

CLINICAL PRACTICE **13** GUIDELINE



Management of **PRELABOUR RUPTURE OF MEMBRANES** at term

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CLINICAL PRACTICE GUIDELINE NO.13

Management of prelabour rupture of Membranes at term

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Management of PRELABOUR RUPTURE OF MEMBRANES at term

Statement of purpose

The goal is to provide an evidence-based clinical practice guideline (CPG) that is consistent with the midwifery philosophy of care. Midwives are encouraged to use this CPG as a tool in clinical decision-making.

Objectives

The objective of this CPG is to provide a critical review of the research literature on the management of prelabour rupture of membranes (PROM) at term gestation. Evidence relating to the following will be discussed:

- Impact of PROM on maternal and neonatal outcomes
- Diagnosis and assessment of PROM
- Management options for PROM

Outcomes of interest

1. Maternal outcomes: infection rates, mode of delivery, satisfaction with care
2. Neonatal outcomes: perinatal morbidity, perinatal mortality

Methods

A search of the Medline database and Cochrane library from 1994-2009 was conducted using the key words: prelabour or preterm rupture of membranes, pregnancy and management. Additional search terms were used to provide more detail on individual topics as they related to term PROM. Older studies were accessed in cases of seminal research studies, commonly cited sources for incidence rates, or significant impact on clinical practice.

Appendix 1 provides further guidance to midwives and clients on the interpretation of GRADE recommendations. A full description of the AOM's policy and procedure for guideline development using GRADE can be provided on request.

Review:

This CPG was reviewed using a modified version of the AGREE instrument (1), the Values-Based Approach to CPG Development (2), as well as consensus of the PROM Working Group, the CPG Subcommittee, the Insurance and Risk Management Program and the Board of Directors.

This guideline reflects information consistent with the best evidence available as of the date issued and is subject to change. The information in this guideline is not intended to dictate a course of action, but inform clinical decision making. Local standards may cause practices to diverge from the suggestions within this guideline. If practice groups develop practice group protocols that depart from a guideline, it is advisable to document the rationale for the departure.

Midwives recognize that client expectations, preferences and interests are an essential component in clinical decision making. Clients may choose a course of action that may differ from the recommendations in this guideline, within the context of informed choice. When clients choose a course of action that diverges from a clinical practice guideline and/or practice group protocol this should be well documented in their charts.

Abbreviations

BMI	body mass index
EOGBSD	early-onset group B streptococcus disease
IAP	intrapartum antibiotic prophylaxis
MSAF	meconium-stained amniotic fluid
NICU	neonatal intensive care unit
OR	odds ratio
PROM	prelabour rupture of membranes
PPROM	preterm prelabour rupture of membranes
RCT	randomized controlled trial
ROM	rupture of membranes
RR	relative risk
SROM	spontaneous rupture of membranes

KEY TO EVIDENCE STATEMENTS AND GRADING OF RECOMMENDATIONS, FROM THE CANADIAN TASK FORCE ON PREVENTIVE HEALTH CARE

Evaluation of evidence criteria		Classification of recommendations criteria	
I	Evidence obtained from at least one properly randomized controlled trial	A	There is good evidence to recommend the clinical preventive action
II-1	Evidence from well-designed controlled trials without randomization	B	There is fair evidence to recommend the clinical preventive action
II-2	Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group	C	The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
II-3	Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category	C	The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
III	Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	D	There is fair evidence to recommend against the clinical preventive action
		E	There is good evidence to recommend against the clinical preventive action
		L	There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

Reference: (3)

INTRODUCTION

Prelabour rupture of membranes (PROM) is a common variant of normal in term pregnancy. Despite the rarity of major complications, PROM is associated with increased maternal and neonatal morbidity. Disagreement exists among maternal health care providers on the optimal management of women with PROM, particularly the need for and timing of inductions. Midwives providing care for women with PROM aim to avoid unnecessary interventions while facilitating the best outcomes possible for mothers and babies. The midwifery management of PROM includes: diagnosing PROM; assessing fetal and maternal well-being, and determining the need for and timing of induction.

Definition and Terms

PROM is defined as the rupture of membranes before the onset of regular uterine contractions at term gestation ($\geq 37+0$ weeks' gestation). In the research literature, PROM has also been referred to as "premature rupture of the membranes," causing considerable confusion as this term also implies neonatal prematurity. In this document, PROM < 37 weeks gestation is referred to as "preterm prelabour rupture of the membranes" (PPROM). The "latent period" is the interval between membrane rupture and the onset of active labour. Expectant management, sometimes referred to as "conservative management," involves waiting for women to begin labour spontaneously. A policy of induction, or "planned management," or sometimes referred to as "active management," involves inducing women with PROM within a short period of time from membrane rupture.

Prevalence

PROM occurs in approximately 10% of all pregnancies (ranging from 2.7% to 17%), with 60% to 80% of cases occurring at term. (4) The Niday Perinatal Database reports that in 2007/8 PROM occurred in 4.3% of women giving birth in Ontario, accounting for 10.6% of all labour inductions and 1.1% of caesarean sections. The Niday statistics may be underreported and therefore may not reflect the true incidence of PROM in Ontario. (5) Approximately 75% of women with PROM will give birth within 24 hours, 90% within 48 hours and 95% by 72 hours. (6-8) Approximately 3% to 4% of women with

PROM do not begin labour within 7 days of membrane rupture. (6)

Etiology

The etiology of PROM is poorly understood. Most research investigating the causes of PROM has focused on PPRM or has failed to differentiate between PPRM and PROM. Researchers have hypothesized that PPRM and PROM are products of different mechanisms, speculating that PPRM is associated with pathological mechanisms such as infection, while PROM may simply be a variation of normal parturition. (9) More recent research suggests that PROM may be a result of a "programmed weakening process" in which the membranes weaken prior to labour. (10) Other proposed mechanisms for PROM include membranes being weakened by mechanical forces, such as polyhydramnios or multiple gestation. (11) Small case-control studies investigating the etiology of both PPRM and PROM have repeatedly found that PROM at different gestations appears to have different origins. (12-14) It has been surmised that women with PROM who do not go into spontaneous labour after a long latent period may have deficient prostaglandin production or prostanoid biosynthesis pathways. (15)

Associated Factors

An American cohort of more than 5000 women in 12 different sites found that a history of PROM was the strongest predictor of PROM in the subsequent pregnancy. This study examined the risk factors for PROM in women with two successive singleton pregnancies, in an attempt to control for genetic factors. Twenty-six percent of women who experienced PROM in their second pregnancy had PROM in their previous pregnancy. When the first pregnancy went to term without PROM, only 17% of the subsequent pregnancies had PROM ($p < .001$). (16) The same study also found a positive association between cigarette smoking and PROM ($p < .05$).

More recently, two small case-control studies have questioned the importance of a number of potential risk factors for PROM. (14) Cases were differentiated as PPRM and PROM and were compared to controls without PROM who delivered at more than 39 weeks'

gestation. In one study involving 220 cases of PROM and 220 controls, there was an association between prior PROM and current PROM (OR 2.35, 95% CI 1.21- 4.58). (13) However, no associations between PROM and other socio-demographic factors (education, income, adequacy of prenatal care) or behavioural factors (smoking, drug use) were found. Medical factors from the index pregnancy, including urinary tract infection, chorioamnionitis, chlamydial or gonorrhoeal infections and lower respiratory infections, had no effect on PROM. No association was shown between PROM and prior planned abortions, fetal loss/miscarriage or preterm births. (14)

A summary of factors associated with PROM \geq 37 weeks is available in Table 1. More research, with larger sample sizes, is still needed to determine which women are at a higher risk for PROM.

Protective Factors

Conflicting research has been identified regarding the use of vitamin C supplements as a protective factor for PROM. Two small research studies were identified (one for PROM and one for PPRM) that suggest that vitamin C supplementation may have a protective effect against PROM by playing a role in collagen metabolism or in reducing oxidative stress. (19) Collagen is believed to help maintain the strength of the membranes. (20,21) A double blind RCT of 120 Mexican women found that daily supplementation with 100 mg vitamin C after 20 weeks' gestation reduced the incidence of PROM. The incidence of PROM was 24.5% in the placebo group and 7.69% in the supplemented group, RR 0.26 (95% CI 0.078-0.837), $p = .018$. (20) Although the mean gestational age at delivery was 38 weeks for both intervention and control groups,

data about the gestational ages at which PROM actually occurred was not specified. Another study observing the effects of vitamin C and vitamin E on the risk of pre-eclampsia was stopped early because of increased rates of PROM and PPRM in the group receiving supplementation. (22)

A Cochrane review on the effects of vitamin C supplementation in pregnancy concluded that there was too little data to determine whether vitamin C supplementation is beneficial and that it may be associated with preterm birth. (19) There is limited data on safe levels of vitamin C intake in pregnancy. Nonetheless, the Institute of Medicine (IOM) set an upper limit for vitamin C intake during pregnancy at 2000 mg per day, a level that is believed not to cause adverse effects for most women in pregnancy. (23) Further research is needed to determine whether or not vitamin C supplementation lowers the risk of PROM. There is inadequate research to recommend taking or not taking vitamin C supplements to prevent PROM.

Associated Complications

Infection (maternal and neonatal) is the foremost concern for women with PROM. Once the protective barrier of the amniotic sac is no longer intact, risk of infection may increase as bacteria ascend the vagina into the uterine cavity.

MATERNAL COMPLICATIONS

PROM increases the risk of maternal infection, which may manifest as chorioamnionitis or endometritis. (4,7) Certain factors increase the risk of maternal infection in women with PROM such as increasing numbers of vaginal exams and presence of meconium in the amniotic

TABLE 1: FACTORS ASSOCIATED WITH PROM OCCURRING \geq 37 WEEKS' GESTATION

Factors associated with PROM	Association not found with PROM
History of PROM (14,16,17)	Socio-demographic factors (13)
Cigarette smoking (16)	Adequacy of prenatal care (13)
	Prior miscarriage/fetal loss/therapeutic abortion (14)
	UTI (14,18)
	Cervical infections (gonorrhoea, chlamydia) (14,18)
	BMI (12)

fluid. These and other factors associated with infection will be discussed more thoroughly later in the CPG.

Chorioamnionitis

Signs and symptoms of chorioamnionitis include: maternal fever > 38°C, uterine tenderness, maternal or fetal tachycardia and foul smelling/purulent amniotic fluid. (24) Clinical chorioamnionitis complicates approximately 1% of all pregnancies. (7) The incidence of chorioamnionitis in women with PROM is estimated to be 6% to 10%. (25)

Endometritis

Endometritis usually presents 2 to 3 days after the birth and is characterized by fever, lower abdominal pain and uterine tenderness. Foul smelling lochia, subinvolution and higher grade fevers are present in more severe cases. (26) The overall incidence of endometritis after a vaginal delivery is less than 3%. Though no specific calculations of risk of endometritis following PROM were found, the most commonly cited risk factors include: caesarean section, long labour, prolonged rupture of membranes and PROM. Although endometritis is more commonly associated with caesarean section, the incidence rises with the presence of chorioamnionitis, even if a woman delivers vaginally. (27)

FETAL / NEONATAL COMPLICATIONS

Fetal complications of PROM include cord prolapse, cord compression and neonatal infection. (4,7) Prolapsed cord occurs in approximately 0.3% to 0.6% of all pregnancies and the risk is only slightly increased with PROM. The incidence of cord prolapse is 0.3% to 1.7% in pregnancies with PROM at all gestations, but is of greater concern with PPROM. (4) Although generally cited as a concern, no studies investigating the incidence of cord compression with PROM were found.

Rupture of membranes is associated with increased risk of neonatal infection, as bacteria may ascend into the uterine cavity once the barrier of the membranes is no longer present. The incidence of neonatal infection for women with PROM is approximately 2% to 2.8%. (28) Clinical presentation of neonatal sepsis varies and includes: diminished spontaneous activity, less vigorous sucking, apnea, bradycardia, temperature instability, respiratory distress, vomiting, diarrhea, abdominal

distention, jitteriness, seizures and jaundice. Diagnosis is clinical and usually based on culture results. (29,30)

OPTIMAL MANAGEMENT OF PROM: EARLY INDUCTION OF LABOUR VS. EXPECTANT MANAGEMENT

Debate continues regarding the optimal management of women with PROM at term.

EARLY RESEARCH RELATED TO PROM

Early reports from the 1960s suggested that PROM for greater than 24 hours resulted in an increase in both maternal and neonatal morbidity and mortality. (31) For instance, one 1965 study showed alarming rates of maternal infection (28%) and perinatal mortality (6.1%) among individuals with PROM ≥ 24 hours. Researchers did not differentiate PPROM from PROM and there was no discussion of other confounding factors, such as fever, meconium or other non-reassuring signs with PROM. (31) Based on these results, many practitioners began to recommend immediate induction for PROM.

More current research has not replicated these dramatically increased rates of adverse outcomes with PROM. (32) Early research has limited relevance today, as antibiotics available at the time were very limited. Advances in treatment of infection and neonatal care have significantly improved outcomes related to maternal and neonatal infection for pregnancies with PROM. As the impact of infection decreased significantly over time compared to rates in these early studies, a policy of immediate induction with PROM was questioned in the face of significantly increased rates of caesarean section, operative delivery and use of birth technology.

More recent research has examined whether a policy of immediate induction of labour with PROM was associated with increased caesarean section rates, renewing debate about the optimal strategy for parents and neonates. (6,33)

THE TERM PROM STUDY

The Term PROM study is the largest study focusing on the management of PROM to date. (34) Researchers sought to determine whether a policy of expectant management or induction of labour for individuals with PROM was

preferable in terms of risk of maternal and fetal infection and risk of caesarean section, and whether one method of induction was superior to the other. This multi-centre randomized controlled trial involved 72 institutions in six countries (Canada, U.K., Austria, Sweden, Denmark, Israel), and followed 5041 participants. Individuals with PROM \geq 37 weeks' gestation, as confirmed by nitrazine or ferning tests, were randomized to 1 of 4 groups: immediate induction with vaginal prostaglandin (PGE₂), immediate induction with oxytocin, expectant management with induction with vaginal prostaglandin if necessary or expectant management with induction with oxytocin if necessary. Researchers excluded any participants in active labour, if there had been a previous failed attempt at induction of labour, or with contraindications to either induction or expectant management. Study participants in the expectant management groups were induced for complications or if labour did not begin spontaneously within four days of membrane rupture. The expectant management group was instructed to monitor temperature twice daily and report if temperatures reached or exceeded 37.5°C, if amniotic fluid colour changed, or if "other complications developed."

Maternal Outcomes

Chorioamnionitis occurred in 4.0% of the induction-with-oxytocin group and 8.6% of the expectant-management (oxytocin) group ($p < .001$). Postpartum fever was also less prevalent in the induction-with-oxytocin group (1.9%) as compared to the expectant-management (oxytocin) group (3.6%) ($p = .008$).

Important to note related to infection rates, is that most cases of chorioamnionitis were diagnosed based on 2 instances of temperature \geq 37.5°C occurring intrapartum, rather than the now more commonly used 38°C. The effect of epidural on intrapartum fever was not examined in the Term PROM study, another potential confounding factor related to chorioamnionitis.

The rate of caesarean section did not differ significantly between the induction-with-oxytocin group (10.1%) and the expectant-management (oxytocin) group (9.7%) (OR 1.0, 95% CI 0.8-1.4).

Participants in the expectant management groups (oxytocin or prostaglandin) had a spontaneous labour rate of 77% and 78.8% respectively. The most common reason for induction was not for medical reasons, but due to patient request, accounting for 10.6% of total inductions in the expectant management group. However, because 77.2% of participants in this group were not induced, patient request as an indication for induction in the expectant management group actually accounts for 46% of the inductions in the expectant (oxytocin) group. Reasons for induction of labour in the expectant-management groups are listed in Table 2.

Neonatal Infection

The risk of neonatal infection did not differ significantly between study groups, with a rate of 2.0% for the induction-with-oxytocin group and 2.8% for the expectant management (oxytocin) group (OR 0.7, 95% CI 0.4-1.2). (34) Of note, the neonatal infection rate in this study was relatively high compared with the 1% rate

TABLE 2: PRINCIPAL REASONS FOR INDUCING LABOUR IN THE TERM PROM TRIAL'S EXPECTANT MANAGEMENT GROUPS (34)

Reason	Expectant (Oxytocin) [% of participants in subgroup]	Expectant (Prostaglandin) [% of participants in subgroup]
Obstetrical complication	2.5	2.7
Chorioamnionitis	1.4	0.8
Rupture of membranes \geq 4 days previously	3.6	4.6
Request by patient	10.6	9.4
Request by physician	4.8	3.7
No induction	77.2	78.9

of neonatal infection associated with PROM > 24 hours that has been generally accepted in the research literature (68). This may be due to variations in how neonatal infection is diagnosed in different study protocols. In the Term PROM study neonatal infection was classified as either definite or probable, which may have captured a higher number of newborns in the infection group, as some newborns with probable infection may not have actually had infection. (34)

Evaluation of Treatment

The Term PROM study also evaluated participants' preferences around PROM management through questionnaires completed within the first few days postpartum. Researchers concluded that the induction strategy was preferred, as participants in the induction groups were more likely to report that there was "nothing they disliked about the method of care" as well as worry about their personal and/or baby's health. (34,35) However, as study participants were randomized to types of management, these results do not necessarily reflect the views of individuals who actively choose expectant management within the context of informed choice. Additionally, it is difficult to determine whether worries about their personal and/or baby's health would apply to clients in midwifery care who choose expectant management, as these clients have access to their midwives by pager, as well as having regularly scheduled check-ins and assessments during the course of their latent periods.

Overall, Term PROM study investigators concluded that the strategies of expectant management and induction were both reasonable options for women with PROM. No single approach was found to be clearly superior and researchers concluded that individuals should be informed about the risks and benefits of each strategy and be encouraged to decide which model of management was more appealing. (34)

COCHRANE REVIEW

A Cochrane meta-analysis explored the outcomes of induction versus expectant management for PROM. This review examined 12 trials (7000 participants), with the Term PROM trial comprising 70% of this population. The meta-analysis concluded that induction for PROM does not result in a higher rate of caesarean and/or instrumental deliveries. Researchers noted a lower rate of

chorioamnionitis (RR 0.74, CI 0.56-0.97) and endometritis (RR 0.30, CI 0.12-0.74) with induction for PROM. The authors calculate that to avoid one case of chorioamnionitis, 50 individuals with PROM would need to be induced. There was no difference in rates of neonatal infection between groups; however, neonates from the expectant management group were more likely to be admitted to the NICU. This effect was only significant when prostaglandin and oxytocin results were pooled. (36)

This review pointed out that in most of the included trials, at least some study participants had digital vaginal exams upon entry to the studies. Only 2 included trials (Shalev 1995 and Wagner 1989) had policies in place to limit vaginal exams to occur only after active labour had commenced or upon labour induction. (37,38)

FACTORS THAT INCREASE THE RISK OF INFECTION WITH PROM

Within the population of individuals with PROM, certain factors increase the risk of infection. Frequent vaginal exams have been shown to be a major risk factor for infection by a number of studies. (37,39,40)

MATERNAL INFECTION

Chorioamnionitis

In a secondary analysis of the Term PROM study, a high frequency of vaginal exams was shown to be the strongest predictor of chorioamnionitis with PROM. Having more than 8 vaginal exams following PROM increased the risk of developing chorioamnionitis (OR 5.07, 95% CI 2.51-10.25). (25) Other factors that increase the risk of chorioamnionitis include: amniotic fluid stained with meconium, nulliparity, GBS status, duration of active labor \geq 12 hours and a latent period between 24 and 48 hours (see Table 3).

A limitation of the Term PROM trial is that 35% to 39% of participants in the Term PROM study had an initial digital exam upon admission to the trial and 49% to 63% of participants had \geq 4 digital exams before or during labour. In addition, the Cochrane review largely included trials where participants had received one or more digital vaginal exams during their latent period. Midwives seek to avoid digital vaginal exams during the latent period in participants with PROM and to minimize the number of vaginal exams during active labour. This is likely to help mitigate the slightly increased maternal infection

rate associated with expectant management in the Term PROM study and Cochrane review.

NEONATAL INFECTION

The risk of neonatal infection appears to rise with particular factors in combination with PROM. The most recent information about neonatal risk factors comes from another secondary analysis of the Term PROM study. The factors associated with increased risk of neonatal infection for women with PROM include: chorioamnionitis (OR 5.89, 95% CI 3.68-9.43), GBS status (OR 3.08, 95% CI 2.02-4.68), between 7 and 8 vaginal exams (OR 2.37, 95% CI 1.03-5.43), a latent period 24 to 48 hours (OR 1.97, 95% CI 1.11-3.48), latent period \geq 48 hours (OR 2.25, 95% CI 1.21-4.18) and the administration of antibiotics before delivery (OR 1.63, 95% CI 1.01-2.62). (30)

Other smaller studies have supported the finding that vaginal exams significantly increase the risk of neonatal infection. A study that randomized 182 participants to early (6 hours post PROM) or delayed (24 hours post PROM) induction, found a significant increase in rates of maternal and neonatal infection in participants in the delayed group who had received an initial digital cervical exam vs. those who had no digital exam. Of 18 participants who had digital examinations in the delayed induction group, 5 infants (33%) developed neonatal infection, whereas no babies born to participants in the delayed induction group (0/78) who did not have an initial digital exam developed infection ($p < .04$). (37)

Two randomized studies (N=1951) were identified that applied a strict protocol of avoiding digital exams until active labour or until labour induction. Both studies had low rates of maternal and fetal infection and showed no difference in rates of infection between planned and expectant management groups. (38,41)

Summary Statement

Neonatal infection is associated with PROM at term (N = 6814). However, no difference was found in rates of infection between planned and expectant management for PROM at term in trials where a strict protocol of avoiding digital exams was enforced (N = 1951). (I)

The main predictors of neonatal infection include: maternal chorioamnionitis, GBS status and increased frequency of vaginal exams. (II)

TABLE 3: FACTORS THAT INCREASE RISK OF MATERNAL INFECTION WITH PROM AT TERM (25)

Risk Factor	Estimated Odds Ratio of Chorioamnionitis [95% CI, $p < .05$]
3 to 4 vaginal exams	2.06 [1.07- 3.97]
5 to 6 vaginal exams	2.62 [1.35- 5.08]
7 to 8 vaginal exams	3.80 [1.92- 7.53]
> 8 vaginal exams	5.07 [2.51-10.25]
Meconium stained amniotic fluid	2.28 [1.67-3.12]
Nulliparity	1.80 [1.29-2.51]
GBS status	1.71 [1.23- 2.38]
Active labour 6 to 9 hours (vs. < 3 hrs)	1.97 [1.18-3.25]
Active labour 9 to 12 hours (vs. < 3 hrs)	2.94 [1.75-4.94]
Active labor lasting \geq 12 hours (vs. < 3 hrs)	4.12 [2.46-6.9]
Latent period 24 to 48 hours	1.77 [1.27-2.42]
Latent period \geq 48 hours	1.76 [1.21-2.55]

Endometritis

Although the Term PROM trial did not investigate the outcome of endometritis, the study measured the incidence of postpartum fever, implying the presence of postpartum infection. In a secondary analysis of the data, researchers found the risk of postpartum fever increased with the following factors: chorioamnionitis (OR 5.37, 95% CI 3.60-8.00), caesarean delivery (OR 3.97, 95% CI 2.20-7.20) operative delivery (OR 1.86, 95% CI 1.15-3.00), GBS status (OR 1.88, 95% CI 1.18-3.00), receiving antibiotics before delivery (OR 1.94, 95% CI 1.06-3.57) and the duration of active labour. (25)

Summary Statement

Maternal complications associated with PROM include chorioamnionitis and postpartum infection. (I)

A high frequency of vaginal exams is the strongest independent predictor of chorioamnionitis with PROM. (II)

TABLE 4: SUMMARY OF OUTCOMES FOR INDUCTION OF LABOUR VS. EXPECTANT MANAGEMENT OF PROM

Outcome	Planned early induction	Planned expectant management	Number of participants (studies)
Chorioamnionitis – including trials where initial vaginal exam was performed on at least some participants	Slight decreased risk	Slight increased risk	N = 6814 (34,36)
Chorioamnionitis – including trials that applied a strict protocol of avoiding digital exams until active labour or until labour induction	No difference	No difference	N = 1951 (38,41)
Endometritis	Slight decreased risk	Slight increased risk	N = 6814 (36)
Operative delivery	No difference	No difference	N = 6814 (34,36)
Caesarean section	No difference	No difference	N = 6814 (34,36)
Neonatal infection	No difference	No difference	N = 6814 (34,36)
Use of EFM	Higher rate of use	Lower rate of use	N = 5041 (34)
Use of epidural	Higher rate of use	Lower rate of use	N = 5041 (34)
Use of antibiotics	Lower rate of use	Higher rate of use	N = 5041 (34)
Perception of care	Fewer participants reported there was “nothing about their care they liked”	More participants reported there was “nothing about their care they liked”	N = 5041 (34)

COMPARING USE OF PAIN MEDICATION FOR INDUCTION OF LABOUR VS. EXPECTANT MANAGEMENT WITH PROM

In the Term PROM study, participants in the expectant-management (oxytocin) group were less likely than those in the induction (oxytocin) group to receive continuous electronic fetal monitoring (28.5% vs. 34.5%, $p = .001$) and more likely not to use anesthesia or analgesia in labour (13.0% vs. 9.6%, $p = .008$). (34) Similarly in a RCT of 444 individuals with PROM randomized to induction of

labour either before or after the 12-hour mark, there was less use of epidural in the expectant group (OR 0.57, 95% CI 0.39-0.84, $p = .005$). (42)

Table 4 provides a summary of outcomes for PROM management strategies.

RECOMMENDATIONS

1. Offer clients with PROM > 37+0 weeks' gestation the option of induction or expectant management. In the absence of abnormal findings (see Table 5), expectant management is as appropriate as induction of labour. [I-A]
2. Inform clients with PROM choosing expectant management that they have the option to revisit their management plan and may choose induction of labour if they no longer desire expectant management. [III-A]
3. In order to reduce the risk of maternal and neonatal infection, avoid digital vaginal exams for clients with PROM whenever possible, until active labour or upon induction of labour. [I-A]

TABLE 5: ABNORMAL FINDINGS WITH PROM

meconium in amniotic fluid
frank vaginal bleeding
fever ($T > 38^{\circ}\text{C}$)
evidence of infection (foul-smelling amniotic fluid, uterine tenderness)
abnormal fetal heart rate, tachycardia
decreased fetal movement

ANTEPARTUM MANAGEMENT

Informed Choice

Given the quantity of information on PROM management and the factors which affect decision-making around this event, having a brief discussion of the management options in the event of PROM during the prenatal period may help prepare clients and their families for these decisions in the event that PROM does occur.

Information sharing regarding signs and symptoms of PROM, as well as when and how to notify the midwife in the event of suspected PROM will ideally occur in the prenatal period, before it presents.

Diagnosis and Initial Assessment

Although a client's report of ruptured membranes must be valued, it is important for the midwife to confirm PROM so appropriate management can be planned. Other fluids such as: urine, vaginal discharge, copious bloody show and/or semen may be mistaken for amniotic fluid. (43)

Phone Assessment

Midwives are available to their clients on a 24-hour basis. As such, midwifery clients will usually report signs and symptoms of PROM by telephone. No research was found to either recommend or reject phone assessment for PROM history-taking and initial management. Despite the paucity of evidence, phone assessment for suspected PROM seems a reasonable first step in assessment by midwives.

This assessment should involve asking the client about the following: time of suspected rupture, colour, smell and amount of fluid, whether or not the fluid continues to leak, whether or not the fetus is/has been active since the suspected rupture, GBS status if known, engagement of presenting part documented at the previous prenatal visit, vaginal bleeding and the presence of and contraction pattern.

In-person assessment should occur promptly if there are any abnormal signs or symptoms present. If the history is clear and signs and symptoms are normal (clear fluid, presence of fetal movement, GBS negative or GBS positive and the client chooses a period of expectant management) the midwife would normally do an in-person assessment within 24 hours from the

time of membrane rupture. If the history is unclear, the midwife should assess as soon as is practical to confirm or rule out PROM. Clients should be informed during the phone conversation of the signs and symptoms of chorioamnionitis and how to monitor for signs of infection. The client should be aware of when to page the midwife for a more prompt assessment in the case of abnormal findings or presence of active labour.

RECOMMENDATION

4. Initial assessment for PROM may occur by telephone or in person.
 - a. If no abnormal signs or symptoms are present during history taking for suspected PROM by telephone, an in-person assessment to confirm PROM and make a management plan should follow the phone assessment within 24 hours from the time of membrane rupture. Ensure the client is aware of when and how to contact the midwife to arrange earlier assessment in the event that abnormal signs develop (presence of meconium in amniotic fluid, frank vaginal bleeding, fever > 38°C, foul smelling amniotic fluid or decreased fetal movement). [III-A]
 - b. If abnormal signs or symptoms are present during history taking related to PROM, an immediate in-person assessment is warranted. [III-A]

In-person Assessment: Location of Assessment

Midwives offer assessment at home, clinic or hospital. All options are reasonable provided that the midwife carries the appropriate instruments to confirm or rule out PROM and that the client's history excludes any urgent need to be in the hospital for assessment. In the absence of circumstances that warrant an immediate PROM assessment there is no evidence to recommend a particular location for the in-person assessment of PROM.

DIAGNOSIS OF PROM

Three main methods are currently used to confirm PROM: visualization with a sterile speculum exam, the nitrazine test and the fern test. These methods have been utilized for more than 60 years and they remain the standard for assessing PROM. Despite this, diagnosis of PROM remains a common problem as there is no one universally accepted method for diagnosing rupture of

membranes. (44)

No recent studies about the predictive nature of each of these 3 procedures were identified. Although other newer procedures to diagnose rupture of membranes have been developed, these remain less attractive than the standard tests due to a combination of lower sensitivities, less rapid results and greater expense. With all tests for PROM, it is imperative that midwives employ sterile technique and avoid performing any vaginal exams, to minimize the chance of infection in parent and/or neonate. When results from any of the tests are uncertain, multiple tests, as well as the midwife's clinical judgment, should be utilized to obtain a clearer clinical picture.

Sterile Speculum Exam

A sterile speculum exam (without lubrication) confirms PROM through the observation of amniotic fluid trickling from the cervix and pooling in the speculum. (11) If no fluid is initially visible, the client may be encouraged to cough or strain. A sterile speculum exam also permits visualization of possible cord prolapse. Although the visualization of fluid streaming from the cervix is a commonly used method to diagnose PROM, the absence of visualized fluid may produce a false negative result. One study found the speculum exam to have a false negative rate of 12%. In this study, no information about the false positive rate was provided. (44)

A sterile speculum exam may also be a reasonable option to assess the dilation and effacement of the cervix, avoiding a digital exam in cases where this information is deemed necessary to formulating a management plan. A prospective study including 133 participants compared the accuracy of speculum exams to assess the dilation and effacement of the cervix to digital vaginal exams. Good correlation was noted with less than 20% mean variation between digital and speculum exams. (45)

Nitrazine Test

The nitrazine test confirms PROM by detecting an alteration in the pH level of the vagina. The pH of amniotic fluid ranges from 7.1 to 7.3, while normal vaginal fluids are usually 4.5 to 6.0. The yellow-coloured nitrazine swab will change to a dark blue colour when the pH is greater than 7.0, such as in the presence of amniotic fluid. (7) Blood, semen, alkaline antiseptics, vaginitis and cervicitis may result in false positive results. (43) False negative results may occur with prolonged

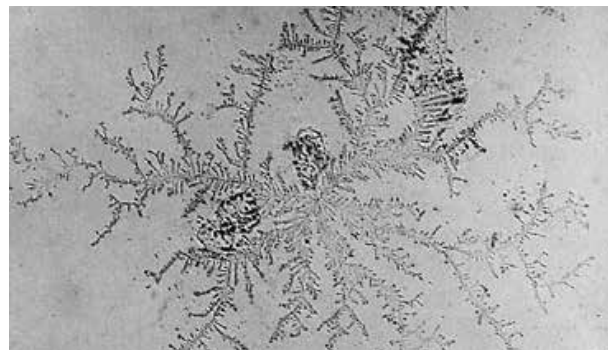
fluid leakage where there is minimal residual fluid. (46)

A study involving 100 participants in the late 1960s reported that the nitrazine test had a false positive rate of 17.4% of cases and a false negative rate of 9.7%. (43)

Fern Test

The fern test (also known as arborization) involves swabbing the amniotic fluid and smearing it on a microscope slide. Once the fluid has air-dried (after approximately 10 minutes), amniotic fluid exhibits a characteristic fern-like crystallization pattern visible under low magnification (see *Figure 1*). This test is not affected by dilute concentrations of blood. However, a

FIGURE 1. Positive fern test (48)



high concentration of blood or meconium may give a false negative result. (47) The fern test has a false positive rate of 3% to 6% and a false negative rate of 3.75% to 12.9%. (43,47) Because the fern test has a higher sensitivity, a positive fern test should be considered evidence of ROM even if a nitrazine test is negative. Access to a microscope may not be possible for assessment at home; however, the fern test is only necessary if the other methods are insufficient to make a diagnosis. Midwives can carry slides to a home visit and return to the office or hospital for evaluation, if necessary.

See *Table 6* for a summary of the sensitivities and specificities of PROM diagnostic tests.

Ultrasound

Ultrasound may be used to document oligohydramnios, but is not diagnostic of PROM. (46) However it can be a useful tool when history is unclear and diagnostic tests are equivocal, as the presence of a normal amount of amniotic fluid makes the diagnosis of PROM less likely. (67)

TABLE 6: SENSITIVITY AND SPECIFICITY OF PROM DIAGNOSTIC TESTS

Test	False Positive Rate	False Negative Rate
Sterile Speculum Exam	N/A	12% (44)
Nitrazine Test	17.4% (43)	9.7% (43)
Fern Test	3% to 6% (43,47)	3.75% to 12.9% (43,47)

Timing of PROM Diagnosis

No studies were identified that assessed the efficacy of PROM diagnostic tests at different time intervals following suspected PROM.

Summary Statement

Other than circumstances that warrant an immediate PROM assessment in hospital (lack of fetal movement, meconium-stained amniotic fluid, signs of infection), there is no evidence to recommend a particular location for the in-person assessment of PROM, which may occur in the home, clinic or hospital. (III)

No single PROM diagnostic test has been found to be completely accurate, with all methods having false positive and negative results. (II-2)

RECOMMENDATIONS

- Diagnosis of PROM may occur with one or more of the following tests: sterile speculum exam, nitrazine or fern test. Test results should be interpreted in combination with a client’s history of PROM. [II-2-B]
- When results from any of the tests are uncertain, multiple tests (sterile speculum exam, nitrazine and/or fern test), as well as the midwife’s clinical judgment, should be utilized to obtain a clearer clinical picture. Decision making may be supported by ultrasound evaluation of the amniotic fluid volume in instances when PROM results are uncertain, following the use of other diagnostic tests. [III-B]

PRACTICAL ASPECTS OF PROM MANAGEMENT

Monitoring of Well-being During Expectant Management

None of the studies reviewed have confirmed an ideal regimen for fetal and maternal monitoring during expectant management of PROM. Any abnormal findings should be seen as contraindicating expectant management. The frequency and rigour of monitoring varies considerably between studies and there is no ideal scheme of monitoring.

The Term PROM study measured temperature twice daily as a gauge of maternal infection, while other studies required temperature every 4 hours and daily white blood cell counts. (7,8,34,49) Some studies used a non-stress test on admission, (34) while others monitored fetal heart rate as frequently as every 4 hours. (8,49) A study from the early 1980s only required NSTs on a weekly basis. (6) No research was found that compared different protocols for expectant management monitoring. Considering the low rates of morbidity and mortality, these studies approximate

TABLE 7: MONITORING PROTOCOLS USED DURING EXPECTANT MANAGEMENT OF PROM STUDIES

Trial	Starting week:	Fetal surveillance protocol:
Hannah, 1996 (50)	37	<ul style="list-style-type: none"> Checked temperature twice daily Checked colour and odour of AF
Natale, 1994 (49)	37	<ul style="list-style-type: none"> Daily WBC and differential Temperature q4h while awake FHR q4h Daily NST
Duff, 1984 (8)	36	<ul style="list-style-type: none"> Temperature q4h FHR q4h WBC at admission and q4h
Kappy, 1982 (6)	36	<ul style="list-style-type: none"> Daily CBC and differential Temperature q4h while awake Daily evaluation of uterine tenderness Weekly NST

what types of monitoring can be considered as reasonable for practice (see *Table 7* for a description of fetal monitoring protocols using during expectant management for PROM studies). Until there are studies that evaluate and compare monitoring protocols, it will be difficult to make best practice recommendations for the expectant management of clients with PROM at term. It would seem reasonable, however, that midwives conduct a daily, in-person assessment to monitor maternal and fetal well-being for clients with PROM choosing expectant management. No research was found regarding the efficacy of using a non-stress test for evaluation of fetal well being during the latent period for individuals with PROM.

RECOMMENDATIONS

7. Ensure that clients with PROM choosing expectant management are aware of when and how to page their midwife for support, should complications develop. [III-A]
8. For clients with PROM choosing expectant management, a daily, in-person, assessment should be conducted by the midwife either in the client's home, clinic or in the hospital. This assessment should include: monitoring maternal and fetal vital signs and examination of the amniotic fluid as well as a discussion of the client's emotional well-being. If any contraindications to expectant management are noted on physical exam, or for any other emotional or psychological reasons, offer induction of labour. [III-B]

PROM and GBS (51)

The combination of PROM and being GBS positive raises two significant questions for care providers:

- When is the ideal time to start intrapartum antibiotic prophylaxis (IAP)?
- When is the ideal time to induce labour?

There are no prospective studies that have been designed to examine either of these questions. The most relevant published evidence comes from secondary analyses of data collected as part of the Term PROM trial. Of the 5041 participants, 4834 were cultured for GBS at delivery. Researchers found a non-significant trend suggesting that GBS carriers were at lower risk of early onset group B streptococcus disease (EOGBSD) if induced with oxytocin than if they were managed

expectantly (OR 0.29, 95% CI 0.08-1.05, $p = .06$). (28) This study has led to the Society of Obstetricians and Gynecologists of Canada (SOGC) recommendations that individuals with term PROM be offered induction immediately. (52)

Though the Term PROM study notes a correlation between GBS status and neonatal infection, it is important to note that this RCT predates the implementation of the intrapartum antibiotic prophylaxis (IAP) screening and treatment strategy. The GBS status of many participants in the Term PROM study was not known until after delivery. Additionally, despite the study's protocol to give intrapartum antibiotic prophylaxis to participants known to be GBS positive at entry to the trial, antibiotics were administered in a minority of patients, which may have contributed to higher neonatal infection rates. The Term PROM study does not provide sufficient evidence to compare the strategy of immediate induction with induction after a moderate waiting period or with ongoing expectant management within a context of universal prenatal screening and IAP for all who test positive for GBS. Further research on the timing of induction of labour for GBS-positive individuals with PROM is warranted.

One 1999 publication reanalyzed previously published data to establish odds ratios for factors associated with increased risk for EOGBSD in neonates. This reanalysis calculated the OR of EOGBSD at stratified time periods from the data of 3 studies (53-55) (see *Table 8*), revealing increasing risk of EOGBSD with increasing length of rupture of membranes. (56) It is important to note that these figures relate to time of rupture of amniotic membranes and not specifically to PROM. They are not reflective of current practices for administering IAP. Because this was a secondary analysis of data collected prior to the introduction of universal screening and IAP, it is difficult to determine whether or not the calculated risks are valid today.

Studies related to administering antibiotics prior to active labour for GBS positive individuals with term PROM during a period of expectant management were not found. In the absence of research on this topic, midwives are currently using a variety of approaches to ensuring adequate administration of IAP for these clients. Further research is necessary. These research gaps, along with the range of approaches to PROM and GBS management and local community standards

should be thoroughly discussed with clients as part of an informed choice discussion.

Please see the AOM CPG titled Group B Streptococcus: Prevention and Management in Labour for a full discussion related to management of GBS.

RECOMMENDATIONS

9. Inform clients of the research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM.
10. Offer a choice between expectant management and immediate induction of labour with oxytocin to clients with a positive GBS swab result at term who experience PROM for < 18 hours, and have no other risk factors [III-B].
11. Recommend induction of labour with oxytocin to clients who are GBS positive with PROM \geq 18 hours [III-B]. IAP should be offered upon commencement of induction of labour.
12. Offer GBS-positive clients with PROM choosing expectant management a range of options for prophylactic antibiotic administration:
 - a. IAP in active labour [II-2-B]
 - b. IAP in the latent phase [III-C]
 - c. IAP upon the initiation of induction of labour. [III-B]

Please note: recommendations 9-12 differ from those of the SOGC and the American Congress of Obstetricians and Gynecologists (ACOG). Rigorous information sharing with clients to assist them in making decisions is essential.

Expectant Management: Home or Hospital?

Midwives routinely offer the option of expectant management at home for clients with PROM, rather than requiring hospital admission prior to the onset of active labour. Very little research compares the outcomes of expectant management in home versus hospital.

In a secondary analysis of the Term PROM data, 1670 participants who were assigned to expectant management also had information collected about their location of management. It is important to note that individuals were not randomly allocated to home or hospital, but that location of management followed particular hospital routines or were made by individual physicians. (57) With

multiple regression analysis, it was found that participants managed at home were more likely to have neonates with infection (OR 1.97, CI 1.00-3.90). Primiparas managed at home were more likely to receive antibiotics (OR 1.52, CI 1.04-2.24) and GBS-negative participants managed at home were more likely to deliver by caesarean section (OR 1.48, CI 1.03-2.14). While the authors concluded that it was “generally safer” for individuals with PROM to remain in hospital for expectant management, there are several reasons to be cautious in assuming that these findings should inform midwifery practice. First, it is possible that the outcomes may have differed if participants were randomly allocated to home or hospital. Second, despite an attempt to avoid vaginal exams in the study, the analysis did not control for this factor, which is known to be a strong predictor of infection. Finally, it is unclear whether or not the participants allocated to expectant management at home received care that would be similar to that offered by Ontario midwives, including routine explanation of practices to minimize risk of infection, regular in-person care to evaluate maternal and fetal well-being, and good access to a health care provider in the event of questions or concerns. Secondary analysis of the Term PROM data also showed that multiparas were more likely to positively evaluate care if expectant management occurred at home rather than in the hospital, indicating that this group preferred to remain at home. (57)

Other studies that appear to address non-hospital expectant management are very small non-randomized designs. A prospective Swedish study examined the outcomes of 176 primiparas with PROM who were expectantly managed at home or in clinic. The results were compared with a historical group and found no differences in instrumental delivery, maternal infection or neonatal infection rates. (58)

Summary Statement

Evidence that exists to recommend expectant management in hospital with PROM is weak. Remaining at home during the latent period is recommended. In some circumstances, where a client has to travel long distances, in-hospital management may be a more practical management strategy for the latent period in clients planning hospital birth. (III)

RECOMMENDATION

13. For clients choosing expectant management following PROM at term, remaining at home during

the latent period is recommended, providing that daily in-person assessment occurs and that the client is aware of how and when to contact a midwife.

In-person assessment should include: monitoring maternal and fetal vital signs, examination of the amniotic fluid and discussion of the client's emotional well-being. [III-B]

Timing of Induction for PROM: When is the Latent Period Too Long?

There is no definitive length of the latent period at which the risks of PROM become significantly increased. Two studies were found that addressed the length of the latent period during expectant management of PROM and the risk of developing chorioamnionitis.

Secondary analyses of the Term PROM trial showed that clinical chorioamnionitis occurred in 6.7% of study participants, or 335/5028 participants. The absolute risk of clinical chorioamnionitis from time of rupture of membranes to onset of active labour changed over time from 1.3% at a time interval < 12 hours, to 1.5% from 12 to < 24 hours, to 2.3% from 24 to < 48 hours, to 1.35% when the time interval of ruptured membranes was ≥ 48 hours. When compared to a latent period of 12 hours, the OR of chorioamnionitis increases from 0.87 from 12 to < 24 hours, to 1.77 from 24 to < 48 hours, to 1.76 when ≥ 48 hours have elapsed. The most important single predictive factor for chorioamnionitis was multiple vaginal exams. (25) The Term PROM study did not show any difference in the overall rate of neonatal infection between in the induction or expectant management groups. The overall incidence of “definite or probable” neonatal infection in the Term PROM study was 2.6% or 133 cases/5028 births. In a secondary analysis of the Term PROM trial, the absolute risks of neonatal infection at different time intervals from rupture of membranes to onset of labour were the following: 0.77% from 12 to < 24 hours, 0.82% between 24 - < 48 hours and 0.54% when ≥ 48 hours. Using multiple logistic regression analysis to compare the OR of neonatal infection at these time intervals with an interval of less than 12 hours, the OR of neonatal infection increased when the length of time from the rupture membranes to onset of labour lasted 24 to 48 hours (OR 1.97, p = .02) or > 48 hours (OR 2.25, p = .01). This secondary analysis notes that the most important single predictive factor for neonatal infection was the presence of chorioamnionitis (OR 5.89, p < .0001). (30)

The length of the latent period had no effect on

endometritis. (25) Digital vaginal exams occurring in 1/3 of participants upon trial entry may have been a confounding factor for risk of chorioamnionitis and neonatal infection, particularly with longer latent periods.

A randomized, prospective study in Israel assigned 566 participants with PROM to expectant management with a limit of either 12 hours or 72 hours. This study excluded anyone who had a digital vaginal exam prior to active labour and had a strict policy to restrict vaginal exams to active labour or upon commencement of induction. Researchers assessed outcomes in each group for chorioamnionitis and type of delivery. There was no difference in the incidence of clinical chorioamnionitis between the 12-hour group (11.7%) and the 72-hour (12.7%) group (RR 0.9, 95% CI 0.6-1.5, p = .83). In addition, no significant differences between groups were found in rates of caesarean delivery or neonatal sepsis. (38) Without significant differences in maternal or neonatal outcomes, these results support individuals who wish to be managed expectantly for up to 72 hours. It should be noted that the study population had a median gravidity of 3, which may make the findings less applicable to the Canadian population.

No literature was found to provide guidance for individuals who choose expectant management beyond 96 hours of PROM.

RECOMMENDATIONS

14. In the absence of signs of maternal or fetal infection, inform clients who are GBS negative and choosing expectant management that it is reasonable to wait for a period of up to 96 hours before induction of labour. [I-A]
15. As part of an informed choice discussion regarding expectant management and the length of the latent period, inform clients that according to a secondary analysis of the Term PROM study, when compared with a latent period of 12 hours, the OR of chorioamnionitis and neonatal infection increase ≥ 24 hours after PROM. [II-2-B] Inform clients that avoiding vaginal exams until active labour appears to mitigate this risk, and is therefore an important part of an expectant management approach. [I-A]
16. Inform clients who choose expectant management beyond 96 hours that no research is available to quantify any potential increase in risks of maternal or fetal infection. [III-B]

Prophylactic Antibiotics for PROM at Term

As PROM may increase the risk of infection for the parturient and neonate, it has been suggested that the administration of prophylactic antibiotics could reduce the occurrence of infection. Little research exists regarding prophylactic antibiotics with PROM at term. A Spanish study randomized 735 participants with PROM (> 35 weeks' gestation) to receive intravenous ampicillin or no antibiotics. If labour had not begun within 12 hours of rupture of membranes, participants were induced with oxytocin. Researchers did not find a significant difference in rates of maternal infection between groups, but there was a decrease in neonatal sepsis in the group receiving antibiotics ($p = .03$). It should be noted that the majority of cases of sepsis were attributable to GBS. (59) This study pre-dated widespread GBS screening and prophylaxis and as many Canadians currently receive antibiotics for GBS prophylaxis, the findings are not applicable to the current context.

A Cochrane meta-analysis from 2009 assessed 2 trials, including the aforementioned study, including a total of 838 participants. No differences in neonatal outcomes were seen, but the use of antibiotics resulted in a decrease in chorioamnionitis and endometritis (RR 0.43, 95% CI 0.23-0.82). Because only 2 trials were included, results were based on a small sample and two specific schedules of antibiotic administration and induction. The author concluded that there was insufficient evidence to justify the use of antibiotics for all individuals with PROM. (60)

Summary Statement

Insufficient evidence exists to recommend antibiotics for all clients with term PROM. (I-L)

INTRAPARTUM MANAGEMENT

Baths

Having ruptured membranes could put individuals at increased risk for infection during a bath since water entering the vagina could facilitate the passage of microorganisms into the uterine cavity. The microorganisms may originate from the parturient may already be present in the tub. (61) Midwives commonly recommend having a warm bath during labour as it promotes relaxation and may reduce pain during labour. (62,63)

Two studies were identified that examined the question of whether or not the use of a warm tub bath in labour increases the risk of maternal and fetal infection with PROM. (61,64) In one non-randomized study of 1385 individuals with PROM > 34 weeks gestation (538 women who wanted a bath in labour and 847 who did not), no differences in maternal or neonatal infectious morbidity were detected between the bath group and the reference group. The authors analyzed the incidence of maternal or neonatal infectious morbidity with PROM < 24 hours and for those with PROM \geq 24 hours. No differences were found among these 2 subgroups. (64) A retrospective cohort study (N=178) also found no differences between groups in maternal or neonatal infection rates. No information related to the number of vaginal exams or the interval from the first digital exam until birth was available. (61)

Summary Statement

Evidence shows that taking a warm bath during labour with PROM is not associated with maternal or neonatal infectious morbidity. Taking warm baths during labour may be recommended for clients with PROM. (II-2)

Intrapartum Fetal Monitoring with PROM

No research literature was found to suggest that PROM or prolonged PROM in the absence of any evidence of fetal compromise is an indication for continuous electronic fetal monitoring.

In their clinical practice guideline on fetal health monitoring, the SOGC notes that the use of continuous electronic fetal monitoring may be beneficial with PROM > 24 hours. (65) There is no rationale given for this recommendation. Attention to fetal heart rate is important, either by intermittent auscultation or by electronic fetal monitoring, in order to detect fetal tachycardia, one of the first signs of clinical chorioamnionitis

RECOMMENDATION

17. In the absence of meconium staining of the amniotic fluid and any signs of fetal or maternal infection, it is appropriate for midwives to use intermittent auscultation as a method of intrapartum fetal monitoring for clients with PROM. [III-B]

POSTPARTUM MANAGEMENT

Treatment of the Newborn

PROM is associated with neonatal infection; therefore, care of the newborn following pregnancies affected by PROM includes monitoring for neonatal infection. Research evidence can be confusing regarding risk of neonatal infection and other factors combined with PROM. The following is a summary of research related to PROM and neonatal infection rates:

Summary of PROM Research Related to Neonatal Infection

No significant difference was found in neonatal infection rates with PROM among expectant management and induction of labour groups in the Term PROM study and Cochrane reviews. The absolute risk of neonatal infection in the Term PROM study was 2.8% for the expectant management (oxytocin) group and 2% for the induction of labour (oxytocin) group (OR 0.7, 95% CI 0.4-1.2) (34, 36) (level of evidence I).

Upon secondary analysis of the Term PROM study, certain factors in combination with PROM appear to be associated with a higher risk of neonatal infection: chorioamnionitis (OR 5.89, 95% CI 3.68-9.43, $p < .0001$, positive GBS status (OR 3.08, 95% CI 2.02-4.68, $p < .0001$), a latent period ≥ 48 hours (OR 2.25, 95% CI 1.21-4.18, $p = .01$), and increased frequency of vaginal exams (7-8) (OR 2.37, 95% CI 1.03-5.43, $p = .04$) (30) (level of evidence II-2).

In studies where a strict protocol of avoiding digital exams until labour induction or active labour was used, there was no difference in neonatal infection rates (37, 38) (level of evidence I)

The well newborn whose gestational parent is GBS negative and well may be assessed as usual, based on clinical signs and symptoms of infection. Diagnostic evaluation for sepsis is unnecessary for the clinically well newborn born to this group.

As always, if the newborn has any signs or symptoms of infection upon newborn exam or upon any subsequent exam, a prompt consultation with a physician is recommended.

Recommendations on the neonatal follow-up for newborns whose gestational parent had PROM and is GBS positive and where intrapartum antibiotic

prophylaxis has been administered fully, partially, or not at all will be addressed in an upcoming CPG on postpartum GBS sepsis prevention.

RECOMMENDATION

18. The well infant born to clients with PROM who are GBS negative may be assessed by the midwife as usual, based on clinical signs and symptoms of infection. [III-A]

CONCLUSION

Overall, prelabour rupture of membranes presents a number of issues for practicing midwives. While it is a common event, there continues to be intense debate around how to best manage individuals with PROM after 37+0 weeks gestation.

Clients must weigh evidence indicating a slightly increased risk of maternal infection with expectant management against risks associated with induction of labour. However, there is no difference in infection rates for policies of expectant management and active management with PROM when vaginal exams are limited to active labour.

Available research does not associate early induction of labour for women with PROM with an increased risk of operative delivery or caesarean section, but these individuals are more likely to require pain medication and continuous fetal monitoring. Therefore, an expectant management approach is more likely to result in a less interventive childbirth.

According to the Canadian Association of Midwives, “the concept of normality rests on the physiology of labour and the capacity of women to give birth with their own power.” (66) As there is no clear evidence regarding best practice with respect to managing clients with PROM and poor outcomes are relatively rare, midwives must balance the expectation that care providers must “do something” with the knowledge that such interventions may be unnecessary and contribute to increasing use of technological intervention in childbirth.

Given the trade-offs between different approaches to PROM, midwives should discuss both expectant management and induction of labour with their clients. Ultimately clients who experience PROM are best suited

to make the final decision about which option is best for them by weighing the risks and benefits within the context of their own values and interests.

RISK MANAGEMENT

Practice groups may wish to create a written protocol specific to the practice group that documents which of the recommendations within the Clinical Practice Guideline they are adopting and how they are putting into practice those recommendations, including what would be included in an informed choice discussion with each client. Midwives are advised to document clearly that an informed choice discussion has taken place. If the practice group has a written protocol about what should be discussed with each client, that discussion should be followed. Any deviation from that

discussion should also be documented in the client's chart. If there is no protocol about what information is provided then documentation in the client's chart should provide details of that discussion. If, based on the client's health or risk status, the midwife makes recommendations for monitoring or intervention that the client declines, the midwife should document that the recommendation was declined.

ACKNOWLEDGEMENTS

The Association of Ontario Midwives acknowledges the support of the Ontario Ministry of Health and Long-Term Care and Ryerson University Midwifery Education Program in providing resources for the development of this guideline.

SUMMARY OF RECOMMENDATIONS

1. Offer clients with PROM > 37+0 weeks' gestation the option of induction or expectant management. In the absence of abnormal findings (see *Table 5*), expectant management is as appropriate as induction of labour. [I-A]
2. Inform clients with PROM choosing expectant management that they have the option to revisit their management plan and may choose induction of labour if they no longer desire expectant management. [III-A]
3. In order to reduce the risk of maternal and neonatal infection, avoid digital vaginal exams for clients with PROM whenever possible, until active labour or upon induction of labour. [I-A]
4. Initial assessment for PROM may occur by telephone or in person.
 - a. If no abnormal signs or symptoms are present during history taking for suspected PROM by telephone, an in-person assessment to confirm PROM and make a management plan should follow the phone assessment within 24 hours from the time of membrane rupture. Ensure the client is aware of when and how to contact the midwife to arrange earlier assessment in the event that abnormal signs develop (presence of meconium in amniotic fluid, frank vaginal bleeding, fever > 38°C, foul smelling amniotic fluid or decreased fetal movement). [III-A]
 - b. If abnormal signs or symptoms are present during history taking related to PROM, an immediate in-person assessment is warranted. [III-A]
5. Diagnosis of PROM may occur with one or more of the following tests: sterile speculum exam, nitrazine or fern test. Test results should be interpreted in combination with a client's history of PROM. [II-2-B]
6. When results from any of the tests are uncertain, multiple tests (sterile speculum exam, nitrazine and/or fern test), as well as the midwife's clinical judgment, should be utilized to obtain a clearer clinical picture. Decision making may be supported by ultrasound evaluation of the amniotic fluid volume in instances when PROM results are uncertain, following the use of other diagnostic tests. [III-B]

7. Ensure that clients with PROM choosing expectant management are aware of when and how to page their midwife for support, should complications develop. [III-A]
8. For clients with PROM choosing expectant management, a daily, in-person, assessment should be conducted by the midwife either in the client's home, clinic or in the hospital. This assessment should include: monitoring maternal and fetal vital signs and examination of the amniotic fluid as well as a discussion of the client's emotional well-being. If any contraindications to expectant management are noted on physical exam, or for any other emotional or psychological reasons, offer induction of labour. [III-B]
9. Inform clients of the research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM.
10. Offer a choice between expectant management and immediate induction of labour with oxytocin to clients with a positive GBS swab result at term who experience PROM for < 18 hours, and have no other risk factors [III-B].
11. Recommend induction of labour with oxytocin to clients who are GBS positive with PROM \geq 18 hours [III-B]. IAP should be offered upon commencement of induction of labour.
12. Offer GBS-positive clients with PROM choosing expectant management a range of options for prophylactic antibiotic administration:
 - a. IAP in active labour [II-2-B]
 - b. IAP in the latent phase [III-C]
 - c. IAP upon the initiation of induction of labour. [III-B]

Please note: recommendations 9-12 differ from those of the SOGC and ACOG. Rigorous information sharing with clients to assist them in making decisions is essential.

13. For clients choosing expectant management following PROM at term, remaining at home during the latent period is recommended, providing that daily in-person assessment occurs and that the client is aware of how and when to contact a midwife. In-person assessment should include: monitoring maternal and fetal vital signs, examination of the amniotic fluid and discussion of the client's emotional well-being. [III-B]
14. In the absence of signs of maternal or fetal infection, inform clients who are GBS negative and choosing expectant management that it is reasonable to wait for a period of up to 96 hours before induction of labour. [I-A]
15. As part of an informed choice discussion regarding expectant management and the length of the latent period, inform clients that according to a secondary analysis of the Term PROM study, when compared with a latent period of 12 hours, the OR of chorioamnionitis and neonatal infection increase \geq 24 hours after PROM. [II-2-B] Inform clients that avoiding vaginal exams until active labour appears to mitigate this risk, and is therefore an important part of an expectant management approach. [I-A]
16. Inform clients who choose expectant management beyond 96 hours that no research is available to quantify any potential increase in risks of maternal or fetal infection. [III-B]
17. In the absence of meconium staining of the amniotic fluid and any signs of fetal or maternal infection, it is appropriate for midwives to use intermittent auscultation as a method of intrapartum fetal monitoring for clients with PROM. [III-B]
18. The well infant born to clients with PROM who are GBS negative may be assessed by the midwife as usual, based on clinical signs and symptoms of infection. [III-A]

Note: Recommendations on neonatal follow-up for newborns whose mother had PROM and is GBS positive and where intrapartum antibiotic prophylaxis has been administered fully, partially, or not at all will be addressed in an upcoming CPG on Postpartum GBS sepsis prevention.

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