Management of Previable Rupture of Membranes with Prolonged Latency

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ABSTRACT

Preterm prelabor rupture of membranes at pre-viable gestations (<23–24 weeks) complicates approximately 0.1–0.8% of pregnancies. Few cases of pre-viable preterm prelabor rupture of membranes (pPPROM) have resulted in term delivery, and even fewer have experienced no complications. The case presented sustained a 21-week (147-day) latency period after confirmed pPPROM at 18+6 weeks gestation, resulting in term delivery with exceptional outcomes for both mother and baby. Expectant management with minimal intervention, due to the client's decline of more invasive options, makes this case unique. A focused literature review was conducted to identify other rare cases of pPPROM. We were particularly interested in understanding the different approaches to managing two similar cases with prolonged latency. We highlight the variations and outcomes of expectant management of pPPROM. Despite the demonstrated benefits of recommended interventions in the expectant management of pPPROM cases, the potential side effects and outcomes of these interventions may be undesirable for patients, leading to their decline. This case underscores the importance of careful counseling regarding management options and the individualization of care based on client risk tolerance.

RÉSUMÉ

La rupture prématurée des membranes avant travail à des stades de gestation pré-viables (<23-24 semaines) complique environ 0,1-0,8% des grossesses. Peu de cas ont connu une rupture prématurée des membranes avant travail (RPMT), qui aboutit à un accouchement à terme, et encore moins de cas n'ont pas eu de complications. Le cas présenté a connu une période de latence de 21 semaines (147 jours) après une RPPM confirmée à 18+6 semaines de gestation et s'est soldé par un accouchement à terme avec des résultats exceptionnels pour la mère et le bébé. La gestion de l'attente avec une intervention minimale en raison du déclin de la cliente rend cette gestion de cas unique. Une analyse documentaire ciblée a été réalisée afin d'identifier d'autres cas rares de pPPROM. Nous voulions en particulier comprendre les différentes approches de la gestion de deux cas similaires avec une latence prolongée. Nous soulignons ensuite les variations et les résultats de la prise en charge attendue de la pPPROM. Malgré les avantages démontrés des interventions recommandées dans la prise en charge des cas de pPPROM, les effets

secondaires potentiels et les résultats des interventions peuvent être indésirables pour les patients et entraîner leur déclin. Ce cas souligne l'importance d'un conseil attentif sur les options de prise en charge et de l'individualisation des soins en fonction de la tolérance au risque du client.

KEYWORDS:
case reports; fetal membranes; pregnancy; premature rupture

BACKGROUND

Preterm prelabor rupture of membranes (PPROM) is defined as any case of ruptured membranes occurring before 37 weeks of gestation and affects approximately 3% of pregnancies.[1] Previable preterm prelabor rupture of membranes (pPPROM) is a subset of PPROM cases that specifically refers to ruptured membranes occurring before 23–24 weeks of gestation, representing a rare complication affecting as few as 0.1% of pregnancies.[2] The cause of pPPROM is poorly understood, but it is hypothesized to result from a weakened chorioamniotic membrane due to stretching or loss of integrity of the extracellular matrix.[2] Risk factors include procedures such as amniocentesis and cervical cerclage, a maternal obstetrical history of bleeding, previous PROM or preterm labor, and maternal tobacco use; however, these factors are considered to have low predictive value for pPPROM.[1] pPPROM is associated with maternal risks of chorioamnionitis, placental abruption, and urgent delivery, as well as a high risk of severe neonatal morbidity, including sequelae associated with prematurity and oligohydramnios, and neonatal mortality.[1–5] Despite these risks, some expectantly managed pPPROM cases experience few complications and result in favorable neonatal outcomes.

Neonatal survival rates in pPPROM cases improve with increasing gestational age at the time of rupture and delivery, amniotic fluid volume, and the latency period between rupture and delivery.[1,3–5] Reported latency periods are often inversely related to the gestational age at which rupture occurs, but median latency in expectantly managed cases has been reported to range from 6 to 13 days at pre-viable gestations.[2] While neonatal medicine continues to expand the limits of viability outside the womb, gestation ≤24+0 weeks is often used to define pPPROM in the literature.[2–6] The Society of Obstetricians and Gynaecologists of Canada (SOGC) guideline on PPROM management (Guideline No. 430) includes a discussion on managing pPPROM, recommending careful parental counseling regarding the choice between continuing or terminating the pregnancy.[1] If parents elect to proceed with expectant management, monitoring for spontaneous preterm labor and maternal-neonatal infection is indicated, including daily maternal temperatures and regular ultrasound assessments of amniotic fluid volume (AFV) and fetal growth. If viability is reached, discussions about prophylactic antenatal antibiotic and corticosteroid administration, as well as the timing of labor induction, should be held with the parents.[1]

We present a pPPROM case that highlights minimal intervention and features a remarkable 21-week (147-day) latency period. A focused literature review and comparison of the management of similar cases of pPPROM with prolonged latency and favorable outcomes are included to support the growing literature and understanding of the variations in managing this rare pregnancy complication. In addition to management variations, we discuss the differing acceptability of recommended interventions among parents facing this challenging clinical scenario.

CASE

A healthy 25-year-old primigravid woman paged her midwife, reporting an ongoing spontaneous loss of copious, clear fluid vaginally at 18+6 weeks gestation. She had no significant medical or obstetrical history and was under the care of registered midwives. The client was instructed to present immediately to triage at the local tertiary hospital for assessment by her midwife. Upon assessment, maternal vitals were within normal limits, and a fetal heart rate in the normal range was detected with Doppler. Given the early gestation, the mother was not yet

reporting fetal movements with confidence at the time of assessment. The rupture was confirmed by the midwife using a sterile speculum, where pooling was visualized, and both fern and Amnisure tests were positive. A consult with the attending obstetrician was then arranged.

After thorough counseling about neonatal viability and monitoring and management options, in accordance with the SOGC guideline, the parents decided to proceed with expectant management. Due to the absence of maternal infection and signs of labor, the client was discharged home with instructions to monitor her temperature twice daily and to page the midwife immediately if it began to rise. The following day, an ultrasound and consult were arranged with a maternal-fetal medicine (MFM) specialist. Although bed rest was not recommended,[1] the client chose to begin bed rest as increased fluid loss was noted during ambulation. Weekly ultrasound assessments with the MFM specialist continued, revealing a slow increase in amniotic fluid volume (AFV) from a 2.0 cm pocket at 19+0 weeks to a 3.5 cm pocket at 24+0 weeks. Despite the reported oligohydramnios, fetal growth remained within normal limits for gestation.

Around 24–25 weeks of gestation, the client reported a cessation of vaginal fluid loss and subsequently reduced her bed rest. Total bed rest time was approximately 6 weeks, although it was not exclusive, as the client continued attending scheduled appointments during this period. The midwifery team followed the client on a prenatal visit schedule with increased frequency (approximately biweekly) and continued biweekly ultrasound assessments with the MFM specialist, along with follow-up appointments with the consulting obstetrician. At viability and during each subsequent assessment, the client was counseled by MFM to accept prophylactic steroids in line with SOGC recommended management.[1] The client repeatedly declined this recommendation, citing no adverse changes in the status of the pregnancy, including the absence of infection, spontaneous onset of labor, or fetal growth concerns. MFM further advised the client to consider inducing labor by 32–34 weeks to mitigate the risk of infection, which the client also declined for the same reasons. Fetal growth remained appropriate for gestation, and AFV continued to increase throughout the remainder of the pregnancy until term. At that point, MFM determined that the client no longer needed their follow-up.

From the onset of the pregnancy, the client's primary choice of birth location was an out-of-hospital setting, as she was under the primary care of midwives. At 37+0 weeks gestation, the client was deemed an appropriate candidate for out-of-hospital delivery. This decision was based on the suspected resealing of membranes at 24–25 weeks, consistently normal fetal growth and testing, improving amniotic fluid volume (AFV) since pPPROM, with current AFV within normal limits for term, and the absence of other pregnancy complications contraindicating out-of-hospital delivery. The client went on to spontaneously labor at 39+6 weeks gestation and vaginally delivered a live female infant weighing 3170 g at an out-of-hospital location under midwifery care. Midwifery continued to provide primary care to the mother-baby dyad for six weeks postpartum. The infant was exclusively breastfed and thrived in early life, with no complications associated with the confirmed pPPROM arising in either the infant or the mother, pre- or postnatally.

LITERATURE AND CASE REVIEW

Most relevant literature regarding the management of PPROM focuses on cases of rupture at viable gestations (>23–24 weeks). Due to the rarity of pPPROM, there is limited knowledge regarding these cases. Much of the existing literature exploring risks, interventions, management, and outcomes consists of small retrospective studies, studies on PPROM at periviable (rupture between 20+0 and 25+6 weeks) and viable gestations (>23–24 weeks), as well as studies that exclusively evaluate cases of expectant management, excluding those involving termination or immediate delivery.

Below, we present a focused literature review on key management considerations for providers handling confirmed pPPROM cases. Due to the rarity and specificity of managing this condition, we also conducted a targeted search for comparable singleton case reports of pPPROM with prolonged latency to provide additional context. We searched the PubMed, CINAHL, and Web of Science databases

for case reports published within the past 20 years. Cases that were not available in English, of an experimental nature, included multiple pregnancies, or resulted in preterm delivery were excluded. Two comparable case studies of pPPROM in singleton pregnancies were identified.[13,14] Both cases involved confirmed pPPROM in the early second trimester, with the patients opting for expectant management. Each case experienced a prolonged latency period from rupture to term delivery of 21+0 to 22+6 weeks, with suspected resealing of membranes and positive maternal and neonatal outcomes. These cases and their management are summarized in Table 1.

The key differences between these cases and ours lie in management and complications. The cases by Hughes et al. and Tomica et al. applied recommended expectant management interventions for viable gestations to their pre-viable cases, such as immediate hospital admission for prophylactic antibiotic regimens. At viable gestations, prophylactic antibiotic administration has been shown to lengthen the latency period between rupture and delivery and reduce maternal and neonatal morbidities, although the optimal antibiotic and dosing regimen remains debated. However, in the context of rupture at pre-viable gestations, the SOGC reports minimal evidence on the risks, benefits, timing, or regimen of prophylactic antibiotic administration.[1] In contrast, the American College of Obstetricians and Gynecologists recommends considering antibiotics as early as 20 weeks.[3] A small retrospective cohort study found no benefit to immediate antibiotic use regarding maternal or neonatal outcomes in pPPROM cases.[6] Similarly, research on inpatient versus outpatient management is limited. Available evidence indicates similar rates of maternal and neonatal complications, although outpatient management is associated with a longer latency period.[1] Interestingly, the clients in both reviewed cases were immediately admitted and received antibiotics at pre-viable gestations of 14 and 16 weeks. Of the three cases, ours was the only one where the client was discharged home immediately with care instructions and an outpatient follow-up plan.

The Hughes et al. case describes the use of 4 weeks of bed rest, despite suspected resealing of membranes after just 5 days. In our case, the client also implemented self-imposed bed rest until cessation of vaginal fluid loss. The SOGC does not recommend bed rest for pregnancies with confirmed PPROM at any gestation[1], and evidence remains inconclusive regarding the effectiveness of this intervention in preventing preterm labor.[7,8] Despite the lack of guideline support, the client in our case felt that bed rest provided her with a sense of control amid the challenging circumstances of her pregnancy. She relied on her intuition to limit her ambulation, noting that increased vaginal drainage occurred when she was upright.

Notably, all three cases cited a suspected resealing of membranes. Resealing after preterm rupture is rarely reported in larger studies, and the mechanism of healing remains poorly understood.[15] The latency period between rupture of membranes and delivery is generally accepted to be inversely related to the gestational age at the time of rupture.[1,15,16] However, this trend was not observed in the cases reviewed, including ours, where rupture occurred in the early second trimester and delivery took place between 21+0 to 22+6 weeks (147 to 160 days) later, with suspected resealing of the membranes in all cases. One study reported that prolonged rupture (>4 weeks) correlated with a lower risk of neonatal sepsis,[17] while another study found no significant difference between latency period length and complications after 32 weeks.[18] These findings suggest that prolonged latency may offer a protective benefit to the pregnancy.

Antenatal administration of corticosteroids is another recommended intervention aimed at reducing neonatal morbidity and mortality in the context of anticipated preterm delivery in viable cases.[10,11] The peak benefits of this practice are achieved when administration occurs within 7 days of delivery. In the Hughes et al. case, prophylactic corticosteroids were administered at 24 weeks; however, the client in our case regularly declined this intervention. Unnecessary exposure to antenatal corticosteroids is reported to occur in 60–85% of cases, largely due to the difficulty in predicting preterm delivery, which can lead to administration outside the optimal window, with up to a third of cases delivering at term.[11] Furthermore, evidence suggests that antenatal corticosteroids may be

Table 1. Summary of Comparable pPPROM Cases with Prolonged Latency

	Hughes et al.	Tomica et al.	Our case
Pregnancy History	34-year-old, 1 previous full-term delivery	32-year-old, gravida and parity not described	25-year-old, gravida 1
Confirmed Rupture	14 weeks	16 weeks	18+6 weeks
Immediate Management	• Admitted to hospital for prophylactic antibiotics and monitoring • Treatment: Oral clarithromycin 500 mg daily • Anhydramnios noted on ultrasound • Discharged: After 10 days and managed as outpatient thereafter	• Admitted to hospital for prophylactic antibiotics, thromboprophylaxis, and bed rest • Amniotic fluid index 10 cm • Smears for aerobic, anaerobic and fungal cultures and GBS collected, all negative • Discharged: After 4 weeks, continued oral prophylactic antibiotics	• Discharged home • 19+0 weeks: Returned for ultrasound with maternal-fetal medicine specialist • Amniotic fluid volume 2.0 cm
Ongoing Prenatal Management	• Daily home temperature monitoring • 14–24 weeks: Weekly ultrasounds • 24 weeks: Prophylactic corticosteroids • 24–36 weeks: Bi-weekly appointments, remained well	Not described	• Twice daily home temperature monitoring • 19–24 weeks: Weekly ultrasounds • 24 weeks: Amniotic fluid volume 3.5 cm, prophylactic corticosteroids recommended but declined • 32–34 weeks: Induction of labor recommended but declined • 24–36 weeks: Biweekly appointments and ultrasounds • 36 weeks: Discharged from specialist care
Suspected Resealing of Membranes	4 weeks post rupture	5 days post rupture	5–6 weeks post rupture
Additional Pregnancy Complications of Note	15 weeks: *Klebsiella pneumoniea* urinary tract infection, treated with Co-amoxiclav	31 weeks: Light vaginal bleeding revealing complete placenta previa	N/A
Delivery	36+6 weeks: SVD following spontaneous rupture of membranes	37th week: Readmitted for substantial vaginal bleeding and immediate Cesarean section delivery	39+6 weeks: SVD following spontaneous rupture of membranes, out-of-hospital delivery
Latency Period from Rupture to Delivery	22 weeks + 6 days or approximately 160 days	21 weeks or approximately 147 days	21 weeks or approximately 147 days

[*continues*]

Table 1. Continued

	Hughes et al.	Tomica et al.	Our case
Neonatal Care	• APGARs 91 + 105 • Birth weight 2870 g • Male sex • Sepsis work-up for history of pPPROM and prophylactic antibiotics • Day 3: Admission to special care baby unit for blood-stained mucoid stools treated with triple antibiotics • Diagnosis of cow's milk protein allergy • Day 10: Discharged home	• APGARs 9^{1} + 9^{5} + 10^{10} • Birth weight 2645 g • Discharged home in good condition • Normal physical and neurological development at 2 years of age	• APGARs not provided • Birth weight 3170 g • Female sex • Exclusively breastfed • Well and thriving at discharge from midwifery care at 6 weeks of age

GBS, Group B streptococcus; SVD, spontaneous vaginal delivery.

associated with adverse long-term neonatal effects, including neurodevelopmental, neurosensory, cardiovascular, metabolic, and hormonal issues.[11]

The SOGC considers gestational age at delivery to be a more influential variable than intrauterine infection in cases of prolonged latency.[1] In the reviewed cases, delivery occurred at term with favorable neonatal outcomes. Early planned delivery in viable PPROM cases is associated with an increased risk of adverse neonatal and maternal outcomes, including respiratory distress syndrome, the need for ventilation, mortality, admission to neonatal intensive care, an increased risk of maternal endometritis and cesarean delivery, and a lower incidence of chorioamnionitis when compared to expectant management.[1,9] A recent meta-analysis and systematic review by Saucedo et al. quantified the maternal and neonatal risks associated with expectant management of periviable PPROM compared to immediate delivery. This study found that expectant management was associated with a 39% neonatal survival rate at discharge, compared to 0% for those delivered immediately.[12] Decisions regarding when and whether to induce delivery in pPPROM cases must consider the importance of gestational age at both the time of rupture and at delivery on anticipated neonatal outcomes.

While the family in our case was counseled on the risks and benefits of recommended interventions in PPROM management, as outlined by the SOGC guideline, they chose to decline all interventions except for regular ultrasounds to monitor fetal growth and AFV at both pre-viable and viable gestations. Weekly ultrasounds were also noted in the Hughes et al. case. Low AFV in the context of pPPROM has been associated with perinatal loss, pulmonary hypoplasia, and long-term sequelae. Both short- and long-term neonatal outcomes improve with advancing gestational age at the time of rupture and delivery, as well as with normal volumes of amniotic fluid at the time of rupture.[4,5] Therefore, close monitoring may provide valuable insights into the prognosis for pPPROM cases and guide intervention recommendations.[5] Despite the absence of active interventions in our case compared to other pPPROM cases, it was resolved without any documented complications beyond the diagnosis of pPPROM.

DISCUSSION

Management of pPPROM is considered one of the most challenging clinical situations in obstetrics.[2] The relative rarity of this complication, combined with the case-specific nuances of monitoring and intervention recommendations, complicates the development of robust literature and management guidelines to assist providers and patients in navigating care decisions. This focused literature and case review underscores the variability in management pathways that providers may encounter when faced with a confirmed pPPROM case. There is not only variability in the monitoring

and management of cases at pre- and post-viability gestations, but also in the acceptance of intervention recommendations by parents navigating this difficult situation. The management approach in this case highlights the importance of centering clients in care decision-making, particularly in clinical circumstances with potentially poor prognoses.

Risk acceptability for any client is subjective, influenced by their values and lived experiences, which may lead to their "informed refusal" of a recommendation. In the context of pre-viable pPPROM, where the risk of maternal and neonatal morbidity is particularly high, developing and maintaining a therapeutic alliance between the care provider and client is especially beneficial for building trust and enhancing client satisfaction. If the pregnancy reaches viability, a strong therapeutic alliance promotes effective, shared decision-making while co-navigating this unpredictable complication to achieve the best possible outcomes. When conflicts arise between care provider recommendations and client preferences, navigating the situation can be challenging from both perspectives. Such conflicts can lead to ethical tension, ineffective communication, compromised care, and potentially contribute to poor outcomes, despite the providers' intentions to reduce risk.[19] While many studies have examined the experiences of healthcare providers facing clients who decline care, few have documented the perspectives of those declining care. A 2021 study from British Columbia, Canada, by Stoll et al. found that clients frequently decline medications, procedures, and interventions during pregnancy, childbirth, and postpartum, with more than half of respondents opting out of some aspect of care. The most commonly cited reasons for declining providers' recommendations included perceiving the test, procedure, or medication as unnecessary, feeling that the recommendation did not align with their values, or preferring an alternative approach.[20]

While some families may choose to terminate pregnancies (where legislation allows) at pre-viable gestations following a diagnosis of pPPROM, Saucedo et al. found that 61.1% opt for expectant management in hopes of achieving more favorable neonatal outcomes.[12] Expectant management in well-selected cases, even at pre-viable gestations, is increasingly supported by reports of improved outcomes for both mothers and babies.[4,9] However, the lack of robust evidence supporting management recommendations means that each pPPROM case is unique and requires individualized management. As the limits of viability continue to be extended, studies examining care management at peri-viable and pre-viable gestations become increasingly necessary and relevant. In summary, there is considerable variation in the management of PPROM at pre-viable gestations, and recommendations for prophylactic interventions in these cases are not yet well-defined due to insufficient robust evidence.[1,4] Counseling patients with this diagnosis is complex, and management should be tailored to each patient's risk tolerance. Minimal use of intervention in such cases should be considered appropriate in the absence of clinical indication and client desire to intervene.

CONCLUSION

The case presented is notable for its minimal use of interventions in the context of pPPROM with prolonged latency, resulting in the unlikely outcome of term delivery without adverse effects for either the mother or infant. To our knowledge, no published cases of pPPROM have been managed with such minimal interventions, leading to exceptional outcomes for both. While the benefits of recommended interventions in expectant management of PPROM cases at viable gestations are well-documented, potential side effects and outcomes of these interventions may be undesirable for clients. Informed refusal of recommended interventions should supported by providers regardless of gestational age. This review contributes to the limited literature on pPPROM management and decision-making for practitioners and families. A deeper understanding of the perspectives of clients who have navigated decision-making in pPPROM cases would enhance management strategies and should be considered for future research to inform clinical practice guidelines.

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DISCLOSURES

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ETHICS

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