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Does Routine Universal Cervical Length Screening Reduce The Incidence Of Preterm Birth?

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Introduction

Preterm birth (PTB) remains a major cause of perinatal morbidity and mortality. Premature birth in the United States accounts for 35% of deaths in the first year of life. The Institute of Medicine's Committee on Understanding Premature Birth and Assuring Healthy Outcomes estimated the annual economic burden associated with preterm birth in the United States for the year 2015 to be at least $26.2 billion.[1] Medical care services comprised $16.9 billion while maternal delivery costs comprised $1.9 billion. Longer term costs included $611 million for early intervention services and $1.1 billion for special education services.[1] Recently, Kuban, et al[2] studied long-term outcomes of prematurity by analyzing cognitive, behavioral, and neurological parameters in premature children at the age of 10. Of the children, 28% of boys and 21% of girls exhibited moderate to severe impairment of cognitive abilities. Boys had a higher prevalence of impairment than girls in nearly all measures of cognition, were more than twice as likely to have microcephaly (15% in boys, 8% in girls), and require more often assistive devices to ambulate. In contrast, boys and girls had comparable risk of seizure or epilepsy. The committee estimated that lost household and labor market productivity comprised $5.7 billion. While approximately 20% of preterm births are indicated preterm births due to medical or obstetrical complications that jeopardize the health of the mother and/or the fetus, the majority of preterm births are spontaneous preterm births that occur as a result of preterm labor or preterm rupture of fetal membranes.

Potential interventions for reducing the incidence of spontaneous preterm birth can be classified as primary (aimed at all pregnant women), or secondary (aimed at reducing the risk in women with a previous preterm birth). Secondary among such interventions are progesterone prophylaxis and cervical cerclage placement.

A prior history of preterm birth is a major risk factor for preterm birth; however, many women who deliver preterm do not have a history of prior preterm birth. A statistically significant inverse relationship between midtrimester cervical length (CL) and preterm birth has been demonstrated in several studies.[3-5] The risk for preterm birth associated with a cervical length below the 10th percentile (25mm) at 18 to 24 weeks is between 25% and 30%, and the risk associated with cervical length at or below the 3rd percentile (15mm) is above 50%.

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The goal of the study is to assess the usefulness of universal CL screening in reducing the incidence of preterm birth in a large community-based practice.

Materials and Methods

Since 2006, we have instituted a policy of routine cervical length screening via transvaginal ultrasound. Cervical length screening generally begins between 16 and 24 weeks. If the cervix measures more than 35 mm, the exam is repeated every 2 weeks until 32 weeks of gestation. A cervical length of 25 mm to 35 mm is managed with weekly follow-ups. If the cervical length is less than 25 mm, surgical (cerclage), medical (progesterone, tocolytics) or combined therapy is applied.

Statistical analysis

Numerical variables are presented as median (interquartile range [IQR]) and categorical data are presented as a number (percentage). Linear regression was used to assess the relationship between the cervical length, treatment modality and preterm birth. Statistical analysis was performed using IBM SPSS Statistics for Windows (version 20.0; IBM Corporation, Armonk, NY). All statistical tests were 2-sided, and a probability value of <.05 was considered statistically significant. Patients of a different group practice using standard management protocol served as the control group. Preterm birth was defined as a delivery between more than 24 and less than 37 weeks of pregnancy.

Results

A total of 1,319 patients comprised the study group and 2,518 were included into the control group. Patients who delivered at less than 32 weeks were considered extremely premature, while those who delivered in less than 37 weeks were of moderate prematurity (Table 1).

Table 1

Gestational age at birth	Study group (N=1319)	Control group (N=2518)
Under 32 weeks	30 2.3 %	78 3.1 %*
More than 32 weeks, less than 37 weeks	55 4.17 %	152 6.03 %
Total preterm	85 6.47 %	230 9.13 %*

*P<0.05

Discussion

Universal cervical length screening has not been universally adopted. The most recent report of the FIGO Working Group on Best Practice in Maternal-Fetal Medicine published in January 2015, recommends that cervical length measurement should be performed in all pregnant patients at 19-23 6/7 weeks of gestation using transvaginal ultrasound. They further recommend that women with a short cervix (<25 mm) diagnosed in the mid-trimester be offered daily vaginal micronized progesterone treatment.[6] However, this approach is far from being universally accepted.

The implementation of a policy of universal second-trimester cervical length assessment remains a contentious topic and is countered by the additional burden it places on the health care system.[7] Alternative strategies, such as using obstetric history to select women who would then undergo screening, have been proposed instead.[8,9]

ACOG Practice Bulletin on prematurity agrees that transvaginal cervical ultrasonography has been shown to be a reliable and reproducible way to assess the length of the cervix.[10] Unlike the transabdominal approach, transvaginal cervical ultrasonography is not affected by maternal obesity, the position of the cervix, or shadowing from the fetal presenting part.[11,12] Most authorities agree that cervical screening and progesterone supplementation should be offered to pregnant women with a prior spontaneous preterm birth.[13-15] However, when it comes to the management of patients without prior history of preterm delivery, opinions differ.[13] Miller, et al,[7] conducted a cohort study of women with a singleton gestation without a history of preterm birth who underwent routine transvaginal second-trimester cervical length screening. According to this study, specificity increases from 62.8% for universal screening to 96.5% with a risk-based approach. They concluded that limiting cervical length screening to women with at least one of the identified risk factors for a short cervix substantially decreases the number of sonograms. However, this strategy results in nearly 40% of women with a short cervix not being ascertained. Arguing against universal screening authors admitted that a risk-based system instead of universal cervical length screening, a reasonably large number of women with a short cervix and a preterm birth will not be identified. In July 2011, a program was implemented, by Son et al,[16] in which all pregnant women who had a sonogram at 18-24 weeks of gestation were to receive a transvaginal cervical length measurement. The preterm birth rates were compared before and after the implementation of the universal cervical length-screening program. Multivariable analysis was used to identify whether the universal cervical length-screening program was associated independently with the frequency of preterm birth. Of 64,207 eligible women, 46,598 underwent their mid-trimester sonogram before the universal cervical length-screening program, and 17,609 underwent a sonogram after implementation of the program. The introduction of the cervical length program was associated with a significant decrease in the frequency of preterm birth at all gestational ages of less than 37 weeks. This reduction in frequency of preterm birth was primarily due to a change in spontaneous preterm births.

Our policy of universal cervical length screening in a large community based practice confirms its effectiveness in reducing preterm births. Our recommendations agree with the ones by Werner, et al[15] who performed a cost-effectiveness analysis of universal cervical length screening. These authors concluded that in low risk pregnancies, universal transvaginal cervical length ultrasound screening appears to be a cost effective strategy. For every 100,000 women screened, $12,119,947 can be potentially saved and 423.9 quality adjusted life years could be gained. When assessing expense for additional sonograms versus the cost of prematurity the multimillion law suites expenses related to prematurity should also be accounted for.

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