

Induction Of Labour Compared With Expectant Management For Term Premature Rupture Of Membranes

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مقارنة بين استحثاث المخاض والتدبير الترقبي في حالات تمزق الأغشية المبكر عند تمام الحمل

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Received: October 04, 2025

Accepted: November 06, 2025

Published: November 25, 2025

Abstract:

Prolonged latency between term prelabor rupture of membranes (PROM) and delivery is associated with an elevated risk of both maternal and neonatal infectious morbidity. Approximately 8% of term pregnancies experience membrane rupture without the spontaneous onset of labor within the subsequent hours. Given the well-established correlation between extended rupture-to-delivery intervals and increased susceptibility to intra-amniotic and postpartum infections, early induction of labor has been advocated as a proactive management strategy to mitigate these risks for both mother and fetus. Conversely, some clinicians support expectant management in the absence of maternal or fetal compromise, citing evidence that spontaneous labor onset may reduce the likelihood of cesarean delivery. This study aims to evaluate the clinical utility of early labor induction in term PROM cases, specifically its effectiveness in reducing maternal and perinatal infectious complications and minimizing hospital length of stay, while ensuring that such intervention does not increase operative delivery rates.

Keywords: Rupture of Membrane, Maternal and Perinatal Infection, Delivery, Management.

الملخص

يرتبط ازدياد الفترة الزمنية بين تمزق الأغشية الجنينية في الحمل مكتمل النمو وبين الولادة بارتفاع خطر الإصابة بالعدوى لكل من الأم والجنين. ويُقدَّر أن نحو 8% من حالات الحمل عند تمام المدة يحدث فيها تمزق للأغشية دون أن يبدأ المخاض تلقائيًا خلال الساعات اللاحقة. ونظرًا للعلاقة الموثقة بين إطالة الفترة الفاصلة بين تمزق الأغشية والولادة وزيادة احتمالية حدوث العدوى داخل الرحم أو بعد الولادة، فقد تم اقتراح التحريض المبكر للمخاض كخيار علاجي وقائي للحد من هذه المخاطر لدى الأم والجنين. وعلى الجانب الآخر، يرى بعض الممارسين أن الانتظار حتى يبدأ المخاض تلقائيًا هو الخيار الأمثل في حال عدم وجود مؤشرات على حدوث مضاعفات لدى الأم أو الجنين، استنادًا إلى دلائل تشير إلى أن هذا النهج قد يقلل احتمالية اللجوء إلى الولادة القيصرية. يهدف هذا البحث إلى تقييم الجدوى السريرية للتحريض المبكر للمخاض في حالات تمزق الأغشية عند تمام الحمل، من خلال دراسة دوره في الحد من مخاطر العدوى لدى الأم والمولود وتقليل مدة البقاء في المستشفى، مع التأكد من عدم زيادة معدلات التدخلات الجراحية المصاحبة للولادة.

الكلمات المفتاحية: تمزق الأغشية، العدوى الأمومية والجنينية، الولادة، التدبير العلاجي.

Introduction

Premature rupture of membranes (PROM), defined as the spontaneous rupture of the fetal membranes before the onset of uterine contractions at or beyond 37 weeks of gestation, constitutes a major clinical concern in modern obstetric practice. Despite extensive advances in prenatal care, PROM continues to affect approximately 3% of pregnancies, yet it contributes disproportionately, nearly one-third, to the global burden of preterm deliveries [1]. The condition is clinically significant not only because

it disrupts the natural sequence of labor but also due to its association with a broad spectrum of maternal and neonatal complications. From a maternal standpoint, PROM can precipitate ascending intrauterine infections such as chorioamnionitis and postpartum endometritis, with the risk of these complications increasing approximately fivefold when membrane rupture persists beyond 24 hours. The prolonged exposure of the uterine environment following rupture enhances bacterial colonization and may trigger a systemic inflammatory response, further complicating maternal outcomes.

Women who experience PROM before term are particularly susceptible to complications such as chorioamnionitis and placental abruption. Diagnostic approaches range from sterile speculum examination, nitrazine testing, and the fern test to more recent developments, including Amnisure and Actim assays. Despite these options, there is still a clear need for diagnostic tools that are faster, non-invasive, and more accurate. Clinicians responsible for managing pregnancies complicated by PROM have a critical role in mitigating risks and ensuring optimal outcomes [2, 3].

The primary clinical dilemma following term PROM is the choice between immediate induction of labour (IOL) and expectant management (EM), where spontaneous labour is waited for a period. Comprehensive knowledge of possible complications and appropriate management strategies is essential. Current clinical practice is shaped by a robust evidence base derived from randomised controlled trials and systematic reviews [4]. The pivotal Term PROM multicentre trial demonstrated that initiating labour promptly significantly lowers the incidence of maternal infectious complications, particularly chorioamnionitis, as well as neonatal infection, when compared with an expectant approach, without a corresponding rise in caesarean birth rates [5]. These results have been repeatedly affirmed by later comprehensive reviews, including a Cochrane analysis that similarly concluded that IOL confers a clear reduction in serious infectious outcomes for both mothers and infants [6].

Additional support originates from the PPROMEXIL study, which, despite focusing on late preterm PROM, identified a higher risk of neonatal sepsis among women managed expectantly, reinforcing concerns regarding delays in delivery [7]. In light of this accumulated evidence, contemporary obstetric guidelines now strongly endorse IOL as the preferred management strategy for term PROM. Recent evaluations continue to validate its superior safety profile, emphasizing reduced infectious morbidity without an increase in operative delivery rates [8]. Overall, the literature consistently supports induction over expectant management to optimize maternal and neonatal outcomes. The main goal of this study is to fine out the effect of active management of tem PROM regarding maternal and fetal outcome comparing to expectant management strategy in the City of Khoms in Libya.

Material and methods

Study description

This research was carried out in the Obstetrics and Gynecology Department of Al-Khums Medical Center in Libya. Two hundred women who admitted to Department of Obstetrics and Gynecology were participated in this study. They were diagnosed as PROM at term the diagnosis based on maternal history and sterile speculum examination, the women were randomly allocated into two groups. 100 cases were managed actively by induction of labor PGE2 gel or oxytocin (active group) and the other 100 patients were managed expectantly (conservative group) with 55 of them were received prophylaxis antibiotic. According to the department protocol, routine investigation includes CBC, blood group, serum urea and creatinine, random blood sugar, CTG monitoring and vital signs observation were carried out for all women.

Risk Factor

Although the precise etiology of premature rupture of membranes (PROM) remains incompletely understood, several maternal, fetal, and environmental factors have been consistently associated with an increased likelihood of its occurrence. In many cases, PROM appears to be multifactorial, arising from interactions between infectious, mechanical, and biochemical influences; however, the condition may also manifest in the absence of any identifiable risk factor [4].

▪ Maternal and Genital Tract Infections:

Lower genital tract infections, such as bacterial vaginosis, sexually transmitted infections, and urinary tract infections, are among the most strongly implicated contributors to PROM. These infections

may induce inflammatory responses that weaken the chorioamniotic membranes through enzymatic degradation of collagen and connective tissue integrity.

- **Cigarette Smoking:**

Maternal smoking during pregnancy is consistently associated with PROM. Tobacco exposure leads to reduced membrane strength, impaired vascularization, and increased oxidative stress, all of which may predispose to premature rupture.

- **Prior PROM:**

A history of PROM in a previous pregnancy significantly heightens the risk of recurrence, suggesting a potential underlying predisposition related to membrane biology, cervical structure, or persistent behavioral and environmental factors.

- **Hydramnios (Polyhydramnios):**

An excessive volume of amniotic fluid (exceeding 2000 mL) increases intra-amniotic pressure and places mechanical stress on the membranes, thereby elevating the likelihood of rupture.

- **Multiple Gestations:**

Twin and higher-order pregnancies impose greater uterine distension and mechanical tension on the amniotic membranes, increasing the probability of PROM relative to singleton gestations.

- **Invasive Obstetric Procedures:**

Procedures such as amniocentesis or fetal blood sampling carry an inherent risk of iatrogenic membrane rupture, particularly when technically challenging or performed in the presence of low membrane resilience.

- **Cervical Insufficiency:**

A structurally weak or prematurely dilated cervix may fail to support the pregnancy adequately, resulting in increased membrane exposure and susceptibility to mechanical rupture.

- **Socioeconomic Factors:**

Low socioeconomic status is indirectly associated with PROM, likely mediated through limited access to prenatal care, higher infection rates, nutritional deficiencies, and increased prevalence of high-risk behaviors.

PROM remains a multifaceted obstetric condition with significant implications for maternal and neonatal health. Although its exact pathophysiology is not fully elucidated, the evidence highlights a complex interplay of infectious, mechanical, behavioral, and socioeconomic determinants that may compromise the structural integrity of the fetal membranes. Maternal genital tract infections, cigarette smoking, previous PROM, hydramnios, multiple gestations, invasive obstetric procedures, cervical insufficiency, and low socioeconomic status are among the most consistently identified contributors. Nevertheless, PROM frequently occurs without any apparent risk factor, underscoring the limitations of current understanding and the need for continued research. Recognizing these risk factors is essential for early identification of vulnerable pregnancies, implementation of targeted preventive strategies, and optimization of prenatal care. Comprehensive clinical assessment and timely intervention can substantially reduce adverse outcomes and improve both maternal and neonatal prognoses. Ultimately, a deeper understanding of the underlying mechanisms of PROM will enhance clinical management and contribute to improved reproductive health outcomes worldwide.

Clinical Assessment

Accurate and timely diagnosis of premature rupture of membranes (PROM) is essential, as subsequent clinical decisions and interventions depend heavily on diagnostic certainty. Misdiagnosis may expose the mother and fetus to unnecessary procedures, elevating the risk of infectious morbidity, obstetric interventions, and adverse neonatal outcomes.

- **History:**

Assessment begins with a detailed maternal history. Women with PROM typically report a sudden “gush of fluid” or continuous leakage from the vagina. Clarifying the onset, quantity, color, odor, and persistence of fluid loss is critical, as these characteristics help differentiate amniotic fluid from urine or physiological vaginal secretions.

- **Physical Examination:**

Confirmation of PROM is optimally achieved through sterile speculum examination after the patient has rested in a supine position for 20–30 minutes to enhance visualization. The presence of amniotic fluid pooling in the posterior vaginal fornix, either spontaneously or following gentle fundal pressure, strongly supports the diagnosis. Importantly, digital vaginal examination should be strictly avoided unless labor is clearly established, as it significantly increases the risk of ascending infections such as chorioamnionitis, postpartum endometritis, and neonatal sepsis. Limiting digital examinations preserves membrane sterility and reduces neonatal exposure to potentially pathogenic organisms.

- **Basic Bedside and Ancillary Tests:**

Given the potential consequences of either over- or under-diagnosing PROM, several adjunctive diagnostic tests may be utilized to improve accuracy:

- **Nitrazine Test:** Assesses the pH of vaginal fluid. Amniotic fluid, being more alkaline, causes the nitrazine paper to turn blue; however, false positives may occur in the presence of blood, semen, or infection.
- **Ferning Test:** Microscopic examination of dried vaginal fluid may reveal a characteristic “ferning” crystallization pattern indicative of amniotic fluid.
- **Specialized Biochemical Assays:** Modern immunoassays detecting placental alpha-microglobulin-1 (PAMG-1) or insulin-like growth factor binding protein-1 (IGFBP-1) provide high diagnostic sensitivity and specificity and are increasingly used as confirmatory tools.
- **Ultrasound Examination:** Although not diagnostic by itself, ultrasound can support the clinical impression by demonstrating decreased amniotic fluid volume (oligohydramnios), especially in cases where fluid leakage is intermittent or unclear.

Collectively, a combination of detailed history, careful physical examination, and appropriate use of bedside or specialized tests ensures a more accurate diagnosis of PROM, thereby guiding optimal maternal and fetal management.

Complication

The immediate complications associated with rupture of membranes include an increased likelihood of abnormal fetal presentation, umbilical cord prolapse, cord compression, and placental abruption, all of which pose significant risks to fetal well-being. Over time, the persistence of membrane rupture further elevates the risk of both maternal and neonatal infections. Notably, approximately 15–25% of pregnant women are asymptomatic carriers of Group B Streptococcus (GBS). Without appropriate intrapartum antibiotic prophylaxis, an estimated 1 in 200 neonates born to these untreated carriers will develop early-onset GBS sepsis [7]. Ascending maternal colonization facilitates intrauterine fetal infection, while fetal aspiration of contaminated amniotic fluid may result in severe outcomes, including stillbirth, neonatal pneumonia, or systemic neonatal sepsis.

Procedure

The Women were divided into two groups: **Group A** one hundred patients who had Expectant management and the criterion for expectant management includes: GBS negative status, Normal CTG, No signs infection, and Commitment to 4 hourly maternal temperature, evaluation of vaginal loss and assessment of fetal well-being.

Whereas **Group B** one hundred patients, who had Active management. Vaginal examinations should be minimized, especially during the latent phase of labor. If the total length of ROM is expected to exceed 18 hours, or any other risk factor streptococcal infection is present, prophylactic antibiotics.

Results and discussion

A total of 200 women were included in this research, 100 were involved in Group A as an expectant management, 55 of them were received prophylaxis antibiotic. In Group B 100 women were enrolled as an expectant management. Comparisons between the two groups were made in terms of Distribution of parity, Admission to NICU, Five minutes Apgar score and Mode of delivery.

Distribution of parity

Comparison between active management group (group A) and expectant management group (group B) regarding distribution of parity is shown in Table 1. The most of women in both groups were prime gravid (PG), where 42% of women in active management and 28% in expectant management and as an increase in parity PROM presentation was less.

Table 1: Comparison between active management and expectant management groups regarding distribution of parity.

Parity	PG	P1	P2	P3	P4	P5	P6	P7	P8	P9
Group A %	42	10	16	10	6	6	3	4	2	1
Group b %	28	20	25	20	3	3	1	-	-	-

Distribution of parity

In this study we also compared between the two groups of management with respect to babies who need admission to Neonatal Intensive Care Unit (NICU). As can be seen in Figure 1, 10 cases in expectant management (group A) were admitted to NICU compared to only 8 cases for the active management (group B). Therefore, there was no considerable variation between the groups regarding admission to NICU, which was a similar to [3] finding.

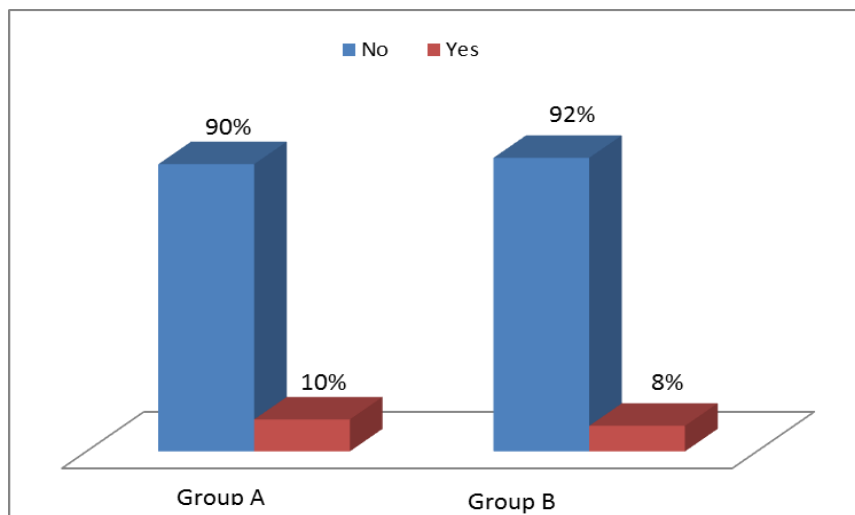


Figure 1: Admission to NICU for expectant management (group A) and active management (group B)

Five minutes Apgar score

The Apgar score taken at five minutes after birth is used to assess how well a newborn is adjusting to life outside the womb. A total score between 7 and 10 indicates that the infant is in good health and normal. Scores ranging from 4 to 6 suggest moderate concerns and may require closer monitoring, while scores from 0 to 3 are considered critically low and often signal the need for immediate medical intervention or resuscitation [4].

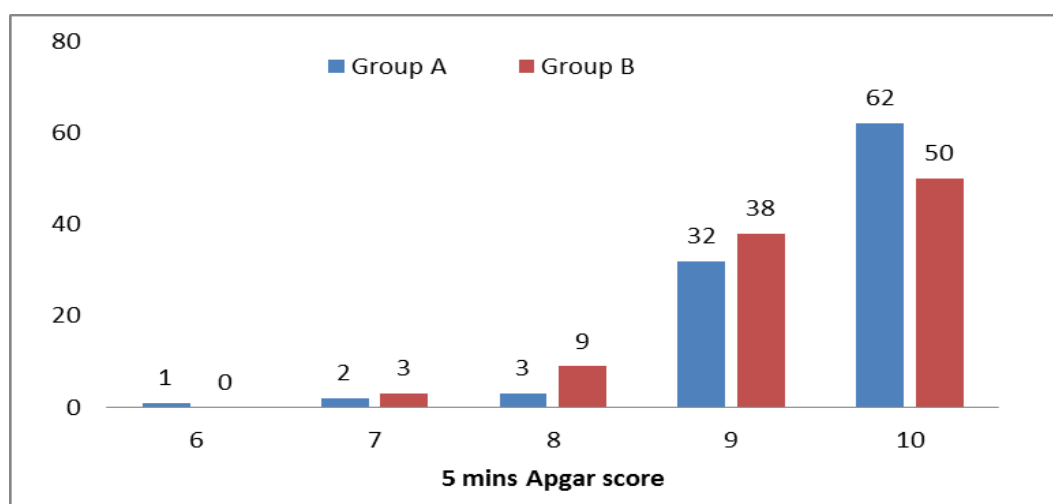


Figure 2: 5 mins Apgar score for expectant management and active management groups.

Figure 2 shows the early assessment of fetal outcome for the two groups of managements. Babies of the two groups were adapted well outside to womb and they were in a good health, except one infant who had neonatal sepsis among the expectant group. So, there was no significant difference between the two groups concerning the five minutes Apgar score.

Mode of delivery

The mode of delivery can be normal vaginal (NV) or caesarean section (CS) delivery. The preferred delivery mode is NV since the CS is associated with increased chances of postpartum endometritis. As can be seen in Figure 3, 96 % in expectant management (Group A) and 92% in active management (Group B) of all births occurred via normal vaginal delivery. Among women who were delivered 4% in Group A underwent a caesarean section, compared to 8% in Group B. As a result, the difference between the two groups regarding the mode of delivery was not significant.

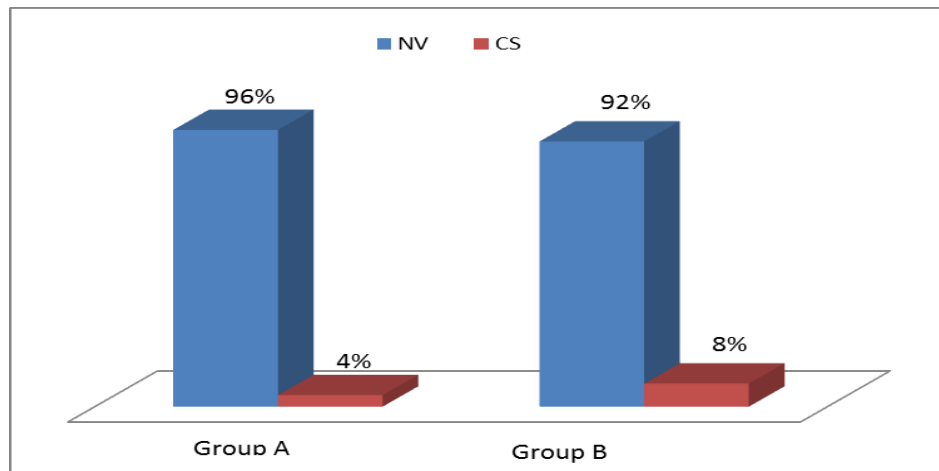


Figure 3: Comparison between study groups regarding mode of delivery

Conclusion

Premature rupture of membranes (PROM) continues to represent a critical obstetric challenge due to its strong association with adverse maternal and neonatal outcomes. In the present investigation, 200 pregnant women presenting with PROM were systematically evaluated and stratified into two management pathways: expectant management (Group A) and active induction of labor (Group B). The comparative findings underscore that the management of PROM is complex, and no single approach can be universally endorsed for all clinical scenarios. The outcomes observed reveal that expectant management may be beneficial in carefully selected cases, particularly when maternal and fetal conditions are stable. This approach allows the spontaneous onset of labor, which may reduce the risk of unnecessary operative deliveries and associated maternal morbidity. However, prolonged latency carries well-documented risks, including ascending intrauterine infection, chorioamnionitis, postpartum endometritis, neonatal sepsis, and other infection-related morbidities. These risks become more pronounced as the duration between membrane rupture and delivery extends. Conversely, active management, typically through early induction of labor, demonstrated advantages in terms of reducing the latency period and consequently lowering the incidence of infectious complications. The earlier delivery in Group B was associated with decreased maternal and neonatal exposure to potential pathogens. Nevertheless, this approach is not without limitations. Induction of labor may increase the likelihood of failed induction, labor dystocia, and the need for instrumental or cesarean delivery, particularly in women with unfavorable cervical conditions.

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