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Outcome of Early and Late Induction of Labour in Premature Rupture of Membranes

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ABSTRACT

Objective: To determine the frequency of early and late labour induction in premature rupture of membranes and compare their outcome.

Study Design: Cross sectional study.

Place and Duration of Study: Department of Obstetrics & Gynaecology, Combined Military Hospital, Rawalpindi Pakistan, from Jan-Dec 2021.

Methodology: One hundred and sixty-four pregnant women aged 18-35 years, with uncomplicated pregnancies at gestational age ≥37 weeks to ≤40 weeks with premature rupture of membranes, were included. All primigravida and multiparous with previous normal vaginal deliveries were selected. Patients were selected with reactive CTG, adequate pelvis, clear liquor and vertex presentation. Induction of labour achieved with cervical Prostaglandin E2. Labour was monitored accordingly.

Results: Seventy-four women (45%) presented (and got induction of labour) within 12 hours of premature rupture of membranes (early induction of labour), while 90(55%) fell under late induction of labour. 35(21%) were delivered by instrumental vaginal delivery, while 31(19%) were delivered by caesarian section. The most common indication of the caesarian section was fetal distress (36%), followed by poor progress of labour (32%). Patients with early induction of labour witnessed less chorioamnionitis (7% vs 18%) and post-partum haemorrhage (8% vs 13%). Likewise, with early induction of labour incidence of neonatal sepsis was less (3% vs 10%) with limited poor APGARs at birth (3% vs 12%). No early neonatal death was observed in 164 cases.

Conclusion: For women with term premature rupture of membranes, earlier induction of labour results in lower maternal and fetal morbidity.

Keywords: Cesarean section, Chorioamnionitis, Induction of labour, Neonatal sepsis, Premature rupture of membranes, Term gestation.

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INTRODUCTION

Premature (pre-labour) rupture of membranes (PROM) is an established entity in obstetric practice. It refers to the loss of integrity of fetal membranes prior to the onset of clinically apparent labour contractions.[1] It has a multifactorial etiology.[2] It happens in approximately 5–10% of pregnancies, of which 80% are at term.[3,4]

Approximately 60–70 % of term PROM cases are followed by the onset of labour within 24 hours.[5,6] It has been linked to various maternal complications, including neonatal septicemia. Common maternal complications include chorioamnionitis, pelvic abscess, sepsis and post-partum haemorrhage (PPH).[7] In order to avoid such complications, recent clinical trials support immediate induction of labour (IOL) once PROM is confirmed, after due consideration of gestational age and obstetric status.[8]

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Few published national data exist evaluating the timing of induction of labour in term-PROM in accordance with pregnancy outcomes, and a limited number of studies define the accurate window of induction in such patients.[9] Thus, the rationale behind this study is to assess the outcome of premature rupture of membranes in terms of the timing of induction of labour. Earlier studies considered IOL after 24 hours as late IOL, while in this study, categorization of late IOL will be restricted to 12-24 hours of PROM.[10] The feto-maternal outcomes will dictate formulating the most appropriate guidelines to narrow the window for the timing of labour induction. Earlier labour induction can lead to a shorter hospital stay and cost-effective medical care in resource-depleted health system, with minimal adverse maternal and fetal complications.

METHODOLOGY

This cross sectional study was carried out at the Department of Obstetrics & Gynaecology, Combined Military Hospital, Rawalpindi Pakistan, from January

to December 2021 after the permission from the Ethical Review Committee (IERB certificate number 208/3 /22). The sample size was calculated using the WHO sample size calculator, taking a confidence level of 95%, a margin of error of 5%, reported prevalence of 87.9%.[3] The estimated sample size came out to be 164 patients. Patients were selected by non-probability consecutive sampling.

Inclusion Criteria: Women aged 18 to 35 years with uncomplicated pregnancies and gestational age of ≥37 weeks to ≤40 weeks with PROM were selected were included in the study.

Exclusion Criteria: Women with complicated pregnancies with comorbid, including pregnancy-induced hypertension, preeclampsia, gestational diabetes, chorioamnionitis or intrauterine growth restriction (on ultrasonography), were excluded. Likewise, patients with absent liquor (on ultrasonography) or multiple pregnancies were not considered for the study.

The selected patients were primigravida to Para 4, with a history of previous normal vaginal deliveries in multiparous. In addition, all considered cases had clear liquor, reactive CTG, and adequate pelvis (on clinical assessment) with vertex presentation (on ultrasonography).

Patients were categorized into two groups in terms of timing of induction of labour–early, where induction of labour was offered within 12 hours of PROM, whereas induction of labour after 12-24 hours of PROM was labelled as late. PROM was confirmed by performing a sterile per speculum examination for evident pooling of amniotic fluid in the posterior vaginal fornix, further reassuring by direct visualization of fluid leakage from the cervical canal with cough reflex. Induction of labour was achieved through cervical Prostaglandin E2. Labour was monitored for progress and fetal well-being. Post-partum haemorrhage (PPH) was considered as >500ml of blood loss within 24 hours of delivery. Maternal fever was taken as temperature recorded as >100.4°F (38°C), while CRP >6mg/L was taken as maternal sepsis. Regarding neonatal complications, an APGAR score of <7 at 5 minutes was marked as poor, and CRP >6mg/L was considered sepsis.[11] The mode of delivery with maternal and fetal complications was documented on a structured proforma.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 23.00 and MS Excel 2016 software. Mean±SD were calculated for continuous variables. Frequency and percentage were calculated for categorical variables. The Chi-square test was used. The *p*-value ≤0.05 was considered significant.

RESULTS

One hundred and sixty-four pregnant women were included in the study. 74 women (45%) presented (and got induction) within 12 hours of PROM–designated as early IOL, whereas 90(55%) women got late IOL (Table-I).

Table-I: Mode of delivery (n=164)

Mode of Delivery	Timing of IOL		*p*-value
	Early IOL(n=74)	Late IOL(n=90)	
Spontaneous vaginal delivery	61(83%)	37(41%)	0.04
Instrumental vaginal delivery	7(9%)	28(31%)	0.02
Lower segment caesarian section	6(8%)	25(28%)	0.02

Ninety-eight women (60%) had spontaneous vaginal delivery. In 35 cases (21%), delivery was achieved by instrumental vaginal delivery, while in 31(19%) cases delivered by lower segment caesarian section (LSCS). With early labour induction, 6(8%) cases were delivered by the lower segment caesarian section, contrary to 25(28%) caesarian sections in the late induction Group (Table-II).

Table-II: Indications for Lower Segment Caesarian Section (n=31)

Indications	n(%)
Fetal distress	11(35%)
Poor progress of labour	10(32%)
Meconium	7(23%)
Others	3(10%)

The most common indication of LSCS was fetal distress, as noted in 11(35%) patients, followed by poor progress of labour in 10(32%) cases, while the meconiumstained amniotic fluid was in 7(23%). Clinical chorioamnionitis was recognized in 21(13%) casesas evident from maternal fever/raised CRP. PPH was noted in 18(11%) cases. Neonatal sepsis was identified in 11(7%) new-borns, while poor APGARs were observed in 13(8%) newborns. However, no early neonatal death (ENND) was observed. Table-III depicted the fre-quency of maternal complications in the two groups. At the same time, Table-IV showed the early and late induction of labour (IOL) in terms of fetal complications.

Table-III: Association of Maternal Complications with Early with Late Induction of Labour (IOL) (n=164)

Maternal Complications		Timing of IOL		*p*-value
		Early IOL (n=74)	Late IOL (n=90)	
Chorioamnionitis	Yes	5 (7%)	16 (18%)	0.03
	No	69 (93%)	74 (82%)	
Post-partum hemorrhage	Yes	6 (8%)	12 (13%)	0.28
	No	68 (92%)	78 (87%)	

Table-IV: Association of Fetal Complications with Early and Late Induction of Labour (IOL) (n=164)

Fetal Complications		Timing of Induction of Labour		*p*-value
		Early-IOL (n=74)	Late-IOL (n=90)	
Poor APGAR Score	Yes	2 (3%)	11 (12%)	0.02
	No	72 (97%)	79 (88%)	
Neonatal sepsis	Yes	2 (3%)	9 (10%)	0.06
	No	72 (97%)	81 (90%)	
Early Neonatal Death (ENND)	Yes	-	-	-
	No	74 (100%)	90 (100%)	

DISCUSSION

We carried out this study to investigate the maternal and fetal outcomes of the term PROM in terms of the timing of induction of labour. Early induction of labour meant that the induction of labour was offered within 12 hours of PROM. On the contrary, late induction of labour signified that the induction of labour was achieved after 12-24 hours of PROM. One hundred sixty-four women of PROM at term with an uncomplicated pregnancy were enrolled on our study. A comprehensive evaluation was meant to identify any possible obstetric and medical complications and uncover any contraindication to vaginal delivery and labour induction achieved with cervical Prostaglandin E2. 45%(74) of 164 cases presented (and got induction) within 12 hours of PROM–designated as early induction of labour, while 55%(90) got late induction. Kehl *et al.* reported an average induction-to-delivery interval of 16 hours.[11]

21%(35) were delivered by instrumental vaginal delivery, 19%(31) were delivered by LSCS, and 98 (60%) were delivered by spontaneous vaginal delivery. Six of the observed 31 caesarian sections were carried out in the early induction cohort (caesarian rate of 8%). While carrying out a study in Haryana, India, Nath showed a lower segment caesarean section rate of 10% in early IOL in PROM, while a rate of 18% with late induction of labour (after 24 hours).[3] Another study documented the caesarian section in 21.9%.[12]

The most common indication of lower segment caesarian section was fetal distress, as witnessed in 11(36%) cases, followed by poor progress of labour in 10 patients (32%) and meconium in 7(23%) mothers.

Clinical chorioamnionitis was evident in 13%(21 patients). PPH was noted in 11%(18 cases). Patients with early IOL witnessed less chorioamnionitis (7%) than those with late IOL (18%). Similarly, PPH was observed in 8% of cases with early IOL. This was much less than 13% of PPH in late induction. The maternal complications witnessed in another study with early IOL were PPH (10%), sepsis (10%) and fever (6%, contrary to 12% PPH, 6% sepsis and 2% fever in the late IOL-Group.[13]

Neonatal sepsis was identified in 7% of newborns, which meant 11 out of 164. Poor APGARs were observed in 8%(13) newborns. However, no ENND was observed in 164 cases. To further stratify, the rate of neonatal sepsis observed in mothers with late IOL was 10%, significantly higher than the 3% rate of neonatal sepsis in early induction. Likewise, 12% of newborns in the late IOL-Group witnessed poor APGARs at birth. This was higher than the 3% of newborns with poor APGARs with an early induction. Nath J had documented fetal complications with early IOL as poor APGARs (<7) in 16% and sepsis (4%), with no reported neonatal death or neonatal sepsis. One study recorded poor APGARs (<7) in 28% of the late IOL-Group, with 4% neonatal sepsis but no reported neonatal death.[14]

As the interval between rupture of the fetal membranes at term and delivery increases, so is the risk of fetal and maternal infection. Most recent guidelines recommend the induction of labour immediately after a term PROM.[15,16] All women with PROM and a viable fetus should receive intrapartum chemoprophylaxis to prevent vertical transmission and associated morbidity.[17,18]

Thus, the earlier the induction is achieved in PROM, the better the outcomes. This is reflected both in terms of maternal as well as fetal complications. The favourable outcomes can be achieved only after sensitizing pregnant women regarding timely reporting to the hospital with suspected leaking membranes. Timely induction will curtail morbidity and mortality and limit the costs and burden of our resource-depleted health system.

CONCLUSION

For women with term premature rupture of membranes, earlier induction of labour with cervical Prostaglandin E2 results in a lower risk of maternal infection than late induction. Similar favourable outcomes are noticed with

earlier induction in terms of neonatal sepsis. This directs us to recommend that for women with premature rupture of membranes at term, labour should be induced at the time of presentation, generally with Prostaglandin E2, to reduce the risk of chorioamnionitis and other related complications. Early induction of labour leads to better maternal and fetal outcomes.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AS & M: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

TM & US: Data acquisition, data analysis, drafting the manuscript, approval of the final version to be published.

AMT & HZ: Concept, critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Gahwagi MM, Busarira MO, Atia M. Premature rupture of membranes characteristics, determinants , and outcomes of in Benghazi, Libya. Open J Obstet Gynecol 2015; 5(9): 494–504. doi: 10.4236/ojog.2015.59072.
2. Grobman WA, Rice MM, Reddy UM, Tita ATN, Silver RM, Mallett G, et al. Labor induction versus expectant management in low-risk nulliparous women. N Engl J Med 2018; 379(6): 513-523. doi: 10.1056/NEJMoa1800566.
3. Nath J. A clinical study on expectant management versus induction of labour in term premature rupture of membranes (PROM). Obstet Gynecol Int J 2015; 5(3): 324-326. doi: 10.15406/ogij.2016.05.00156.
4. Hannah ME, Ohlsson A, Farine D, Hewson SA, Hodnett ED, Myhr TL, et al. Induction of labor compared with expectant management for prelabor rupture of the membranes at term. TERMPROM Study Group. N Engl J Med 1996; 334(16): 1005-1010. doi: 10.1056/NEJM1996 04183341601..
5. Khan S. Khan A. Study on preterm premature rupture of membrane with special reference to maternal and its fetal outcome. Int J Reprod Contracept Obstet Gynecol 2016; 5(8): 2768–2774. doi:10.18203/2320-1770.ijrcog20162663.
6. Sargunam PN, Bak LLM, Tan PC, Vallikkannu N, Azmi MAN, Zaidi SN, et al. Induction of labor compared to expectant management in term nulliparas with a latent phase of labor of more than 8 hours: a randomized trial. BMC Pregnancy Childbirth 2019; 19(1): 493. doi: 10.1186/s12884-019-2602-2.
7. Coates D, Makris A, Catling C, Henry A, Scarf V, Watts N, et al. A systematic scoping review of clinical indications for induction of labour. PLoS ONE 2020; 15(1): 1-42. doi: 10.121321371/journal.pone.0228196.
8. Wennerholm UB, Saltvedt S, Wessberg A, Alkmark M, Bergh C, Wendel SB, et al. Induction of labour at 41 weeks versus expectant management and induction of labour at 42 weeks (SWEdish Post-term Induction Study, SWEPIS): multicentre, open label, randomised, superiority trial. BMJ 2019; 367(6131): 1-13. doi: 10.1136/bmj.l6131.
9. Devillard E, Delabaere A, Rouzaire M, Pereira B, Accoceberry M, Houlle C, et al. Induction of labour in case of premature rupture of membranes at term with an unfavourable cervix: protocol for a randomised controlled trial comparing double balloon catheter (+oxytocin) and vaginal prostaglandin (RUBAPRO) treatments. BMJ Open 2019; 9(6): 1-7. doi: 10.1136/bmjopen-2018-026090.
10. Yang F, Huang S, Long Y, Huang L. Double-balloon versus single-balloon catheter for cervical ripening and labor induction: a systematic review and meta-analysis. J Obstet Gynaecol Res 2018; 44(1): 27-34. doi: 10.1111/jog.13551.
11. Kehl S, Weiss C, Dammer U, Baier F, Faschingbauer F, Beckmann MW, et al. Effect of premature rupture of membranes on induction of labor: a historical cohort study. Geburtshilfe Frauenheilkd 2017; 77(11): 1174-1181. doi: 10.1055/s-0043-121007.
12. Frederiks F, Lee S, Dekker G. Risk factors for failed induction in nulliparous women. J Matern Fetal Neonatal Med 2012; 25(12): 2479–2487. doi: 10.3109/14767058.2012.703718.
13. Gupta S, Malik S, Gupta S. Neonatal complications in women with premature rupture of membranes (PROM) at term and near term and its correlation with time lapsed since PROM to delivery. Trop Doct 2020; 50(1): 8-11.
14. Petronela RA, Sofia AM, Beatrix M, Cedric S, Luigi R, Martin M, et al. Safety and effectiveness of labour induction after caesarean section using balloon catheter or oxytocin. Swiss Med Wkly 2017; 147: 1-9. doi: 10.4414/smw.2017.14532.
15. Boskabadi H, Zakerihamidi M. Evaluation of maternal risk factors, delivery, and neonatal outcomes of premature rupture of membrane: a systematic review study. Pediatr Rev 2019; 7(2): 77–88. doi: 10.32598/jpr.7.2.77.
16. Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ, Gebreheat G, et al. Risk factors of premature rupture of membranes in public hospitals at Mekele city, Tigray, a case control study. BMC Pregnancy Childbirth 2018; 18(1): 386. doi: 10.1186/s12884-018-2016-6. Erratum in: BMC Pregnancy Childbirth 2020; 20(1): 28.
17. Eskicioglu F, Gur EB. Diagnostic modalities in premature rupture of membranes. Int J Womens Health 2015; 3(2): 89-92. doi 10.15296/ijwhr.2015.17.
18. Saccone G, Berghella V. Antibiotic prophylaxis for term or near-term premature rupture of membranes: metaanalysis of randomized trials. Am J Obstet Gynecol 2015; 212(5): 1-9. doi: 10.15296/ijwhr.2022.30.