Interventions and Neonatal Outcomes in Patients with Premature Rupture of Fetal Membranes at and Beyond 34 Weeks Gestational Age at a Tertiary Health Facility in Nigeria

Adetunji O. Adeniji1* and Oluseyi O. A. Atanda2

1Department of Obstetrics and Gynaecology, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.  
2Department of Obstetrics and Gynaecology, Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Nigeria.

Authors’ contributions

This work was carried out in collaboration between all authors. Authors AOA and OOAA designed the study, wrote the protocol and performed the statistical analysis. Author OOAA wrote the first draft and managed the literature searches. Final manuscript was written by author AOA. Both authors read and approved the final manuscript.

ABSTRACT

Aims: To compare the neonatal outcome in patients with PROM at and beyond 34 weeks, who had expectant management and progressed to spontaneous labour and those who had induction of labour.

Study Design: Retrospective study of patients presenting with PROM at and beyond 34 weeks gestation over a 3 year period.

Place and Duration of Study: Department of Obstetrics and Gynaecology, Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Nigeria, between July 2007 and June 2010.

Methodology: Case files of 92 patients with PROM and live, singleton fetuses, at and beyond 34 weeks gestation, in the study period, were retrieved from the hospital Health Records Department, collated and analyzed. Data collected included parity, estimated...
gestational age (EGA) at PROM, latency period (time interval from PROM to onset of labour), intervention following PROM, eventual mode of delivery and neonatal outcome.

**Results:** A total of 2340 deliveries were recorded in the study period and 92 cases of PROM were on record for the period. However, only 74 PROM cases were included in the study, due to incomplete information. Incidence of PROM was therefore 3.9%. Length of latency period had a direct influence on the number of patients that went into spontaneous labour \( (P = 0.012) \) and subsequent vaginal delivery \( (P = 0.021) \). Induction of labour did not increase rate of caesarean section \( (P = 0.449) \) and had no effect on neonatal outcome \( (P = 0.239) \).

**Conclusion:** Acceptable approach for the management of PROM at and beyond 34 weeks would be expectant management for the 1st 24 hours and induction of labor afterwards in patients who have not progressed into spontaneous labour. Expectant management in the extended latency period in the late preterm PROM group is associated with increased NICU admission \( \text{OR} 7.33, 95\% \text{ C.I} 2.45 – 21.98 \); however, this did not affect duration of NICU stay or neonatal mortality.

**Keywords:** Term PROM; Late preterm PROM; latency period.

**ABBREVIATIONS**

PROM= Premature/Prelabour Rupture of Fetal membranes; SVD= Spontaneous Vaginal Delivery; EGA= Estimated Gestational Age; CS= Caesarean Section; FSB= Fresh Still Birth; ENND = Early Neonatal Death; NICU= Neonatal Intensive Care Unit.

**DEFINITIONS**

Latency Period: Time interval from PROM to onset of labor; Extended Latency Period: Latency interval greater than 48 hours; Late preterm PROM: PROM occurring at estimated gestational age of 34 - 36 weeks and 6 days; Term PROM: PROM occurring at 37 weeks and beyond.

**1. INTRODUCTION**

As a part of natural process of delivery, the rupture of fetal membrane occurs, but if this preceded the onset of labor, it is termed Premature Rupture of Membranes (PROM). PROM occurs in 5-10% of deliveries [1]. Labour is a sequence of coordinated uterine contractions that results in effacement and dilatation of the cervix and voluntary bearing-down efforts leading to the expulsion per vagina of the products of conception [2]. In normal labor, there appears to be a time-dependent relationship between these sequences of events [1]. When rupture of fetal membranes is followed by spontaneous onset of labor within 2 hours, it is regarded as part of the physiologic process of labor. At term, activation of catabolic enzymes, such as collagenase and mechanical forces result in ruptured of fetal membranes. Preterm PROM occurs probably due to the same mechanisms and the premature early activation of these pathways, possibly linked to inflammation and/or infection of the membranes [2]. Therefore, PROM is associated with problems such as increase in the rate of induction of labor, fetal distress, fetal and maternal infection, caesarean section and its complications, longer hospitalization duration and patient's increased expenses [1]. There are controversies regarding the management of PROM and eventual neonatal outcome. [1,3]. While, there seems to be to a unified position on management of term PROM, with
weight of evidence in support of delivery, opinions are diverse across professional groups from countries to countries on management processes for preterm PROM. In Canada and Australia, surveys had shown lack of consensus on management of cases with PROM occurring between gestational ages of 34 and 37 weeks [4,5]. While the American College of Obstetricians and Gynecologists recommends IOL at 34 weeks [1], the Royal College of Obstetricians and Gynaecologists guidelines was rather circumspect, recommending that delivery at this gestational age should be considered, but less specific on the process of delivery [6]. In Nigeria, no guideline exists for the management of these groups of patients and apart from this fact, reports, on this condition is also scarce. This study aims to determine the incidence of PROM in the study population, determine the rate of caesarean section in cases with PROM and the effect/s of latency period (time lag between PROM and onset of labour) and intervention modalities on the eventual mode of delivery and also to evaluate relationship between neonatal outcome, mode of delivery and latency period.

2. MATERIALS AND METHODS

This is a 3 years retrospective study of cases of premature rupture of fetal membrane at Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Nigeria. Case files of patients with PROM with singleton, live fetuses, at and beyond 34 weeks, managed in the hospital between July 2007 and June 2010, were retrieved from the hospital Health Records Department, collated and analyzed. Diagnoses of PROM were from history of fluid drainage per vaginam, direct visualisation of egress of fluid from cervical os at sterile speculum vaginal examination and determination of fluid pH. High vaginal swab was taken from each patient and analyzed for microscopy, culture and sensitivity. Prophylactic antibiotics (IV Erythromycin 250 mg 6 hourly) were initiated in cases with latency period beyond 12 hours. All cases of PROM were managed expectantly first 24 hours and labour induction with either oxytocin or misoprostol instituted as indicated thereafter. The institution ethical committee approved the study (LTH/EC/07/02-21/10). PROM occurring with non-cephalic presentation, multiple gestation and intra-uterine fetal death were excluded. Data collected included parity, estimated gestational age (EGA) at PROM, latency period (time interval from PROM to onset of labor), intervention following PROM, eventual mode of delivery and neonatal outcome. Late preterm PROM is defined as PROM occurring at estimated gestational age of 34 - 36 weeks and 6 days, while term PROM is PROM occurring at 37 weeks and beyond.

These were analyzed using Statistical Package for Social Sciences version 16 (SPSS Inc, Chicago, IL, USA). Analyses are expressed as Frequency, Mean and Chi-square test for comparison. Level of significance was set at p<0.05.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 2340 deliveries were recorded in the period of the study. Ninety-two cases were on record as cases of PROM managed; however, only 74 case notes with complete information for computation and analysis were eventually included in the study. This gives a case retrieval rate of 80.4%. The incidence of PROM in the studied population was therefore 3.9%.

Of the cases analyzed, 40 patients (54.1%) were multipara, 18 (24.3%) were primiparous and 16 (21.6%) were nulliparous women. The mean maternal age and parity of all patients
analyzed were 28.6 ± 2.4 and 2.03 ± 1.60 respectively. The mean estimated gestational age (EGA) was 37.9 ± 2.4. Majority (48/74) of the patients (64.9%) had term PROM, while 26 (35.1%) out of the 74 patients were in the late preterm PROM group (Table 1).

Table 1. Maternal age, parity & birth weight distribution in the study groups

| Factors             | 34 – <37 Weeks (n = 26) | ≥ 37 Weeks (n = 48) | † X²/t test | p-value (95% C.I.) |
|---------------------|-------------------------|--------------------|-------------|--------------------|
| Maternal age, years (mean (SD)) | 28.4 (2.6) | 28.7 (2.7) | †10.499 | 0.620** (0.01 – 0.76) |
| Parity              |                         |                    |             |                    |
| Nulliparous         | 2                       | 14                 | †4.697      | 0.096**            |
| Primiparous         | 8                       | 10                 |             |                    |
| Multiparous         | 16                      | 24                 |             |                    |
| Birth weight, grams (SD) | 2235 (328) | 2365 (354) | ††1.583 | 0.118**            |

Forty-four patients (59.5%) were managed conservatively on the ward and subsequently developed spontaneous labour, while 22 patients (29.7%) had induction of labour with oxytocin and 8 patients (10.8%) had oral misoprostol for labour induction. Fifty-six patients (75.7%) ended up having spontaneous vaginal delivery (SVD) while 18 (24.3%) patients had caesarean section (CS). Thus, incidence of CS in the study was 24.3%. Seventy (94.6%) neonates were delivered alive, while 4 (5.4%) were cases of fresh still birth (FSB). No case of early neonatal death (ENND) was recorded till time of discharge of these neonates. However, 35 (47.3%) of the babies delivered were admitted to NICU, mostly on account of low birth weight or presumed neonatal sepsis. Prophylactic use of antibiotics was 89.2% among the patients (66 patients).

Table 2 showed that more patients in the term PROM group were in labour within 24 hours of latency period (79.2% vs. 46.2%). These proportions rose to 93.8% and 77% in both term and late preterm PROM groups respectively, within 48 hours latency period (p = 0.012).

Table 2. Relationship between EGA and latency period in the groups

| EGA groups   | Latency period  | X² | p-value (95% C.I.) |
|--------------|-----------------|----|--------------------|
|              | 0 - 24 hrs (%) | >24 - 48 hrs (%) | >48 Hrs - 7 days (%) |                  |
| 34 - <37 weeks | 12 (46.2) | 8 (30.8) | 6 (23.0) | 8.826 | 0.012* (0.01 – 0.76) |
| n = 26       |                |            |            |        |                    |
| ≥37 weeks    | 38 (79.2) | 7 (14.6) | 3 (6.2) |                  |
| n = 48       |                |            |            |        |                    |

Incidence of vaginal delivery within 48 hours latency period in the term PROM group was significantly higher (92.5%), in contrast to 68.8% in the preterm group (p = 0.021).

Though, the incidence of caesarean delivery was highest in the late preterm PROM group in the latency period beyond 48 hours, when compared with term PROM group (70% vs. 25%), the distribution across the latency period groups was not statistically significant (p = 0.449). In the 18 patients who were delivered by caesarean section, indications were co-existing
maternal hypertension 3 (16.7%), previous caesarean delivery 1 (5.6%), fetal distress 6 (33.3%), severe oligohydraminos 4 (22.2%) and no indication recorded in 4 (22.2%).

Fetal outcomes between the groups were similar, with the live birth rates of 23/26 (88.5%) and 47/48 (97.9%) and still birth rates of 3/26 (11.5%) and 1/48 (2.1%), in the preterm and term PROM groups respectively (p=0.239). However, Table 3 showed NICU admissions were significantly more (20/26) in the late preterm PROM group, in contrast to the term PROM group (15/48), (OR = 7.33, 95% C.I 2.45 – 21.98). The major indications for NICU admission in the late preterm PROM group prematurity, birth weight below 2500grams and low Apgar score, while it was majorly presumed neonatal sepsis in the term PROM group (p = 0.043). Neonatal sepsis was confirmed by positive blood culture in 5/12 (41.7%) of the admitted neonates (1 – Term PROM, 4 preterm PROM respectively). Four of the neonates were from mothers who also had chorioamnionitis. The duration of NICU admission was however comparable in both groups.

### Table 3. Incidence & factors of NICU admissions

| NICU admission | 34 -<37 weeks | ≥37 weeks | $\chi^2$ test | p-value (95% C.I) |
|---------------|--------------|----------|--------------|------------------|
| No            | 6 (23.1)     | 33 (68.7)| †14.113      | 0.0002*          |
| Yes           | 20 (76.9)    | 15 (31.3)|             | (0.178 – 0.621)  |

Indications for NICU admission

|            | 34 -<37 weeks | ≥37 weeks | $\chi^2$ test | p-value (95% C.I) |
|------------|--------------|----------|--------------|------------------|
| Prematurity| 5            | 1        | †8.121       | 0.043*           |
| Low birth weight (<2500grams) | 6 | 2 | †1.414 | 0.167 (-4.147 - 0.747) |
| Birth Asphyxia (Apgar score < 7 @ 5 minutes) | 6 | 3 | †1.414 | 0.167 (-4.147 - 0.747) |
| Presumed Neonatal sepsis | 3 | 9 | †8.121 | 0.043 (0.01 – 0.458) |
| Duration of NICU admission, mean (SD) | 5.6 (3.3) | 7.3 (3.8) | †1.414 | 0.167 (-4.147 - 0.747) |

* = statistically significant

Recorded maternal complications was mainly chorioamnionitis in 4/74 (5.4%) patients in extended latency period of greater than 48 hours - one (term PROM) and three (preterm PROM) respectively. (OR = 0.16, 95% C.I 0.02 – 1.66). The relationship between Intervention modalities and prevalence of caesarean delivery as shown in Table 4 indicated that there is no statistical difference (p = 0.267) between the various intervention modalities and occurrence of CS. The CS rates in the 3 intervention groups were comparable.

### Table 4. Relationship between intervention modalities and mode of delivery

| Intervention modalities | Mode of delivery | X$^2$ | p-value |
|-------------------------|------------------|-------|---------|
|                         | SVD (%)          | CS (%)|         |
| Conservative management | 36 (81.8)        | 8 (18.2)|         |
| Oxytocin Induction      | 14 (63.6)        | 8 (36.4)| 2.636 0.619** |
| Misoprostol Induction   | 6 (75)           | 2 (25) |         |

** = not statistically significant
4. DISCUSSION

In this study, the incidence of PROM at 34 weeks and beyond was 3.9% which is lower than reports of 5 – 10% from most studies [1,3,7]. However, wider variations do exist, as an incidence of 2-18% had also been reported [8]. With inclusion of preterm PROM, an incidence of 2.5% had been previously reported in our environment [9]. The incidence of 3.9% in this study may therefore not be out of place considering these wide variations. The low incidence can also be explained by the relatively low number of deliveries compared with other studies with from institutions with high patients’ attendance. In this study, more than 60% of the study population presented with term PROM compared with 35% of the patients presenting with late preterm PROM. This distribution is similar to other studies [1,10,11].

The mean maternal age, parity and birth weights in both groups studied were similar. This eliminated confounding influences of these factors on the outcome of this study. Our finding suggested lower incidence of PROM in the nulliparous than in the multiparous patients. This is similar to report of Eslamian and Asadi [12], though other reports had also shown higher incidences in multiparous patients [1,13].

In this study, all patients were initially managed conservatively in anticipation of spontaneous labour and vaginal delivery. Labour inductions, with either oxytocin or misoprostol were initiated when latency period extended beyond 24 hours. This expectant management allowed for substantial proportion in the two groups to progress into spontaneous labor. The proportions were 79.2% and 46.2% in the first 24 hours in the term and late preterm PROM groups respectively. These finding are similar to reports from other studies [1,3,10,11,14]. In the late preterm PROM group, though proportion of spontaneous labor increased with the latency period, this was lower when compared with the term PROM group. At 48 hours, 77% of patients in late preterm PROM group were in spontaneous labour as against over 90% in the term PROM group. The expected higher concentration of endogenous prostaglandins in the choriodecidual space in term PROM might be the factor in this circumstance [15,16]. Consequently, longer latency period further increased the chances of spontaneous vaginal delivery in both groups. This supports conclusions of studies which have suggested expectant management as an acceptable management option for PROM at and beyond 34 weeks [1,2,3,11]. It is however noted from our study that it appeared that expectant management confers more benefit to the late preterm PROM group, when latency period extends from 24 hours to 48 hours, than in term PROM towards achieving spontaneous labour. However, the extended latency period beyond 48 hours was associated with increased caesarean section in the group. Also, cases of chorioamnionitis diagnosed amongst patients in this study occurred in patients in the extended latency period, which would warrant caution in taking clinical decision for extended latency period in expectant management protocol. However in this study, it could not be possible to assess for known predisposing risk factors for infections.

The various intervention modalities in this study were not associated with increased caesarean section. The incidence of caesarean section in the study was 24.3% and this conforms to the overall caesarean section rate in our institution. Most studies have also reported that intervention modality alone, does not increase caesarean section rate following PROM [10,12,17,18]. Some other studies have reported a lower CS rate with oxytocin induction [19] while some have reported a higher CS rate [20].

In this study, prophylactic antibiotic was used in 89.2% of patients which is supported by published reports emphasizing role of antibiotics in management of PROM [21,22]. This may
have contributed to the low occurrence of chorioamnionitis (5.4%), still births (5.4%) and no occurrence of early neonatal deaths recorded in this study. Our findings and findings from other studies [10,23] indicated that intervention modality had no direct influence on neonatal outcome. Induction of labour may shorten the length of hospital stay but there is insufficient evidence to suggest that it is harmful or beneficial for the baby [24]. However, expectant management in both groups and more importantly in the extended latency period of the late preterm PROM group increased NICU admission. This can be explained by the fact that some of the neonates were admitted on account of prematurity, low birth weight, or in the term PROM group, majorly for presumed neonatal sepsis following prolonged latency period. Our institution’s neonatal care protocol prescribe NICU admission, at least for close monitoring and evaluation in cases of prolonged rupture of fetal membranes. Neonatal sepsis was confirmed in 5/12 neonates admitted into NICU, four of whom were from mothers diagnosed with chorioamnionitis and all of whom had latency period above four days. This further supports the reported association of prolonged latency period with infectious morbidities [25]. However, the overall neonatal outcome was still favourable. Expectant management in this study increased length of hospital stay, from both the latency period and NICU admission, but without untoward adverse neonatal outcome. Shorter hospital stay with induction of labour compared with expectant management have been reported, however no difference in neonatal outcome was established [17,23]. Some studies have reported that expectant management increases neonatal morbidity [18–21]. These studies were of small sample sizes and prophylactic antibiotics were not routinely used. In more recent studies [PPROMEXIL and PPROMEXIL-2], it was reported that induction of labour did not significantly reduce the incidence of neonatal sepsis or improve pregnancy outcome compared with expectant management in late preterm PROM [26,27], which also was justified by the findings in our study.

5. CONCLUSION

This study has shown that expectant management increases chances of spontaneous onset of labour and vaginal delivery, though increasing the length of hospital stay. Induction of labour, however does not increase rate of CS. Expectant management, in the extended latency period in the late preterm PROM group is associated with increased risk of chorioamnionitis in the mother and NICU admission in the neonates. However, this did not affect duration of NICU stay or neonatal mortality. It can be suggested that an acceptable management plan should be expectant management in the 1st 24 hours in carefully selected patients and subsequent induction of labour thereafter if spontaneous labour has not commenced. This approach might save the patients the cost from hasty intervention without any added benefits in the 1st 24 hours following PROM.

CONSENT

Not applicable.

ETHICAL APPROVAL

Institution ethical approval was obtained for the study and privacy of all patients in the study were protected.
ACKNOWLEDGEMENTS

Special thanks to all Colleagues whose patients were reviewed towards this publication and resident Doctors involved in the management of these patients.

COMPETING INTERESTS

The authors report no conflicts of interest in this work.

REFERENCES

1. ACOG Practice Bulletin No. 80: premature rupture of membranes. Clinical management guidelines for Obstetrician-Gynecologists. Obstet Gynecol. 2007 Apr; 109(4):1007-19. PMID: 17400872. Available: http://dx.doi.org/10.1097/01.aog.0000263888.69178.1f.

2. DeCherney, Alan H, Nathan, Lauren. Current Obstetric & Gynecological Diagnosis & Treatment. 9th ed. New York: McGraw-Hill; 2003.

3. Hannah ME, Ohlsson A, Farine D, Hewson SA, Hodnett ED, Myhr TL, et al. Induction of Labor Compared with Expectant Management for Prolabour Rupture of the Membranes at Term (TERM PROM study). New England Journal of Medicine, 1996; 334(16), 1005-1010. PMID: 8598837. Available: http://dx.doi.org/10.1056/NEJM199604183341601.

4. Smith G, Rafuse C, Anand N, Brennan B, Connors G, et al. Prevalence, management, and outcomes of Preterm Prolabour rupture of the Membranes of Women in Canada. J Obstet Gynaecol Can. 2005;27:547–553. PMID: 16100631.

5. Buchanan S, Crowther C, Morris J. Preterm Prolabour Rupture of the Membranes: A survey of Current Practice. Aust N Z J Obstet Gynaecol. 2004;44:400–403. PMID: 15387859. Available: http://dx.doi.org/10.1111/j.1479-828x.2004.00256.x.

6. Royal College of obstetricians and Gynaecologists. () Preterm Prolabour Rupture of Membranes. Guideline No. 44. 2006. Accessed 04/04/2013. Available: http://www.rcog.org.uk/files/rcog-corp/uploaded_files/gt44pretermprelabourrupture2006.pdf.

7. Semczuk-Sikora A, Sawulicka-Oleszczuk H, Semczuk M. Management in Premature Rupture of Membranes (PROM) at term- own experiences Ginekol Pol. 2001;72(10):756-64.

8. Merenstein GB, Weisman LE. Premature rupture of the membranes: Neonatal consequences. Semin Perinatatol. Oct 1996;20(5):375-80. Available: http://dx.doi.org/10.1016/S0146-0005(96)80004-8.

9. Obi SN, Ozumba BC. Pre-term premature rupture of fetal membranes: The dilemma of management in a developing nation. J Obstet Gynaecol. January 2007;27(1):37–40. PMID: 17365456. Available: http://dx.doi.org/10.1080/01443610601016875.

10. Dreyfus M, Baldauf JJ, Boesinger F, Tissier I, Andrianivo J, Lehmann M, Ritter J. [Premature rupture of membranes at term. Retrospective study of 88 cases]. [Article in French] Rev Fr Gynecol Obstet. 1995 May-Jun; 90(5-6):275-80. PMID: 7569588.

11. Jazayeri A, Galan H, Suzanne T. Premature rupture of membranes. emedicine. 2006. Available: http://www.emedicine.com/med/topic3246.htm.

12. Eslamian L, Asadi M. The Caesarean section rate in cases with Premature Rupture of Membranes (PROM) at 36th week of pregnancy or later. Acta Medica Iranica. 2002;40(2):83-87.
13. Zamzami TY. Prelabour rupture of membranes at term in low-risk women: induce or wait. Arch Gynecol Obstet. 2006 Feb; 273 (5): 278 – 82. PMid: 16208479. Available: http://dx.doi.org/10.1007/s00404-005-0072-4.

14. Omole-Ohonsi A, Ashimi A, Adeleke S. Spontaneous Pre-Labour Rupture of Membranes at Term: Immediate versus Delayed Induction of Labour. West Africa Journal of Medicine. 2009;28(3):156–160.

15. Wing DA, Paul RH. A comparison of differing dosing regimens of vaginally administered misoprostol for pre induction cervical ripening and labour induction. Am J Obstet Gynaecol. 1990;180:1155–1160. Available: http://dx.doi.org/10.1016/S0002-9378(99)70610-1.

16. Ferguson JE, Head BH, Frank FH, Frank ML, Singer JS, Stefos T, et al. Misoprostol versus low dose oxytocin for cervical ripening: A prospective, randomized, double mask trial. Am. J. Obstet Gynaecol. 2002;187:273–80. PMid: 12193911. Available: http://dx.doi.org/10.1067/mob.2002.126202.

17. Mozurkewich EL, Wolf FM. Premature rupture of membranes at term: a meta-analysis of three management schemes. Obstetrics & Gynecology. 1997;89(6):1035-1043.

18. Fabiana da Graça Krupa, José Guilherme Cecatti, Fernanda Garanhani de Castro Surita, Helaine Maria Besteti Pires Milanze, Mary Ângela Parpinelli. Misoprostol versus expectant management in premature rupture of membranes at term. BJOG. 2005;112(9):1284–1290. Available: http://dx.doi.org/10.1111/j.1471-0528.2005.00700.x.

19. Akyol D, Mungan T, Unsal A, Yuksel K. Prelabour Rupture of the Membranes at Term-No advantage of Delaying Induction for 24 Hours. Australia and NZ Journal of Obstetrics & Gynecology. 1999;39(3):291-295. Available: http://dx.doi.org/10.1111/j.1479-828X.1999.tb03399.x.

20. Tan BP, Hannah ME. Oxytocin for prelabour rupture of membranes at or near term (Cochrane Review). In: The Cochrane Library, No. 2, Oxford: Update Software; 2001.

21. Ehrenberg HM, Mercer BM. Antibiotics and the management of preterm premature rupture of the fetal membranes. Clinical Perinatology; 2001;28:807–818. Available: http://dx.doi.org/10.1016/S0095-5108(03)00079-4.

22. Passos F, Cardoso K, Coelho AM, Graça A, Clode N, Mendes da Graça L. Antibiotic prophylaxis in premature rupture of membranes at term: a randomized controlled trial. Obstet Gynecol. 2012 Nov;120(5):1045-51. Available: doi:http://10.1097/AOG.

23. Dare MR, Middleton P, Crowther CA, Flenady VJ, Varatharaju B. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane Database Syst Rev. 2006 Jan 25;(1):CD005302. PMid: 16437525.

24. Hartling L, Chari R, Friesen C, Vandermeer B, Lacaze-Masmonteil T. A systematic review of intentional delivery in women with preterm prelabor rupture of membranes. J Matern Fetal Neonatal Med. 2006 Mar;19(3):177-87. Available: http://dx.doi.org/10.1080/14767050500451470. PMid:16690512.

25. Lau J, Magee F, Qiu Z, Hoube J, Von Dadelszen P, et al. Chorioamnionitis with a fetal inflammatory response is associated with higher neonatal mortality, morbidity, and resource use than chorioamnionitis displaying a maternal inflammatory response only. Am J Obstet Gynecol. 2005; 193:708–713. PMid: 16150264. Available: http://dx.doi.org/10.1016/j.ajog.2005.01.017.
26. van der Ham DP, van der Heyden JL, Opmeer BC, Mulder AL, Moonen RM, van Beek JH, et al. Management of late-preterm premature rupture of membranes: the PPROMEXIL-2 trial. Am J Obstet Gynecol. 2012 Oct;207(4):276.e1-10. doi: 10.1016/j.ajog.2012.07.024. Epub 2012 Jul 20. Available: http://dx.doi.org/10.1016/j.ajog.2012.07.024.

27. van der Ham DP, Vijgen SM, Nijhuis JG, van Beek JJ, Opmeer BC, Mulder AL, et al. PPROMEXIL trial group. Induction of labor versus expectant management in women with preterm prelabor rupture of membranes between 34 and 37 weeks: a randomized controlled trial. PLoS Med. 2012; 9(4):e1001208. doi: 10.1371/journal.pmed.1001208. Epub 2012 Apr 24. Available: http://dx.doi.org/10.1371/journal.pmed.1001208.

© 2013 Adeniji and Atanda: This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=205&id=12&aid=1274