 cases, who presented with preterm premature rupture of membrane before 37 completed weeks of gestation included in the study. These 906 women were divided into 3 groups according to gestational age (GA), group 1 (28-30 week GA), group 2 (31-33 weeks of GA) and group 3 (34-36 weeks of GA); analysis was done to find the association between PPRM and neonatal, maternal outcomes.

Among 11400 women delivered during the period of the study, 906 women with PPRM identified, the frequency of PPRM was 7.9%, 211(23.3%) were delivered by cesarean section, chorioamnionitis was reported in 140 (15.5%) of the cases and its frequency was more among gestational age group (28-30 weeks), ($P = 0.001$). Most common morbidity among neonates was respiratory distress syndrome 85(9.4%), followed by neonatal sepsis 77(8.5%), and seizure 71(7.8%). The results revealed that 147(16.2%) of neonates developed hypoglycemia, 130(14.3%) hyperglycemia, and 571(63%) hyperbilirubinemia). The occurrence of these complications was more frequently among group of 34-36 weeks gestational age, ($P = 0.0001$). Death rate was 5.3%, with increasing gestational age survival increased to 99.6% at 34-36 weeks of gestation ($P = 0.0001$).

The study results imply that early PPRM is associated with higher rates of perinatal morbidity and mortality.

Keywords- PPRM; Chorioamnionitis; Feto-aterenal outcome.

INTRODUCTION

Preterm premature rupture of membrane (PPROM) is defined as rupture of the fetal membranes with leakage of amniotic fluid occurring before the onset of regular uterine activity prior to 37 completed weeks of gestation. PPRM is a serious complication of pregnancy, occurring in approximately 3-4% of all deliveries.¹ It is one of the leading identifiable causes of prematurity and is responsible for approximately 30% of all preterm deliveries.¹ PPRM is associated with significant perinatal morbidity and mortality that decreases with advancing gestational age at delivery.²

PPROM is multifactorial in nature.^{3,4} Choriodecidual infection or inflammation may cause preterm PROM. A decrease in the collagen content of the membranes has been suggested to predispose patients to pre term PROM.^{4,5} Other risk factors include black patients, lower socioeconomic status smokers, a history of sexually transmitted infections, previous preterm delivery, vaginal bleeding, or uterine distension (e.g., polyhydramnios, multifetal pregnancy). Procedures that may

result in PPRM include cerclage and amniocentesis.⁴

PPROM is associated with an increased risk of serious maternal, fetal, and neonatal morbidities, especially the risks of preterm delivery, and infectious complications, such as respiratory distress syndrome, neonatal sepsis, necrotizing enterocolitis, intraventricular hemorrhage, and periventricular leukomalacia and varying degrees of hypoplasia and bronchopulmonary dysplasia.^{6,9}

Several studies have implicated oligohydramnios in patients with PPRM as a significant risk factor for perinatal infection, and fetal distress, cesarean delivery, and neonatal death.⁵

Maternal complications include intraamniotic infection, which occurs in 13%- 60% of women with PROM, placental abruption, and postpartum endometritis⁸ and increased risk of caesarean section are noted.¹⁰

Management of PROM requires an accurate diagnosis as well as evaluation of the risks and benefits of continued pregnancy or expeditious delivery. An understanding of gestational age-dependent neonatal morbidity and mortality



is important in determining the potential benefits of conservative management of preterm PROM at any gestation. Where possible, the treatment of pregnancies complicated by PROM remote from term should be directed towards conserving the pregnancy and reducing perinatal morbidity due to prematurity while monitoring closely for evidence of infection, placental abruption, labor, or fetal compromise due to umbilical cord compression.¹¹

The objectives of the present study were to determine the frequency of PPROM among pregnant women at Eben Sena Hospital in Sirte and to study neonatal and maternal outcomes.

MATERIALS AND METHODS

The present study was prospective longitudinal type, conducted in the Department of Obstetrics and Gynecology at EbenSena Hospital in Sirte. It was included all (906) patients from January 2012 to December 2014, who presented with preterm premature rupture of membrane before 37 completed weeks of gestation. The women were divided into 3 groups according to gestational age [GA], group 1 PPROM (28-30 week) (n=132), group 2 PPROM (31-33 weeks of GA) (n=278) and group 3 PPROM (34-36 weeks of GA) (n=496). Collected data was included age, parity, social status of patients, duration of leaking, past medical and obstetric history.

PPROM were confirmed if on speculum examination, there was amniotic fluid seen draining through the cervical OS. All patients with PPROM were put on conservative management if no signs of infection were present and active management was done if any sign of infection was present.

Maternal and fetal status was closely monitored for development of chorioamnionitis, labour or fetal complications. The criteria for maternal infection was temperature $>38^{\circ}\text{C}$ with one or more of the following signs, uterine tenderness, fetal or maternal tachycardia or foul smelling amniotic fluid draining per vaginum in absence of any obvious reason for elevated temperature.

If infection was identified, delivery was expedited and the use of broad-spectrum antibiotics was initiated. Administration of Betamethasone 12 mg intramuscularly (2 doses 24 hours apart) for pregnancies less than 34 weeks was recommended.

Maternal and neonatal outcomes were recorded including maternal infection morbidity (endometrium or chorioamnionitis) and major neonatal morbidities (respiratory distress syndrome (RDS), necrotizing enter colitis (NEC), neonatal sepsis (NNS), Pneumonitis, seizure, meningitis) and biochemical complication which include hypoglycemia, hyperglycemia, hyperbilirubinemia, and hyponatremia.

The data were analyzed by descriptive statistics using the statistical package for social science version 16 and the results expressed in descriptive statistics by simple percentages. A *Chi-square* test was used for categorical variables, and a *P* value <0.05 considered as significant.

RESULTS

Among 11400 women delivered during the period of the study, 906 women with PPROM identified, the frequency of PPROM was 7.9%, out of which 132(14.6%) cases were between 28-30 weeks, 278(30.6%) between 31-33 weeks and 496(54.7%) were between 34-36 weeks. In this study, maximum number of women was between 21-37years. The results showed that 695 (76.7%) of cases had normal vaginal delivery (NVD), while 211(23.3%) were delivered by cesarean section (CS), and there was no instrumental delivery. There was a significant difference between mode of delivery and gestational age ($P = 0.0001$), (Table 1).

Table 1: Mode of delivery according to gestational age

Gestational age	NVD No. (%)	CS No. (%)	Total No. (%)
28-30	78 (59.1%)	54 (40.9%)	132(100%)
31-33	227 (99.6%)	51 (18.3%)	278(100%)
34-36	390 (78.6%)	106 (21.3%)	496(100%)
Total	695(76.7%)	211(23.3%)	906 (100%)

Out of 906 cases, 140 (15.5%) women had maternal complication in the form of chorioamnionitis and its frequency was more among gestational age group (28-30 weeks), $P = 0.0001$ (Table 2).

Table 2: Maternal morbidity (chorioamnionitis) in relation to gestational age

Gestational age	Chorioamnionitis	No Chorioamnionitis	Total
28-30	78 (59.1%)	54 (40.9%)	132(100%)
31-33	27 (9.7%)	251 (90.3%)	278(100%)
34-36	35 (7.1%)	461 (92.9%)	496(100%)
Total	140 (15.5%)	766(84.5%)	906 (100%)

Among 906 neonates most common morbidity was respiratory distress syndrome(RDS) in 85(9.4%), followed by neonatal sepsis (NNS) in 77(8.5%), seizure in 71(7.8%), while pneumonia, necrotizing enterocolitis (NEC), and meningitis, were 2.3%, 2%, 0.8% respectively (Figure 1).

Most of neonatal morbidities were found at 28-30 weeks gestational age. RDS in 71(53.8%), seizure in 65(49.2%), sepsis in 51(38.6%), necrotizing enterocolitis in 14(10.6%), pneumonia in 12(9%), meningitis in 2(1.5%) babies. While at 34-36weeks, respiratory distress syndromein3 (0.6%), neonatal sepsis in 8(1.6%), seizure in 1(0.2%), no pneumonia and meningitis, $P = 0.0001$ (Figure 1).



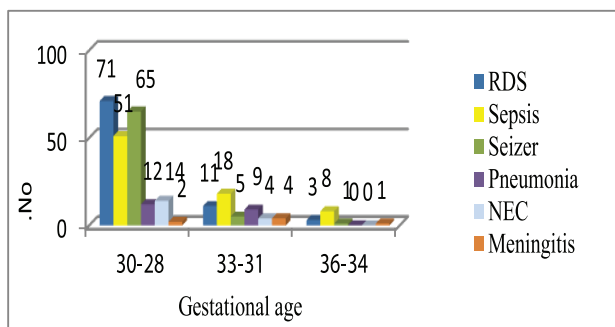


Figure 1: Distribution of neonatal morbidity according to gestational age

Regarding Biochemical complications, results revealed that among 906 neonates, 147(16.2%) of neonate developed hypoglycemia, 130(14.3%) hyperglycemia, 571(63%) hyperbilirubinemia and hyponatremia was reported in 178(19.6%) neonates (Figure 2).

The occurrence of these complications was more frequently among group of 34-36 weeks gestational age, $P = 0.0001$ (Figure 2).

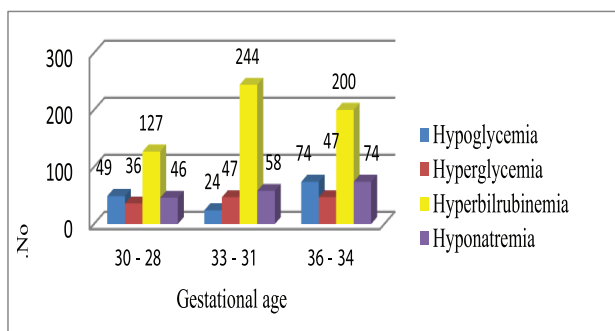


Figure 2: Distribution of biochemical complications according to gestational age.

In this study there were 858(94.7%) alive births and 48(5.3%) were deaths. Maximum neonatal death were in babies belonging to 28-30 weeks of gestation but with increasing gestational age survival increased to 99.6% at 34-36 weeks of gestation, $P = 0.0001$ (Figure 3).

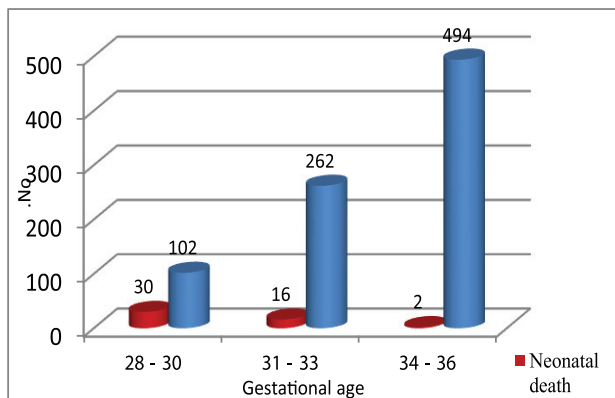


Figure 3: Neonatal outcomes according to gestational age

DISCUSSION

PPROM evaluation and management are important for improving neonatal outcomes. Accurate diagnosis of PPRM requires a thorough history, physical examination and laboratory studies. These would allow for gestational age specific obstetric interventions to optimize perinatal outcome and reduce fetomaternal complications.¹²

The frequency of PPRM in present study was 7.9%. This was higher than that reported by Idrisa et al⁸ (3.2%), Okeke et al¹² (3.3%), and Shukla et al² (1.8%); it is mainly because the EbenSena Hospital was referred center; but it is comparable to range of 3-8% as reported by Egarter *et al.*¹³

Hocq et al¹⁴ study reported that infection is a common complication of PPRM, the clinical chorioamnionitis rate was 30%, but in present study, chorioamnionitis reported in 15.5% of the cases. This finding was consistent with the results of Linehan et al.¹⁵

Cesarean section rate in the current study was 23.3%, when comparing with other studies it lower than that reported by D'souza et al¹⁶ (36%) and by Tavassoli et al¹⁷ (32%).

When PROM occurs, too early, surviving neonates may develop sequelae such as malpresentation, cord compression, oligohydramnios, necrotizing enterocolitis, neurologic impairment, intraventricular hemorrhage, and respiratory distress syndrome.⁴

Early PPRM were at significantly higher risk of adverse outcomes during neonatal period, even the neonatal death rate was higher among those delivered following early PPRM compared with late PPRM (22.7% vs 0.4%). Although the incidence of neonatal complication is high, but comparable to that documented by Elimian et al¹⁸ and Dexter et al.¹⁹

Our results revealed that most of neonatal morbidities were reported among 28-30 weeks gestation, mainly RDS (53.8%), seizure (49.2%), and sepsis (38.6%), in agreement with Shukla et al study².

And RDS was the commonest neonatal complication and it is around 9% at all gestation which equally to result founded by Lieman et al²⁰ and significantly higher among pregnancies delivered at 33 weeks or less. Despite this, high neonatal complication maybe related more closely to the effect of premature birth and sophistication of newborn care unit.

CONCLUSION

PPROM is major complication of pregnancies and an important cause of perinatal mortality and morbidity along with maternal morbidity. Several areas of controversies exist regarding the best approach of management of PPRM. The management of pregnancies complicated with PPRM is individualized, highly controversial, and challenging. Management of PPRM varies according to the gestational age of the fetus, expectant management and immediate delivery are the two potential options in these patients, and each has its own merit and demerits.



REFERENCES

1. Kacerovsky M, Musilova I, Andrys C, Drahosova M, Hornychova H, Rezac A et al. (2014) Oligohydramnios in women with preterm prelabor rupture of membranes and adverse pregnancy and neonatal outcomes, *PLoSOne* **9**(8), e105882.
2. Shukla P, Bhargava M and Disha. (2014) Study of maternal and fetal outcome in preterm premature rupture of Membrane. *Journal of Evolution of Medical and Dental Sciences* **3**(7), 1789-1795.
3. Zanardo V, Vedovato S, Cosmi E, Litta P, Cavallin F, Trevisanuto D, et al. (2010) Preterm premature rupture of membranes, chorioamnion inflammatory scores and neonatal respiratory outcome, *BJOG* **117**, 94-98
4. Medina TM and Hill DA (2006) Preterm premature rupture of membranes: Diagnosis and management, *Am FamPhysician* **73**(4), 659-664.
5. Borna S, Borna H, Khazardoost S and Hantoushzadeh S. (2004) 'Perinatal outcome in preterm premature rupture of membranes with Amniotic fluid index < 5 (AFI< 5), *BMC Pregnancy Childbirth* **4**(1), 15.
6. Riyami NA, Shezawi FA, Al-Ruheli L, Al-Dughaishi T and Al-Khabori M. (2013) Perinatal outcome in pregnancies with extreme preterm premature rupture of membranes (Mid-Trimester PROM), *Sultan Qaboos Univ Med J.* **13**, 51-56.
7. Bouchghoul, H., Kayem, G., Schmitz, T. Benachi A, Sentilhes L, Dussaux C, et al. (2019) Outpatient versus inpatient care for preterm premature rupture of membranes before 34 weeks of gestation, *Sci Rep* **9**, 4280.
8. Idrisa A, Pius S and Bukar M. (2019) Maternal and neonatal outcomes in premature rupture of membranes at University of Maiduguri Teaching Hospital, Maiduguri, NorthEastern Nigeria, *Trop J ObstetGynaecol* **36**, 1520.
9. Goldenberg RL, Culhane JF, Iams JD and Romero R. (2008) Epidemiology and causes of preterm birth, *Lancet* **371**(9606), 75-84.
10. Stuart EL, Evans GS, Lin YS and Powers HJ. (2005) Reduced collagen and ascorbic acid concentrations and increased proteolytic susceptibility with prelabor fetal membrane rupture in women, *BiolReprod* **72**, 230-235.
11. Mercer BM. (2003) Preterm premature rupture of the membranes, *ObstetGynecol.* **101**(1), 178-193.
12. Okeke TC, Enwereji JO, Okoro OS, Adiri CO, Ezugwu EC, and Agu PU. (2014) The incidence and management outcome of preterm premature rupture of membranes (PPROM) in a Tertiary Hospital in Nigeria, *American Journal of Clinical Medicine Research* **2**(1), 14-17.
13. Egarter C, Leitich H, Karas H, Wieser F, Hussiein P, Kader A, et al. (1996) Antibiotic treatment in preterm premature rupture of membranes and neonatal morbidity: a meta analysis, *Am J ObstetGynecol.* **174**, 589-597.
14. Hocq C, Van Grambezen B, Bernard P and Debauche C. (2017) Impact of gestational age at PPRM on the short-term outcome of children born after extreme and prolonged preterm prelabor rupture of membranes in an experienced care center, *SIGNAVITAE* **13**(2), 63-70
15. Linehan, L.A., Walsh J, Morris A, Kenny L, O'Donoghue K, Dempsey E, et al. (2016) Neonatal and maternal outcomes following midtrimester preterm premature rupture of the membranes: a retrospective cohort study, *BMC Pregnancy Childbirth* **16**, 25.
16. D'souza A, Walia M, Gupta G, Samuel C, Katumalla F and Goyal S. (2017) Feto-maternal outcome in pregnancies with preterm premature rupture of membranes: a tertiary hospital experience, *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* **4**(5), 1529-1533.
17. Tavassoli F, Ghasemi M, Mohamadzade A and Sharifian J. (2010) Survey of pregnancy outcome in preterm premature rupture of membranes with amniotic fluid index < 5 and ≥ 5, *Oman Med J.* **25**(2), 118-123.
18. Elimian A, Verma U, Beneck D, Cipriano R, Visintainer P and Tejani N. (2000) Histologic chorioamnionitis, antenatal steroids and perinatal outcomes, *ObstetGynecol.* **96**, 333-336.
19. Dexter SC, Pinar H, Malee MP and Hogan J, Carpenter MW, and Vohr BR. (2000) Outcome of very low birth weight infants with histopathologic chorioamnionitis, *Obstet Gynecol.* **96**, 172-177.
20. Lieman JM, Brunfield GG, Carlo W and Ramsey PS. (2005) Preterm premature rupture of membranes: Is there an optimal gestational age for delivery?, *Obstetrics and Gynecology* **105**(1), 12-17.

