

DIFFERENTIAL APPROACH TO LABOR MANAGEMENT IN WOMEN WITH PREMATURE RUPTURE OF MEMBRANES

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<https://doi.org/10.5281/zenodo.22847959>

Annotation. This article examines a differential approach to labor management in women with premature rupture of membranes. Particular attention is given to the assessment of gestational age, maternal and fetal condition, cervical maturity, characteristics of amniotic fluid, signs of infection, and the course of labor. The study highlights the importance of individualized obstetric decision-making in selecting expectant or active management strategies. The analysis demonstrates that comprehensive clinical assessment and timely selection of delivery tactics may contribute to improving maternal and neonatal outcomes, reducing unnecessary operative interventions, and optimizing the course of labor. The proposed approach emphasizes continuous monitoring of both mother and fetus and the timely identification of potential complications associated with premature rupture of membranes.

Keywords: Premature rupture of membranes, labor management, differential approach, obstetric management, gestational age, cervical maturity, fetal well-being, maternal condition, amniotic fluid, intrauterine infection.

Introduction

Premature rupture of membranes is one of the important problems in obstetric practice that can affect maternal and fetal health. This condition may occur at different stages of pregnancy, and its clinical course and pregnancy outcomes depend on factors such as gestational age, the general condition of the mother and fetus, and the risk of infection. Premature rupture of membranes may affect the course of labor, fetal condition, and perinatal outcomes. Therefore, proper monitoring of pregnant women with this condition and appropriate selection of labor management tactics are of great practical importance. In women with premature rupture of membranes, an individualized approach is important when selecting the appropriate labor management strategy. In this process, gestational age, the degree of cervical maturity, fetal heart rate, the condition of the amniotic fluid, signs of an infectious process in the mother, and the presence of labor activity should be assessed. Changes in these clinical indicators may influence the choice between expectant management and active delivery. Therefore, applying a differential approach based on a comprehensive assessment of the patient's clinical condition is important for ensuring maternal and fetal safety. The relevance of studying this issue is determined by the need to reduce complications associated with premature rupture of membranes, improve the management of labor, and achieve better perinatal outcomes. In this regard, improving the differential approach to labor management in women with premature rupture of membranes, taking into account their clinical condition, is considered one of the important areas of modern obstetric practice.

Relevance

Premature rupture of membranes is an important obstetric problem that may increase the risk of various maternal and fetal complications. The management of women with premature rupture of membranes requires consideration of gestational age, maternal and fetal condition, cervical maturity, and the risk of infection.

Therefore, selecting an appropriate and individualized approach to labor management is essential for reducing complications and improving perinatal outcomes. The relevance of this study is determined by the need to optimize obstetric management and improve the safety of both mother and fetus.

Aim

To evaluate a differential approach to labor management in women with premature rupture of membranes, taking into account gestational age, maternal and fetal clinical condition, cervical maturity, and other important obstetric indicators, and to determine the optimal management strategy for improving maternal and perinatal outcomes.

Main part

Premature rupture of membranes is an important obstetric condition that may significantly influence maternal and fetal outcomes. It is characterized by rupture of the fetal membranes before the onset of regular labor. The clinical presentation may vary depending on gestational age, duration of membrane rupture, and the general condition of the mother and fetus.

The most common clinical manifestation is the spontaneous leakage of amniotic fluid from the vagina. During the initial assessment, the time of membrane rupture, the amount and characteristics of the discharged fluid should be determined. Maternal body temperature, heart rate, blood pressure, uterine tone, and other clinical parameters should also be monitored.

Particular attention should be paid to signs that may indicate an infectious process.

Prolonged rupture of membranes may increase the risk of maternal and neonatal complications. Therefore, timely diagnosis and continuous clinical observation are essential.

Fetal well-being should be assessed by monitoring fetal heart rate and other appropriate indicators. Cardiotocography can provide important information about fetal cardiac activity and uterine contractions. Ultrasonographic examination may also be used to evaluate fetal condition and amniotic fluid volume. Assessment of cervical status is important when determining the appropriate labor management strategy. A comprehensive evaluation of these clinical parameters allows an individualized approach to each patient. Early recognition of unfavorable changes is particularly important for preventing serious complications.

Gestational age is one of the key factors determining the management strategy in women with premature rupture of membranes. The clinical approach may differ depending on the degree of fetal maturity and the potential risks associated with continuing pregnancy. When premature rupture of membranes occurs at an early gestational age, special attention should be given to fetal maturity and maternal and fetal safety. In such cases, continuous monitoring of the clinical condition is essential. Fetal heart rate, uterine activity, maternal temperature, and possible signs of infection should be assessed dynamically. As gestational age increases, the balance between expectant management and active delivery may change. However, gestational age should not be considered independently of other clinical parameters. The general condition of the mother, fetal well-being, cervical maturity, and duration of membrane rupture should also be taken into account.

Cervical assessment is particularly important when induction of labor is being considered. Fetal presentation and cardiac activity may also influence the choice of delivery strategy. If maternal or fetal complications develop, continuation of pregnancy may become inappropriate. In clinically stable patients, expectant management may be considered depending on the individual circumstances.

Comprehensive assessment of maternal and fetal condition is a fundamental component of labor management in women with premature rupture of membranes. Maternal condition should initially be evaluated through clinical examination and monitoring of vital signs. Body temperature, blood pressure, heart rate, and general well-being should be assessed regularly.

Particular attention should be given to clinical signs suggesting infection. Abdominal or uterine tenderness, abnormal-smelling amniotic fluid, and elevated body temperature may indicate the development of an infectious complication. Laboratory investigations may provide additional information when clinically indicated. Fetal condition should be evaluated primarily through monitoring of fetal heart rate. Cardiotocography can be used to assess fetal cardiac activity and uterine contractions. Ultrasonography may provide additional information regarding fetal presentation, fetal well-being, and amniotic fluid volume. The results of maternal and fetal assessments should be interpreted together rather than separately. Dynamic observation is particularly important because the clinical condition may change over time. If maternal or fetal status deteriorates, the previously selected management strategy should be reconsidered.

Conversely, stable clinical findings may support continued observation when appropriate.

This comprehensive approach allows clinicians to identify potential complications at an early stage. It also contributes to the selection of an individualized delivery strategy.

The decision between expectant management and active delivery in women with premature rupture of membranes should be individualized according to the clinical situation.

Expectant management involves close observation of the mother and fetus while assessing the development of labor and possible complications. During this period, maternal temperature, vital signs, fetal heart rate, and other relevant clinical indicators should be monitored regularly. The development of infection, fetal compromise, or progressive labor activity may require modification of the initial management plan. Active management, in contrast, involves measures aimed at initiating or facilitating delivery when clinically indicated.

The choice between these approaches should consider gestational age, maternal condition, fetal well-being, cervical maturity, and the duration of membrane rupture. The presence of maternal or fetal complications is an important factor in determining the need for active intervention. In clinically stable patients, continued observation may be considered when appropriate. However, prolonged observation should always be accompanied by careful monitoring for potential complications. The expected benefits and potential risks of each management strategy should be assessed individually. A differential approach helps avoid both unnecessary intervention and inappropriate delay of delivery. Clinical decisions should be based on the patient's current condition and changes observed during dynamic monitoring. If new risk factors emerge, the management strategy should be promptly reassessed.

A differential approach to labor management in women with premature rupture of membranes provides an opportunity to individualize obstetric care according to the clinical characteristics of each patient. The main factors considered include gestational age, maternal condition, fetal well-being, cervical maturity, and the duration of membrane rupture. The presence or absence of maternal infection is particularly important when determining the appropriate management strategy. Fetal heart rate and other indicators of fetal well-being should also be evaluated throughout the observation period. Cervical maturity may influence the feasibility and expected effectiveness of labor induction. The duration of the period between membrane rupture and delivery should also be taken into consideration because prolonged rupture may be associated with an increased risk of complications.

Comprehensive assessment of these parameters allows patients to be differentiated according to their individual clinical risks. Consequently, expectant management, active delivery, or other obstetric interventions can be selected according to the specific clinical situation. The principal objective of the differential approach is to maintain maternal and fetal safety while reducing the probability of adverse outcomes. Continuous monitoring is necessary because the patient's condition may change during labor management.

Any significant deterioration in maternal or fetal status should lead to reassessment of the selected strategy. Individualized clinical decision-making therefore represents an important principle of modern obstetric practice. Overall, a differential approach to labor management in women with premature rupture of membranes may contribute to more appropriate clinical decision-making and safer maternal and perinatal outcomes.

Results

The study evaluated the clinical outcomes of women with premature rupture of membranes using a differential approach to labor management. A total of 120 pregnant women were included in the analysis and divided into two groups according to the selected management strategy. The main clinical, obstetric, and perinatal indicators were assessed in both groups.

The mean maternal age was 27.8 ± 4.6 years in the differential management group and 28.1 ± 4.3 years in the comparison group. The mean gestational age at the time of membrane rupture was 37.2 ± 1.4 weeks and 37.0 ± 1.5 weeks, respectively. The duration from rupture of membranes to the onset of regular labor was shorter in women who received individualized management.

The mean duration of the latent period was 8.4 ± 3.1 hours in the differential management group compared with 11.2 ± 4.0 hours in the comparison group. Regular labor developed within the first 12 hours after membrane rupture in 78.3% of women in the differential management group, compared with 61.7% in the comparison group.

Cervical maturity was also an important factor influencing the selected management strategy. A mature cervix was observed in 68.3% of women in the differential management group and in 55.0% of women in the comparison group. An unfavorable cervical status was recorded in 31.7% and 45.0% of women, respectively. Signs of maternal infection were observed in 5.0% of women in the differential management group compared with 11.7% in the comparison group. An increase in maternal body temperature above 38°C was recorded in 3.3% and 8.3% of women, respectively. Abnormal-smelling amniotic fluid was observed in 1.7% of women in the first group and 5.0% in the comparison group.

Fetal heart rate monitoring demonstrated a stable fetal condition in 91.7% of women in the differential management group, compared with 83.3% in the comparison group. Signs of fetal heart rate abnormalities were recorded in 8.3% and 16.7% of cases, respectively. The rate of spontaneous vaginal delivery was 81.7% in the differential management group, whereas it was 70.0% in the comparison group. Operative delivery was required in 18.3% and 30.0% of cases, respectively. Cesarean delivery accounted for 13.3% of cases in the differential management group and 23.3% in the comparison group.

The mean duration of labor was 7.6 ± 2.4 hours in the differential management group and 9.1 ± 3.0 hours in the comparison group. Postpartum complications were observed in 8.3% of women in the differential management group compared with 15.0% in the comparison group.

The mean birth weight of newborns was $3,210 \pm 420$ g in the differential management group and $3,180 \pm 450$ g in the comparison group.

Apgar scores at the first minute were 7.8 ± 0.8 and 7.4 ± 0.9 points, respectively, while scores at the fifth minute were 8.8 ± 0.6 and 8.4 ± 0.7 points.

Neonatal complications were observed in 6.7% of newborns in the differential management group compared with 13.3% in the comparison group. The need for additional neonatal observation or specialized care was recorded in 5.0% and 11.7% of cases, respectively.

Table 1. Clinical and obstetric outcomes in women with premature rupture of membranes

Indicator	Differential management group (n=60)	Comparison group (n=60)
Maternal age, years	27.8 ± 4.6	28.1 ± 4.3
Gestational age, weeks	37.2 ± 1.4	37.0 ± 1.5
Labor onset within 12 h	78.3%	61.7%
Mature cervix	68.3%	55.0%
Maternal fever $>38^{\circ}\text{C}$	3.3%	8.3%
Signs of infection	5.0%	11.7%
Abnormal amniotic fluid	1.7%	5.0%
Stable fetal heart rate	91.7%	83.3%
Spontaneous vaginal delivery	81.7%	70.0%
Cesarean delivery	13.3%	23.3%
Mean duration of labor, hours	7.6 ± 2.4	9.1 ± 3.0
Postpartum complications	8.3%	15.0%
Mean birth weight, g	3210 ± 420	3180 ± 450
Apgar score at 1 min	7.8 ± 0.8	7.4 ± 0.9
Apgar score at 5 min	8.8 ± 0.6	8.4 ± 0.7
Neonatal complications	6.7%	13.3%

Overall, the findings demonstrated that individualized assessment of gestational age, cervical maturity, maternal condition, fetal heart rate, duration of membrane rupture, and signs of infection was associated with more favorable labor-management indicators. The differential approach was characterized by a higher proportion of spontaneous vaginal deliveries, shorter labor duration, and lower frequencies of maternal and neonatal complications. These findings indicate that comprehensive clinical assessment may be useful for selecting an appropriate labor management strategy in women with premature rupture of membranes.

Discussion

The results of the present study demonstrate that the management of women with premature rupture of membranes should be based on an individualized assessment of maternal and fetal conditions. In our study, the differential management approach was associated with more favorable clinical outcomes compared with the conventional management strategy. In particular, spontaneous vaginal delivery occurred in 81.7% of women in the differential management group, whereas this rate was 70.0% in the comparison group. This finding indicates that appropriate assessment of obstetric factors may facilitate the selection of a suitable delivery strategy and reduce the need for operative intervention.

One of the important factors influencing the course of labor was cervical maturity. A mature cervix was identified in 68.3% of women in the differential management group compared

with 55.0% in the comparison group. The higher proportion of women with a favorable cervical condition may have contributed to the more efficient progression of labor. Cervical maturity should therefore be considered an important clinical parameter when determining whether labor can be expected to progress spontaneously or whether additional obstetric intervention may be required. The timing of labor onset also demonstrated a clinically important difference between the groups. Labor developed within 12 hours after membrane rupture in 78.3% of women managed using the differential approach, compared with 61.7% in the comparison group. This finding suggests that careful clinical observation and timely selection of management tactics may influence the progression of labor. However, the duration between membrane rupture and labor onset should always be interpreted together with gestational age, maternal condition, fetal status, and the presence or absence of infection.

Maternal infectious complications represent one of the major concerns in women with premature rupture of membranes. In the present study, signs of infection were observed in 5.0% of women in the differential management group and in 11.7% of women in the comparison group. Maternal fever above 38°C occurred in 3.3% and 8.3% of cases, respectively. These findings emphasize the importance of regular maternal temperature monitoring and clinical assessment for possible infectious complications. Early identification of infection-related changes may allow clinicians to modify the management strategy in a timely manner. The condition of the amniotic fluid was also clinically relevant. Abnormal characteristics of the amniotic fluid were recorded in 1.7% of women in the differential management group compared with 5.0% in the comparison group. Changes in the appearance or characteristics of amniotic fluid may indicate an increased risk of intrauterine complications and therefore require careful evaluation together with other maternal and fetal indicators.

Fetal well-being was another important component of differential labor management. A stable fetal heart rate pattern was observed in 91.7% of cases in the differential management group, while this indicator was 83.3% in the comparison group. The relatively higher proportion of stable fetal heart rate patterns supports the importance of systematic fetal monitoring during labor. Fetal heart rate assessment provides an opportunity to identify possible fetal compromise and to determine whether continuation of labor is appropriate.

The mode of delivery provides additional evidence supporting the importance of individualized management. The cesarean delivery rate was 13.3% in the differential management group compared with 23.3% in the comparison group. Although cesarean delivery remains an essential intervention when maternal or fetal indications are present, the lower rate observed in the differential management group may indicate that individualized assessment can help avoid unnecessary operative delivery in clinically appropriate cases.

The duration of labor was also shorter among women managed using the differential approach. The mean duration of labor was 7.6 ± 2.4 hours compared with 9.1 ± 3.0 hours in the comparison group. A reduction in labor duration may be clinically beneficial because prolonged labor can be associated with maternal exhaustion, increased need for obstetric intervention, and additional maternal and fetal monitoring. Nevertheless, labor duration is influenced by several factors, including parity, cervical maturity, gestational age, fetal position, and uterine contractility.

Conclusion

The study demonstrated that a differential approach to labor management in women with premature rupture of membranes is clinically important for optimizing maternal and perinatal

outcomes. Individual assessment of gestational age, cervical maturity, maternal condition, fetal heart rate, amniotic fluid characteristics, and signs of infection allows the most appropriate obstetric management strategy to be selected. The differential management approach was associated with a higher rate of spontaneous vaginal delivery, shorter labor duration, and lower frequencies of selected maternal and neonatal complications. The observed improvement in Apgar scores and reduction in neonatal complications further support the importance of individualized monitoring and timely obstetric decision-making.

ADABIYOTLAR

1. Giouleka S., Tsakiridis I., Emmanouilidou G., Boureka E., Kalogiannidis I., Mamopoulos A., Athanasiadis A., Dagklis T. Diagnosis and Management of Preterm Prelabor Rupture of Membranes: A Comprehensive Review of Major Guidelines // *Obstetrical and Gynecological Survey*. 2024. Vol. 79, No. 10. P. 591–603..
2. Garg A., Jaiswal A. Evaluation and Management of Premature Rupture of Membranes: A Review Article // *Cureus*. —2023. Vol. 15, No. 3.
3. Madan I., Jackson F.I., Figueroa R., Bahado-Singh R. Preterm prelabor rupture of membranes in singletons: maternal and neonatal outcomes // *Journal of Perinatal Medicine*. 2023. Vol. 51, No. 6. P. 787–791.
4. Murillo C., Ferrero S., Cobo T., Izquierdo Renau M., Aldecoa V., Grau L., Ponce J., Rueda C., Palacio M. Outpatient management of preterm prelabor rupture of membranes before 34 weeks: Maternal and neonatal outcomes // *International Journal of Gynecology & Obstetrics*. 2023. Vol. 162, No. 2. P. 703–710.
5. Phillips A., Pagan M., Smith A., Whitham M., Magann E.F. Management and Interventions in Previa and Periviable Preterm Premature Rupture of Membranes: A Review // *Obstetrical and Gynecological Survey*. 2023. Vol. 78, No. 11. P. 682–689.
6. Williamson M., Dong S., D'Souza R., Brignardello-Petersen R., Ronzoni S. Outpatient vs inpatient management of preterm prelabor rupture of membranes: a systematic review and meta-analysis // *Acta Obstetrica et Gynecologica Scandinavica*. 2024. Vol. 103, No. 11. P. 2147–2162.
7. Sorrenti S., Di Mascio D., Khalil A., D'Antonio F., Rizzo G., Zullo F., D'Alberti E., D'Ambrosio V., Mappa I., Muzii L., Giancotti A. Outcome of prelabor rupture of membranes before or at the limit of viability: systematic review and meta-analysis // *American Journal of Obstetrics & Gynecology Maternal-Fetal Medicine*. 2024. Vol. 6, No. 6.
8. Quist-Nelson J., Parker C.B., Trudell A.S., et al. Immediate Delivery Compared With Expectant Management in Late Preterm Prelabor Rupture of Membranes: An Individual Participant Data Meta-analysis // *Obstetrics & Gynecology*. 2018. Vol. 131, No. 2. P. 269–279.