



Evaluation of the length of the cervix by transvaginal and transabdominal ultrasonography in the second trimester

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OBJECTIVE(S): To evaluate the cervical canal in the second trimester by transvaginal and transabdominal ultrasonography and to find the one which is more accurate of the two.

METHOD(S): One hundred and twenty pregnant women were enrolled in this prospective study. Women with cervical incompetence, multiple gestation, maternal medical diseases, previous cervical surgery and history of preterm delivery were excluded. Maternal and fetal data were collected. Each woman underwent a transabdominal and endovaginal ultrasonographic cervical length measurement. Statistical comparisons were made between the two ultrasonographic methods for gestational age at birth and parity. Significance was set at $P < 0.05$.

RESULTS: Preterm delivery occurred in 14.2% of the women. Transvaginal ultrasonographic cervical length measurements of term and preterm deliveries showed a statistically significant difference ($P < 0.05$) but no significant difference was found in transabdominal measurements ($P > 0.05$). Although transvaginal cervical length measurements showed a statistically significant difference between primiparous and multiparous women ($P < 0.05$), the difference was at significance limit by transabdominal route ($P=0.05$).

CONCLUSION(S): Transvaginal ultrasonography seems to be the optimal method for the assessment of cervical length in the second trimester and for screening for spontaneous preterm delivery.

Key words: cervical length, transvaginal sonography, transabdominal sonography

Introduction:

In order to assess the risk of preterm delivery, the evaluation of the condition of the uterine cervix is important. The evaluation of the cervix by digital examination and Bishop score is unsatisfactory. There is a large variation among examiners in digital examination and it is only possible to identify the dilatation of the cervix when the ripening has advanced¹. Before detecting the cervical ripening by digital examination, it is possible to measure the cervical length by ultrasonography. Ultrasonographic method offers the examiner a more objective way. The value of this method

has been examined by many investigators²⁻⁷ and it is demonstrated that a shorter cervix predicts a higher risk of spontaneous preterm delivery^{2,4,6}.

In clinical practice, for dating and screening for fetal congenital anomalies, most patients undergo ultrasonography in the second trimester of pregnancy by transabdominal route. Large studies conducted to date have used transvaginal method to assess cervical length in the second trimester^{2,6,8}. We planned this study to identify the optimal method of ultrasonography for the assessment of cervical length in the second trimester and to determine the more accurate method in screening for spontaneous preterm delivery.

Methods

A prospective study was performed on 120 pregnant women attending our antenatal clinic in their 1st trimester

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between January 2002 and December 2002. Women with fetal anomalies, maternal medical diseases (diabetes mellitus, hypertension, thyroid diseases etc.), cervical incompetency, previous cervical surgery, multiple pregnancies, and those with a history of previous preterm delivery were excluded. The purpose of selecting the study group in the first trimester was to exclude these women.

At the first visit, maternal age, first day of last menstrual period and parity were recorded, and a first trimester ultrasonographic evaluation was performed for dating the gestation. A second scan was performed between 16 and 18 weeks for fetal congenital anomaly screening and at the third visit at 20-24 weeks, each woman underwent a transabdominal ultrasonographic measurement of cervical length with full bladder. Then, the subjects were asked to empty their bladders and endovaginal ultrasonographic cervical length measurement was performed in the lithotomy position with a 5-MHz transvaginal probe. The entire cervical canal was visualized both in abdominal and endovaginal routes. Markers were placed at the furthest points between the internal os and the external os. Two measurements were obtained for each route and the minimum values were recorded. All examinations were performed by the same examiner.

All women were followed throughout the course of gestation and delivered in our hospital. None underwent induced preterm delivery because of other gestational complications. Preterm delivery was defined as delivery before 37 weeks of gestation. Data were analyzed and statistical comparisons were made between the two ultrasonographic methods for gestational age at birth and parity. To evaluate the predictive value of the mean cervical length measurement for preterm birth, the sensitivity, specificity, positive and negative predictive values for mean ± 1 standard deviation of the mean cervical length of all subjects calculated. 36.17 mm for transvaginal and 27.35 mm for transabdominal ultrasonography were taken as cut-off values. The same values were also calculated for mean ± 2 standard deviation. 28.51 mm for transvaginal and 19.49 mm for transabdominal ultrasonography were taken as cut off values. For statistical analysis, chi-square test and Fisher's exact test were used as appropriate. Significance was set at $P < 0.05$.

Results

The mean maternal age of the study population was 25.38 ± 4.54 years (range 18 - 35), and 45% (54/120) of the women were nulliparous and 55% (66/120) multiparous. Mean gestational age at the time of ultrasonographic cervical length

measurement was 22.06 ± 1.53 weeks (range 20 - 24) and mean gestational age at birth was 38.33 ± 1.85 weeks (range 32 - 42). Preterm delivery (before 37 weeks) was observed in 14.2% (n=17) and 85.8 % (n=103) delivered after 37 weeks of gestation.

The mean cervical length was found to be 35.21 ± 7.86 mm by transabdominal ultrasonography and endovaginal measurement of cervical length revealed a mean of 43.83 ± 7.66 mm. The mean cervical length measurements of the women with regard to parity and gestational age at birth are shown in Table 1. A statistically significant difference was found between transvaginal ultrasonographic cervical length measurements of term and preterm deliveries ($p=0.012$). However, no significant difference was found between transabdominal ultrasonographic measurements of term and preterm deliveries ($p=0.106$). Although, transvaginal cervical length measurements showed a statistically significant difference between primiparous and multiparous women ($p=0.006$), such difference was not at significance limit when transabdominal measurements of cervical length were compared for parity ($p=0.052$).

The sensitivity, specificity, positive and negative predictive values for the cut-off value taken as -1 standard deviation are 17.6%, 88.3%, 20% and 86.4%, respectively for transabdominal ultrasonography and 41.2%, 87.4%, 35% and 90% for transvaginal ultrasonography. For -2 standard deviation as a cut-off, the sensitivity, specificity, positive and negative predictive values calculated are 5.9%, 99%, 50% and 86.4%, for transabdominal ultrasonography and 5.9%, 100%, 100% and 86.6% for transvaginal ultrasonography.

Discussion

In developed countries, the major cause of perinatal morbidity and mortality is preterm birth⁹. Predicting spontaneous preterm birth will help in early intervention and improvement in outcome. Numerous investigators have developed risk scoring systems but there is still no reduction in the rate of preterm birth in the general population¹⁰. Early confirmation of cervical changes is possible by ultrasonographic examination, value of which is studied by several investigators²⁻⁷. A short cervix at ultrasonography was reported as an independent predictor of preterm delivery¹¹.

For preterm delivery risk assessment, cervical assessment by ultrasonography is not a routine¹². Besides there is no standardization of methods. In addition the identification of the optimal time and method of the examination is required. In this study, we have screened all pregnant women seen

during the year 2002 to find out the method of ultrasonography that can provide precise measurements of cervical length.

Screening with transabdominal ultrasonography is more acceptable to women than endovaginal ultrasonography ¹¹. However, over distended bladder can cause overestimation of cervical length which is a concern in screening with transabdominal route ¹¹. With an empty bladder, because of inadequate visualization of the cervix, about half of the cervical length measurements are not possible on transabdominal sonography and ^{12,13} funnelling of the cervix can be missed ¹¹. Besides, transabdominal ultrasonography is unsatisfactory because of technical drawbacks that produce inaccurate images ^{4,14}.

Andersen et al ¹⁴ were the first to note the use of endovaginal ultrasonography in the prediction of preterm birth. They reported a cervix of less than 39 mm before 30 weeks of gestation as a risk factor for early delivery. Visualization of the cervix is possible in nearly all patients by transvaginal ultrasonography with an empty bladder ¹⁴. Advances in the transvaginal ultrasonographic tecnic have made the cervical length measurement more objective and endovaginal ultrasonography is a promising method for the prediction of risk of preterm delivery ¹⁴.

Interestingly, in studies performed by Zemlyn ¹⁵, Bowie et al ¹⁶ and Verma et al ¹⁷, evaluation of the cervix was performed by transabdominal ultrasonography with an empty or nearly empty bladder, and the mean cervical lengths determined by these researchers were similar to those detected by transvaginal ultrasonography. In our study, mean cervical lengths detected by transvaginal ultrasonography were not similar with transabdominal measurements. Shorter cervical length measurements on transvaginal sonography may be due to incomplete filling of the bladder.

Comparison of mean cervical lengths of women who delivered infants preterm and at term are presented in Table 1. By each method the mean cervical length was shorter among women who delivered preterm, but only the measurements of endovaginal ultrasonography were statistically different. These results confirm the findings of previous study conducted by Andersen et al ¹⁴ and clearly show the superiority of transvaginal route in the prediction of preterm delivery risk. Previous studies performed by transvaginal ultrasonography also showed a statistically significantly shorter cervix in women who delivered preterm ^{1,18}.

In our study, transvaginal cervical length measurements showed a statistically significant difference between primiparous and multiparous patients. When the mean cervical lengths of women were examined with regard to parity, irrespective of gestational age at birth, mean cervical lengths of nulliparous women were found to be longer than those of multiparous ones by both the methods. In another study conducted by transvaginal ultrasonography, the mean cervical length measurements of multiparas were longer at both 24 and 28 weeks of gestation, confirming our results. In the literature, some investigators reported a significant difference ³ and some reported that there is not a significant difference between cervical canal length measurements of nulliparous and multiparous women ¹⁻¹⁸. Zarzoti et al ¹⁹ claimed that irrespective of gestational age, multiparous women have longer cervical canal lengths than nulliparous women. There is no consensus about this in the literature and we know that even if the mean cervical lengths differ significantly in nulliparous and multiparous women, it has no clinical importance ³.

Table 1. The mean cervical length measurements with regard to parity and gestational age at birth.

	Transabdominal sonography cervical length (mm)	Transvaginal sonography cervical length (mm)
Parity		
Nulliparous	36.47 ± 8.49	45.56 ± 7.60
Multiparous	33.67 ± 6.77	41.72 ± 7.26
Gestational age		
Term	35.68 ± 7.72	44.54 ± 6.96
Preterm	32.35 ± 8.34	39.53 ± 10.22

Owen et al ²⁰ reported that a cervical length measurement shorter than 25 mm on transvaginal sonography at 16-18 weeks of gestation increases the risk of spontaneous preterm birth by 3.3 fold (95% CI 2.1-5.0, sensitivity 19%, specificity 98%, positive predictive value 55%). Hibbard et al ¹⁸ report that on transvaginal sonography the sensitivity, specificity, positive and negative predictive values of the cervical length ≤ 22 mm between 16 and 22 weeks of gestation are 12.9%, 98.5%, 30.0% and 89.6% respectively and with cervical length measurement of ≤ 30 mm they are 32.9%, 91.3%, 32.7% and 90.1%.

This study being an observational study, we have no recommendation on how to treat women with abnormal cervical length detected in the second trimester. But we infer that transvaginal cervical length measurement can be

established as one of the predictors of preterm delivery and can be routinely used to select women for early interventional trials.

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