

Transvaginal cervical length and amniotic fluid index: can it predict delivery latency following preterm premature rupture of membranes?

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OBJECTIVE: We sought to determine whether transvaginal cervical length (TVCL), amniotic fluid index (AFI), or a combination of both can predict delivery latency within 7 days in women presenting with preterm premature rupture of membranes (PPROM).

STUDY DESIGN: This was a prospective observational study of TVCL measurements in 106 singleton pregnancies with PPRM between 23-33 weeks. Delivery latency was defined as the period (in days) from the initial TVCL after PPRM to delivery of the infant, with our primary outcome being delivery within 7 days of TVCL. The independent predictability of significant characteristics for delivery within 7 days was determined using multiple logistic regression. Sensitivity, specificity, and predictive values were used to examine whether the presence of a short TVCL, AFI, or a combination of both affected the risk of delivery within 7 days.

RESULTS: Delivery within 7 days occurred in 51/106 (48%) of pregnancies. Median duration (interquartile range) from PPRM to delivery and TVCL to delivery was 8 days (4.0–16.0) and 8 days (3.0–15.0), respectively. Using multiple regression TVCL as a continuous variable (odds ratio, 0.65; 95% confidence interval, 0.44–0.97; $P < .05$), AFI ≤ 5 cm (odds ratio, 4.69; 95% confidence

interval, 1.58–13.93; $P < .01$) were determined to be independent predictors of delivery within 7 days. In all, 42 women (40%) had a TVCL ≤ 2 cm, while 62 (59%) had AFI ≤ 5 cm. A total of 26 women (25%) had a combination of both TVCL ≤ 2 cm and AFI ≤ 5 cm, while 28 women (27%) had neither characteristic. The predictive value of delivery within 7 days for a TVCL ≤ 2 cm was 62%, and for an AFI ≤ 5 cm was 58%. Having a combination of low TVCL and low AFI did not increase the predictive value of delivery within 7 days (58%). In contrast, only 3 of 27 women (11%) with neither characteristic delivered within 7 days. The predictive value of delivery >7 days for TVCL >2 cm alone was 61%. This predictive value changed when analyzed in conjunction with an AFI ≤ 5 cm and >5 cm at 42% and 89%, respectively.

CONCLUSION: A shorter TVCL and an AFI ≤ 5 cm independently predict delivery within 7 days in women presenting with PPRM. The combination of an AFI >5 cm and TVCL >2 cm greatly improved the potential to remain undelivered at 7 days following cervical length assessment. These findings may be helpful for counseling and optimizing maternal and neonatal care in women with PPRM.

Key words: amniotic fluid index, cervical length, labor latency, preterm birth, preterm premature rupture of membranes

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Preterm premature rupture of membranes (PPROM) is a breach of the chorioamniotic membrane prior to the onset of labor at <37 weeks of gestation. It affects up to 3% of all pregnancies,^{1,2} and accounts for about one third of all preterm births.³ The rate

of preterm birth, 12.8% in 2006, represents a 36% increase since 1981.⁴ Patients with PPRM are often hospitalized for a prolonged period of time, and deliver premature infants who frequently require neonatal intensive care.^{3,5} These women and their infants contribute significantly to obstetric and neonatal health care costs.⁶ Predicting the time to delivery (latency) is difficult for an individual patient, leading to uncertainty for both the patient and the health care provider. The prediction of delivery latency could help direct the need for specific interventions such as hospitalization, intensive monitoring, timing of antenatal steroids, and magnesium for neuroprotection.^{3,7}

Transvaginal ultrasound (TVU) for the determination of cervical length

(CL) has been demonstrated to predict the risk of preterm delivery with intact membranes in both singletons and twin gestations.⁸⁻¹¹ The safety of serial TVU is consistently reported with no significant increase in endometritis, chorioamnionitis, or neonatal infection in women with PPRM.^{12,13} Still, the use of TVU has previously been avoided in the presence of ruptured membranes; therefore, its use in the management of PPRM has been infrequently studied. Studies show that accurate measurement of CL cannot be reproduced as reliably with either abdominal or translabial ultrasound.¹⁴ CL by translabial ultrasound was not found to be associated with the duration of latency period following PPRM.¹⁵

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A few studies reported that a CL <2 cm may be associated with a shorter latency to delivery.^{13,16,17} Prior studies found that a low (≤ 5 cm) amniotic fluid index (AFI) in PPROM is associated with a shorter latency and a higher rate of delivery within 7 days compared to women with a normal AFI.¹⁸⁻²¹ However, it is unclear how these 2 clinical variables can be used, either

independently or in combination with CL, to help predict delivery latency.

The purpose of this study was to examine the relationship among CL, amniotic fluid volume, and latency in women presenting with PPROM. Secondly, we sought to determine how other variables predict latency in this population. We hypothesized that after PPROM, an initial transvaginal

CL (TVCL) would independently predict the latency period within 7 days and that AFI would improve this predictive ability.

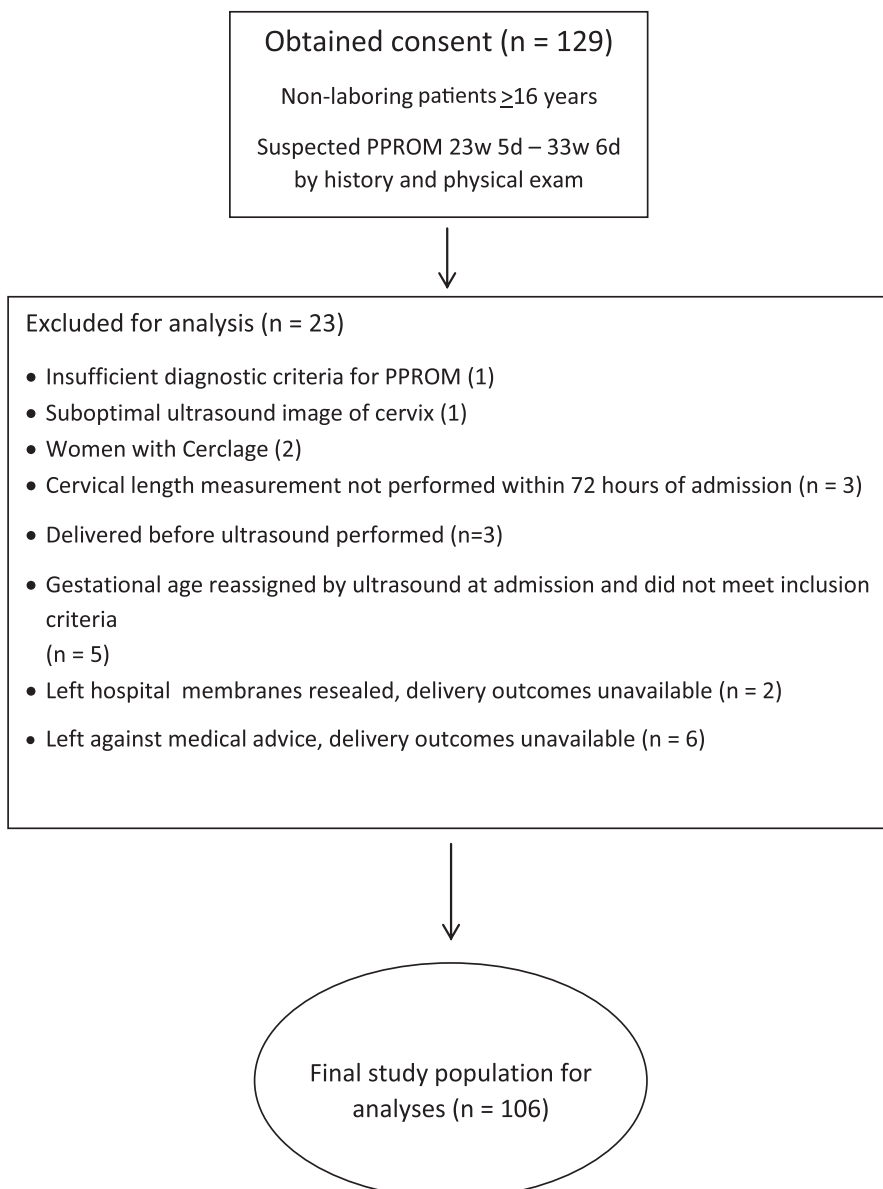
MATERIALS AND METHODS

The study was conducted from July 2011 through March 2014 at a single perinatal center. This study was approved by the Institutional Review Board at Saint Louis University. This was a prospective observational study in women with PPROM who consented to undergo TVCL measurement after admission.

Eligible women included nonlaboring patients, ages ≥ 16 , with singleton gestation who presented with PPROM between the gestational age (GA) of 23 weeks 5 days–33 weeks 6 days. PPROM was diagnosed by history and physical examination, which included documentation of nitrazine- or fern-positive pooled vaginal fluid obtained by sterile speculum examination. In equivocal cases a placental alpha microglobulin-1 protein assay was performed from the vaginal fluid sample. GA was calculated from the first day of the last normal menstrual period and an ultrasound in early pregnancy when available. Women were excluded prior to enrollment for labor (defined as painful uterine contractions ≥ 12 in an hour and cervical dilation of >3 cm confirmed by digital examination), for being non-English speaking, or for having had >1 digital examination following PPROM. Following study enrollment women were excluded for a variety of reasons (Figure 1).

All women were hospitalized and placed on modified bed rest. TVCL was performed within 72 hours of admission using the CLEAR guidelines.²² Measurements of the TVCL were taken after visualizing the endocervical canal in its entirety for 3-5 minutes, with an empty maternal bladder. Calipers were placed where the anterior and posterior walls of the cervix were sonographically opposed and the shortest technically best measurements were used. The presence of funneling was noted. AFI was recorded at the time of the TVCL measurement. Prophylactic antibiotics

FIGURE 1
Study inclusion characteristics



PPROM, preterm premature rupture of membranes.

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