Transvaginal Ultrasound in the Prediction of Preterm Delivery: Singleton and Twin Gestations

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To compare, in singleton and twin pregnancies, the effectiveness of transvaginal ultrasound versus digital examination in predicting preterm delivery in women with suspected preterm labor.

**Title:** Transvaginal Ultrasound in the Prediction of Preterm Delivery: Singleton and Twin Gestations

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**Study Design:** This is a prospective group-comparison (modified case control) using cross-sectional data.

**Rating:**

**Abstract:**

**Objective:** To compare, in singleton and twin pregnancies, the effectiveness of transvaginal ultrasound versus digital examination in predicting preterm delivery in women with suspected preterm labor.

**Methods:** Transvaginal ultrasound and pelvic examinations were performed on patients admitted with suspected preterm labor between 23 and 33 weeks' gestation. Ultrasound assessment of cervical length and the presence of funneling with fundal pressure were recorded for each patient, and the results were compared with dilatation and effacement as assessed by digital examination for the prediction of preterm delivery in the two groups (singletons and twins).

**Results:** One hundred sixty-two subjects were recruited (136 singletons and 26 twin pregnancies), with no significant demographic differences between the groups. Overall, 33% of the participants delivered preterm (27% of singletons, 62% of twins). Using receiver operating characteristic curves, the best cutoff points were 30 mm for endocervical length at ultrasound, 50% for effacement, and 1.5 cm for dilatation. Of these, the best predictor was endocervical length, which was a better predictor in singleton than in twin pregnancies. Of the potential predictors, including endocervical length, funneling, dilatation, and effacement, only endocervical length was an independent predictor of preterm delivery at less than 34 weeks' gestation for both singletons and twins by multiple logistic regression. When analyzed for delivery at less than 37 weeks' gestation, this relation held true for singletons but not twins. Endocervical length less than 30 mm had a sensitivity of 81% and 75%, specificity of 65% and 30%, positive predictive value of 46% and 63%, and negative predictive value of 90%, and 43% for singleton and twin pregnancies, respectively, in predicting spontaneous birth at less than 37 weeks' gestation.
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Conclusion: Between 23 and 33 weeks' gestation, transvaginal ultrasound assessment of endocervical length is superior to funneling and digital examination in predicting preterm delivery in patients who present with suspected preterm labor, and is a better predictor in singletons than in twins. (Obstet Gynecol 1997; 90:357-63. (c) 1997 by The American College of Obstetricians and Gynecologists.)

Commentary

The primary conclusion that a sonographic endovaginal measurement of 3.0 cm or less is a better predictor of preterm deliver in singleton pregnancies than other methods (sonographic observation of funneling or digital examination) is useful information. It is less useful for twin gestations. The cervical length of 3.0 cm is on the same order as that described by others for incompetent cervix (2.5 cm or less). 1,2 Others have agreed that the normal pre-labor cervical length should be at least 4.0 to 3.0 cm. 3,4

The study population excluded patients with a diagnosis of active preterm labor, active vaginal bleeding, placenta previa, ROM, cervical cerclage, known stillbirths, cervical dilation greater than 3 cm, and multiple gestations greater than twins; i.e., they only included suspected preterm labor between 23 and 33 weeks gestation with regular contractions, and cervical changes. There are eighteen referenced publications; most are recent (1990's). The article is devoid of sonographic images, examples of which would have been instructional. There was little discussion of the endovaginal sonographic technique used other than to state, "With the maternal bladder empty, the cervical length was measured in the sagittal plane after visualizing simultaneously the internal and external cervical os." In addition there was no discussion of the experience of the observers, though it appears obvious that they were highly experienced; in less experienced hands the results may be more variable.

In the discussion one of the advantages of endovaginal sonography over digital examination it was stated: "Furthermore, accurate assessment of the effacement through the cervical canal may lead to local cervical activation of prostaglandins, which theoretically could increase the risk of preterm birth." There was no discussion of the same mechanism functioning due to "cervical massage" by the endovaginal transducer. For this reason an interesting follow-up research project would be to compare the accuracy of endovaginal against translabial and transperineal measurement of cervical length.5 While intuition would tell us there should be no difference in the measurements, to this reviewer's knowledge, this has not been scientifically tested except in the comparison of embryonic crown-rump lengths using transabdominal and endovaginal techniques.6,7

Further commentary

This is a prospective observational study which addresses two important current questions about to the biophysical assessment of the cervix. The paper is topical and fits in well with recent studies which showed increased likelihood of preterm delivery with shortened cervical [1] and that shortening and/or funneling is associated with PTL [2]. It addresses two main questions: 1. which is the best test and 2. how does performance compare in singletons and twins.

1. The results show that in this study population, 30 mm cervical length is the cut-off for a significant improvement in prediction. Digital assessment in comparison is not predictive. Nor is funnelling: in addition to ROC curves, the authors are able to demonstrate through a multiple regression analysis of different parameters that funnelling has little to add once cervical length is in the equation. This is important new information and allows future management studies to concentrate on this measurement.

2. The comparison between singletons and twins is also novel and shows that twins need to be evaluated differently, most (61%) will go into PTL and that again cervical length only is useful, at the earlier gestational cut-off of 34 weeks.

My only quibbles are minor and relate to the way some of the data are presented: if clearly skewed
e.g. the digital assessment data in Table 2, or the gestational age & delay to delivery data in Table 3, non-parametric methods would be more applicable and more informative - e.g. to state the number of pregnancies which continued for more than 2 weeks, four weeks, etc, (rather than a mean with a large standard deviation).

I think this is a good, authoritative paper which should help to formulate protocols for management trials in pregnancies presenting with threatened preterm labour. It is important to remember that this study makes a statement on the usefulness of these tests in a selected population, i.e. those who were admitted in threatened PTL and in whom contractions had settled (with or without tocolytics). Hence the results can NOT be transferred to other populations in whom cervical ultrasonography has been tried - e.g. in asymptomatic populations considered at high risk of preterm labor on history; those suspected of cervical incompetence; or as a screening test for the general population.

References:
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