Cervical Length in the Early Second Trimester for Detection of Triplet Pregnanacies at Risk for Preterm Birth

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Objective. Preterm triplet delivery is common and has a tremendous impact on neonatal mortality and morbidity. We aimed at assessing early second-trimester cervical length as a means of detecting triplet pregnancies at risk for preterm birth. Methods. Cervical length was measured in triplet pregnancies during weeks 14 to 20. Cervical length of less than 25 mm was used as a cutoff to divide individuals into 2 groups. Perinatal outcome parameters were compared between the 2 groups and included gestational age at delivery, birth weights, and neonatal intensive care unit admission rates. Sensitivity, specificity, and positive and negative predictive values were calculated for cervical length as a screening method for preterm birth. Results. We evaluated 36 triplets during weeks 14 to 20. Cervical length of less than 25 mm was measured in 14 (group I), 12 of which were delivered before 32 weeks (mean ± SD, 28.4 ± 3.1 weeks). Four of 22 women with cervical length of greater than 25 mm (group II) had delivery before 32 weeks (mean, 30.1 ± 1.8 weeks). The mean gestational age at delivery for all parturients from group II was 33.1 ± 2.1 weeks (P < .05). Group I neonates had lower birth weights (972 versus 1889 g; P < .001) and higher rates of low 5-minute Apgar scores and neonatal intensive care unit admissions compared with group II neonates. The sensitivity of a shorter cervix as a predictor of preterm labor was 75%, with specificity of 90%, a positive predictive value of 83%, and a negative predictive value of 81%. Conclusions. Cervical length of less than 25 mm at 14 to 20 weeks’ gestation is associated with preterm delivery and adverse perinatal outcome in triplet pregnancies.

Key words: cervical length; preterm; triplets.
The role of cervical length in detection of women susceptible to preterm labor of singletons and twins had been studied widely.\(^5\)\(^-\)\(^10\) In light of the considerable preterm delivery rate in triplets and its impact on neonatal mortality and morbidity, it is prudent to address the predictive potential of early second-trimester cervical length measurements. The paucity of published studies on this issue motivated us to evaluate our experience regarding the clinical implications of reduced cervical length in triplet pregnancies.

**Materials and Methods**

We evaluated the medical files of women with triplechorionic triplet pregnancies referred to the ultrasound unit from January 2001 to December 2003 for consultation regarding multifetal pregnancy reduction (MFPR). First-trimester sonographic scanning and early fetal malformation screening were available to all participants. In our institution, couples with triplets are counseled, and MFPR is offered. Most patients indeed opt for MFPR, but because we aimed at assessing exclusively triplet pregnancies, we excluded them from the current study.

Gestational age was calculated either from the date of embryo transfer (for in vitro fertilization) or by crown-rump length measurement during the first 8 weeks of pregnancy. Cervical length assessment was performed by a skilled sonographer (A.J., J.H., or G.F.) during gestational weeks 14 to 20. The examinee lay in the dorsal lithotomy position with an empty urinary bladder. Cervical length was measured by a transvaginal probe with a dynamic focus (Sonoline Elegra, 5–7 MHz; Siemens Medical Solutions, Mountain View, CA) introduced into the anterior vaginal fornix. A sagittal view of the endocervical mucosa marking the cervical canal was obtained, and the distance along the hypoechoic line of endocervical apposition between the external os (marked by a triangular area of echogenicity at the caudal tip) and the internal os was measured. In cases of a curvilinear line, the overall length was obtained by summing linear fragments of the canal. Measurements were done with the optimal achievable view: the whole length had to be visualized with equal widths of the 2 cervical lips and a clear view of both the internal and external ostia. Neither funneled nor widened sections of the cervical canal were included in the measured length.

General data, including age, obstetric history, and method of ovulation induction, were obtained from the medical files of the participants. Obstetric data were gathered from a computerized database and included gestational age at delivery, spontaneous onset of labor or indicated cesarean delivery, and neonatal outcome (birth weights and 5-minute Apgar scores). All women underwent cesarean delivery at the onset of spontaneous delivery or after completing 36 weeks.

Women were divided into 2 groups by cervical length measured during gestational weeks 14 to 20, with the cutoff set at 25 mm. Preterm triplet delivery was defined as spontaneous onset of labor before 32 weeks. Both definitions (short cervix and preterm delivery) were based on earlier publications in which similar cutoffs were used.\(^11\) A comparison was made between the 2 groups in terms of pregnancy outcome parameters.

All statistics were done with SPSS for Windows version 11 (SPSS Inc, Chicago, IL). \(P < .05\) by \(\chi^2\) test was considered statistically significant. Results are given as mean ± SD unless specified otherwise.

**Results**

Ninety-four couples with triplet pregnancies were initially referred to our institute, and 52 of them opted for MFPR performed at 14 to 18 weeks’ gestation (turning triplet pregnancies into singleton or twin pregnancies) and were thus excluded from the study. Of the remaining 42 pregnancies, 4 were excluded because of indicated induction of labor before the onset of spontaneous delivery. Indications for preterm labor induction were severe preeclampsia in 2 (at 29 and 30 weeks’ gestation), amnionitis (at 27 weeks), and severe growth restriction of 1 cotwin (at 33 weeks). Two women were lost to follow-up. Thirty-six women were eventually included: and 30 (83%) of them conceived after in vitro fertilization; 4 (11%) were treated with clomiphene citrate; and 2 (6%) conceived spontaneously.

The mean maternal age at delivery was 31.1 ± 4 years. Our study group included 22 primiparous women; the others had at least 1 previous term delivery. Seven women (19%) had a cesarean delivery before labor ensued and after completing 36 weeks (the predetermined due date for triplets). The mean cervical length measured during gestational weeks 14 to 20 for the entire group was 31.1 ± 9.3 mm. The mean gestational
age at delivery for all 36 triplet pregnancies was 32.3 ± 2.2 weeks, and the mean birth weight was 1673 ± 502 g. Seventy-five (69%) of 108 neonates were admitted to the neonatal intensive care unit (NICU), and 5-minute Apgar scores were less than 7 in 35 (32%). There were 2 incidents of early neonatal death and 5 incidents of late neonatal deaths due to complications of severe prematurity.

Subjects were classified into groups I (n = 14) and II (n = 22) by cervical length measured during gestational weeks 14 to 20 (cutoff set at 25 mm). The demographic data and obstetric history were similar between the 2 groups (Table 1). Mean cervical lengths for groups I and II were 22.8 ± 1.8 mm (range, 16–25 mm) and 36.4 ± 2.1 mm (range, 27–47 mm), respectively (P < .001). Twelve (86%) of 14 women with short cervices and 4 women with normal cervical length had delivery before 32 weeks. Table 2 details various pregnancy outcome parameters for both groups: cervical length of less than 25 mm during the early second trimester in triplet pregnancies was associated with preterm delivery, lower birth weights, lower 5-minute Apgar scores, and a higher rate of NICU admissions.

The sensitivity of a shortened cervix as a predictor of spontaneous onset of labor before 32 weeks was 75%, with specificity of 90%, a positive predictive value of 83%, and a negative predictive value of 78%.

Discussion

In this study, we assessed the validity of cervical length of less than 25 mm during weeks 14 to 20 as a predictor of preterm labor in triplet pregnancies and found sensitivity and specificity of 75% and 90%, respectively.

Very few studies had previously addressed the issue of early second-trimester cervical length in triplets as a means of detecting a population at high risk for preterm delivery. Ramin et al12 measured transperineal cervical length in 32 triplet pregnancies at various weeks and found a mean gestational age at delivery of 32.4 weeks. They also noted progressive cervical shortening among the “early delivery” (<32 weeks) cohort that was not apparent until the 20th week.

Guzman et al11 conducted a longitudinal study in which they assessed 51 triplet pregnancies by transvaginal sonographic cervical length measurements at 15 to 28 weeks’ gestation. They correlated gestational ages at delivery with cervical length to delineate the ideal cutoff value for various timings and showed that a cutoff of 25 mm between 15 and 20 weeks’ gestation for delivery before 32 weeks had specificity and a positive predictive value of 100% (consistent with our findings) and sensitivity and a negative predictive value of 25% and 72%, respectively. They proposed that these cutoff values may be used to select candidates for interventions targeted at prevention of preterm deliveries and consequent prematurity.

Poggi et al13 investigated 58 triplet pregnancies with at least 3 sonographic assessments of cervical length at various gestational ages. They found that women who had delivery earlier than 32 weeks had significantly shorter cervices at 16 to 20 weeks but not at 20 to 24 weeks. They calculated the ideal cutoff of cervical length for predicting preterm delivery and suggested that it should be set at 26 mm (similar to the 25-mm cutoff proposed by Guzman et al11), with sensitivity of 41% and specificity of 92%.

Maymon et al14 studied 45 triplet pregnancies beginning at 26 weeks and found a cutoff of 25 mm to be the most accurate for prediction of premature delivery before 33 weeks, with specificity and sensitivity of 45% and 94%, respectively. These results are consistent with a series published by To et al15 who measured cervical

### Table 1. General Data of the Study Group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group I (n = 14)</th>
<th>Group II (n = 22)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y*</td>
<td>30.8 ± 4.99</td>
<td>31.7 ± 3.8</td>
<td>NS</td>
</tr>
<tr>
<td>Parity*</td>
<td>0.43 ± 0.3</td>
<td>0.36 ± 0.2</td>
<td>NS</td>
</tr>
<tr>
<td>Nulliparous, n (%)</td>
<td>8 (57)</td>
<td>14 (64)</td>
<td>NS</td>
</tr>
<tr>
<td>In vitro fertilization, n (%)</td>
<td>11 (79)</td>
<td>19 (86)</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS indicates not significant (P ≥ .05).

*Values are mean ± SD.

### Table 2. Comparison of Perinatal Parameters Between Women With Short (Group I) and Long (Group II) Cervices

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group I</th>
<th>Group II</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical length, mm</td>
<td>22.8 ± 1.8</td>
<td>36.4 ± 2.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Gestational age at measurement, wk</td>
<td>16.75 ± 2.1</td>
<td>15.96 ± 2.1</td>
<td>NS</td>
</tr>
<tr>
<td>Gestational age at delivery, wk</td>
<td>28.4 ± 1.6</td>
<td>32.8 ± 2.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Birth weight, g</td>
<td>981 ± 79</td>
<td>1864 ± 231</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean 5-min Apgar score</td>
<td>4.5 ± 2.1</td>
<td>8.1 ± 1.5</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>NICU admission</td>
<td>42/42</td>
<td>33/66</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Values except NICU admission are mean ± SD. NS indicates not significant (P ≥ .05).
length at 22 to 24 weeks in 43 triplet pregnancies. Neither Maymon et al\textsuperscript{14} nor To et al\textsuperscript{15} measured cervical length during the early second trimester. Our results add to the scarce data already published on this important issue. We adopted the cutoff of 25 mm as a matter of consistency with previous publications and found early second-trimester cervical length to be a valid means of detecting a population at high risk for preterm birth in triplet pregnancies. The positive and negative predictive values were 83% and 81%. Adverse perinatal outcome in pregnancies with shorter cervixes is obviously attributable to a higher rate of preterm birth and prematurity, yet the considerable disparity we report regarding 5-minute Apgar scores, birth weights and NICU admission rates emphasizes the importance of early measured cervical length as a predictor of high-risk pregnancies. Because complication rates are overwhelmingly higher in triplets than twins or singletons, early detection and, optimally, effective intervention in high-risk triplet pregnancies will have an immense impact on prevention of overall perinatal morbidity.

Unfortunately, contemporary obstetric interventional strategies, such as bedrest, tocolytic agents, and cerclage, which have been studied extensively in high-risk singleton pregnancies, have not been evaluated adequately in high-order multiple gestations. The limited success (if any) of these intervention policies in singletons and twins is not promising with respect to triplets.\textsuperscript{16–18} The lack of efficacious intervention led to extreme measures such as MFPR to improve perinatal outcome by some, whereas others found such measures ineffective.\textsuperscript{19,20}

In conclusion, with establishment of second-trimester cervical length as a valid tool for early detection of high-risk multifetal gestations, obstetricians should continue their quest for efficacious intervention to prevent prematurity and its ensuing morbidity.

References


