

# Cervical length at 23 weeks in triplets: prediction of spontaneous preterm delivery

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## ABSTRACT

**Objectives** To establish the distribution of cervical length at 23 weeks of gestation in triplet pregnancies and to examine the relation to preterm delivery before 33 weeks.

**Methods** Cervical length was measured by transvaginal sonography at 23 (range 22–24) weeks of gestation in 43 triplet pregnancies. The distribution of cervical length was determined and the relationship between cervical length and the rate of spontaneous preterm delivery before 33 weeks was calculated.

**Results** The cervical length distribution was skewed to the left with a median of 34 mm. The rate of spontaneous labor and delivery before 33 weeks increased exponentially with decreasing cervical length at 23 weeks from 8% at 36–48 mm, to 11% at 26–35 mm, 33% at 16–25 mm and 67% at 15 mm or less. Cervical length was  $\leq 30$  mm,  $\leq 25$  mm and  $\leq 15$  mm in 37%, 16% and 8% of cases, respectively, and the corresponding sensitivities in the prediction of spontaneous delivery before 33 weeks were 67%, 50% and 33%.

**Conclusions** In triplet pregnancies, measurement of cervical length provides a useful prediction of risk for spontaneous early preterm delivery.

## INTRODUCTION

Delivery before 33 weeks of gestation is associated with a high risk of death or severe handicap in survivors<sup>1–4</sup>. In both singleton and twin pregnancies measurement of cervical length at 22–24 weeks of gestation provides sensitive prediction of early preterm delivery<sup>5–9</sup>. In singleton pregnancies, the median cervical length is 36 mm and, in 1.5% of cases, the length is  $\leq 15$  mm; the corresponding values in twin pregnancies are 36 mm and 4.7%<sup>10,11</sup>. The rate of spontaneous delivery before 33 weeks increases exponentially with decreasing cervical

length at 23 weeks. In singletons, the exponential increase in risk is observed in patients with cervical length below 15 mm, whereas in twins this threshold is 25 mm<sup>6,10</sup>.

The aim of this study was to examine the possible value of cervical assessment at 23 weeks in the prediction of risk for preterm delivery before 33 weeks in triplet pregnancies.

## PATIENTS AND METHODS

Transvaginal ultrasonographic measurement of cervical length was offered to women with triplet pregnancies attending our unit for the 23 week fetal anatomy and growth scan. All 43 women examined consecutively agreed to undergo cervical assessment. In all cases, the chorionicity had been determined by examination of the interfetal membranes at the 10–14 week scan<sup>12</sup>.

The women were asked to empty their bladders and were placed in the dorsal lithotomy position. Transvaginal sonography with a 5 MHz transducer (Aloka 1700, Aloka Co., Ltd, Tokyo, Japan) was carried out by one of four appropriately trained sonographers. The probe was placed in the anterior fornix of the vagina and a sagittal view of the cervix, with the echolucent endocervical mucosa along the length of the canal, was obtained. Care was taken to avoid exerting undue pressure on the cervix. The calipers were used to measure the distance between the triangular area of echolucency at the external os and the V-shaped notch at the internal os<sup>13,14</sup>. Each examination was performed during a period of approximately 3 min to observe any cervical changes; changes that may be due to contractions are observed in less than 1% of patients and, in such cases, the shortest measurement is recorded.

Patient characteristics, including demographic data and previous obstetric and medical history, were obtained from the patients at their first visit to the hospital and were entered into a computer database. Similarly, the ultrasound findings were recorded in the database at the time of the scan. Gestational age was determined from the menstrual

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history and confirmed from the measurement of fetal crown-rump length of the longest triplet at the first trimester scan. Data on pregnancy outcome were obtained from the computerized system in the delivery ward, and of those that delivered in other hospitals, from the patients themselves or their general medical practitioners.

A computer search was made to identify all triplet pregnancies with live fetuses that had 23 week cervical assessments. The distribution of cervical length was determined and the normality was examined by the Kolmogorov-Smirnov test. The sensitivity and false-positive rate for spontaneous labor and delivery before 33 weeks for a cut-off cervical length of 15, 25 and 30 mm were calculated.

## RESULTS

Cervical assessment at 22–24 (median 23) weeks of gestation was carried out in 43 triplet pregnancies with live fetuses. Ultrasound examination at 11–14 weeks had demonstrated that 32 were trichorionic-triamniotic, nine were dichorionic-triamniotic, one was monochorionic-triamniotic and one was monochorionic-monoamniotic.

There were 39 (91%) Caucasians, three of Afro-Caribbean origin and one Asian, 18 (42%) were aged 35 years or more, one was a cigarette smoker, two admitted to drinking more than the equivalent of five glasses of wine per week, none was taking recreational drugs, and none had a previous cone biopsy to the cervix. Conception was spontaneous in nine (21%) cases and by assisted reproductive techniques in 34 (79%) cases. In terms of obstetric history, 20 (47%) patients had no previous pregnancies, nine (21%) had one or more miscarriage and/or termination of pregnancy before 16 weeks of gestation, 12 (28%) had one or more term deliveries, with or without previous fetal losses before 16 weeks, one (2%) had at least one previous spontaneous preterm delivery, and one (2%) had at least one previous miscarriage at 16–23 weeks. Detailed ultrasound examination demonstrated fetal abnormalities in one of the fetuses in four pregnancies (one case each of diaphragmatic hernia, atresia of the pulmonary valve, multiple defects associated with trisomy 18, which was confirmed by chorionic villus sampling, and two cases of spina bifida) and there were no obvious defects in any of the other fetuses.

The distribution of cervical length was skewed to the left. The median and fifth centiles were 34 mm and 15 mm, respectively (Figure 1); the median values were 34 mm for the trichorionic and 33 mm for the dichorionic pregnancies. Five cases were excluded from further analysis. In two of these, iatrogenic delivery was undertaken at 27 and 32 weeks because of fulminating pre-eclampsia and severe maternal thrombocytopenia, respectively; in the third case, selective fetocide of a fetus with severe spina bifida was carried out at 31 weeks and delivery was undertaken at 32 weeks after the spontaneous onset of labor; in the fourth case, there was spontaneous onset of labor at 30 weeks following intrauterine death of a trisomy 18

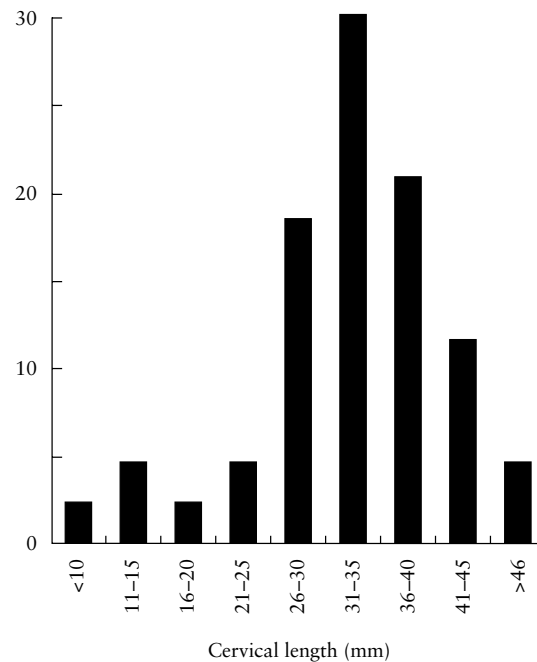


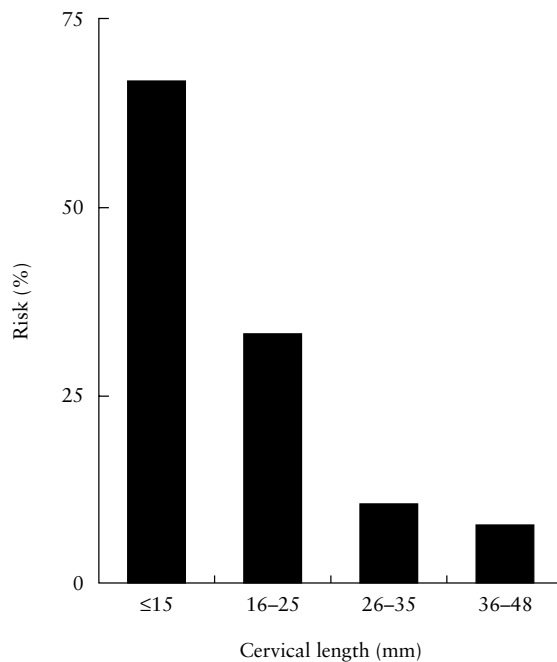
Figure 1 Distribution of cervical length at 23 weeks of gestation in 43 triplet pregnancies.

fetus at 29 weeks; and, in the fifth, there was intrauterine death of a growth-restricted fetus at 28 weeks and the cotwins were delivered electively at 36 weeks.

In the remaining 38 pregnancies, there were six (16%) deliveries before 33 weeks (one spontaneous vaginal delivery and five Cesarean sections after spontaneous onset of labor) and 32 (84%) elective Cesarean sections at 33–36 weeks. In these 38 pregnancies, the median cervical length was 34 mm. Three patients with the shortest cervical lengths (6 mm, 14 mm and 15 mm, respectively) had elective placement of cervical sutures and they delivered at 28, 34 and 27 weeks, respectively. All other patients were managed expectantly without bed rest, prophylactic antibiotics or tocolytics. The rate of spontaneous delivery before 33 weeks increased exponentially with decreasing cervical length at 23 weeks from 8% at 36–48 mm, 11% at 26–35 mm, 33% at 16–25 mm and 67% at  $\leq 15$  mm (Figure 2). Cervical length was  $\leq 30$  mm,  $\leq 25$  mm and  $\leq 15$  mm in 37% (14 of 38), 16% (6 of 38) and 8% (3 of 38) of cases, respectively, and the corresponding sensitivities in the prediction of spontaneous delivery before 33 weeks were 67% (4 of 6), 50% (3 of 6) and 33% (2 of 6).

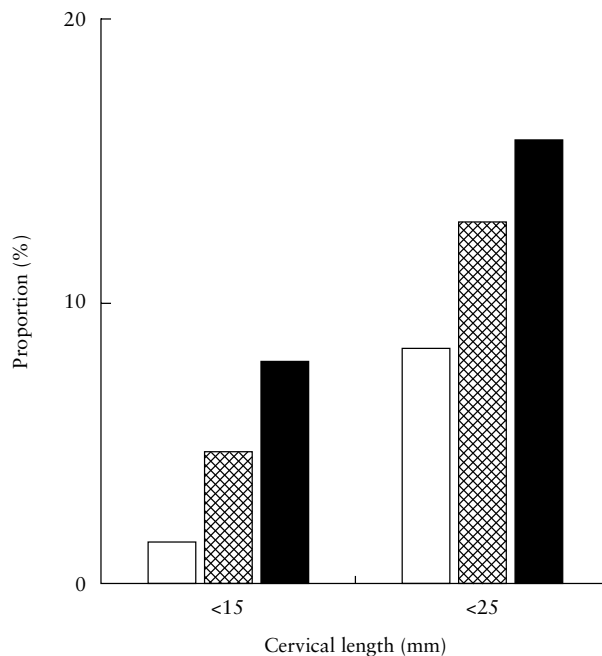
## DISCUSSION

The findings of this study suggest that in triplet pregnancies measurement of cervical length at 23 weeks of gestation may provide sensitive prediction of spontaneous early preterm delivery. Cervical length at 23 weeks is 25 mm or less in approximately 16% of the population and this group contains approximately 50% of women delivering spontaneously before 33 weeks. Furthermore,



**Figure 2** Rate of spontaneous delivery before 33 weeks according to cervical length at 23 weeks of gestation in triplet pregnancies.

the study demonstrates that the risk for early preterm delivery increases exponentially with decreasing cervical length from approximately 8% at 40 mm, to 11% at 30 mm, 33% at 20 mm and 67% at 10 mm. Three of our patients with a very short cervix had placement of a cervical suture at 23–24 weeks of gestation and they



**Figure 3** Proportion of singleton<sup>11</sup> (□), twin<sup>10</sup> (▨), and triplet (■) pregnancies with cervical length ≤15 mm and ≤25 mm at 23 weeks of gestation.

delivered at 27–34 weeks. The extent to which this treatment was useful in prolonging the pregnancies is uncertain but certainly in singleton pregnancies the insertion of a cervical suture in women with a short cervix appears to be beneficial<sup>15</sup>.

Our findings are compatible with those of previous reports of sonographic assessment of cervical length in triplet pregnancies. Ramin *et al.* carried out serial measurements of cervical length, starting from 10 weeks of gestation, and reported that in 11 pregnancies delivering before 33 weeks compared to six delivering beyond this gestation, the mean cervical length was significantly shorter from as early as 20 weeks<sup>16</sup>. Guzman *et al.* examined 51 triplet pregnancies and reported that a cervical length of 15 mm or less at 21–24 weeks predicted 38% of deliveries before 32 weeks with a specificity of 90%<sup>17</sup>.

In triplets, the median cervical length at 23 weeks (34 mm) is lower than in twins and singletons (36 mm)<sup>10,11</sup>. This value (34 mm) was similar to that reported in a study of 20 triplets at 23 weeks (31 mm)<sup>18</sup> but higher than the mean of 27 mm at 24 weeks in a study involving transperineal measurement of cervical length in 32 triplet pregnancies<sup>16</sup>. Although the median cervical length in triplets is slightly lower than in singletons, a short cervix is observed in a substantially higher proportion of multiple compared to singleton pregnancies. Thus, cervical length is 15 mm or less in 1.5% of singletons, in 4.7% of twins and in 7.9% of triplets (Figure 3)<sup>10,11</sup>. These findings provide further support for the association between short cervical length and high risk of spontaneous delivery before 33 weeks since both the incidence of a short cervix at 23 weeks and the rate of early preterm delivery increase exponentially with the number of fetuses.

In singleton pregnancies, cervical length at 23 weeks is significantly shorter in women of Afro-Caribbean origin compared to Caucasians, in teenagers, in those with a low ponderal index, in those with a history of previous miscarriage or preterm delivery and in drug abusers<sup>19</sup>. The number of triplets studied was too small to allow examination of the association between cervical length and patient characteristics; for example, only three of our patients were of Afro-Caribbean origin and only one was a cigarette smoker. In terms of chorionicity, the median cervical length in trichorionic and dichorionic triplets was similar.

The risk of spontaneous preterm delivery before 33 weeks increases exponentially with decreasing cervical length at 23 weeks. In singleton pregnancies, the exponential increase is observed in patients with cervical length below 15 mm<sup>6</sup>, whereas in twins<sup>10</sup> and in triplets this threshold is 25 mm. The sensitivity of screening by cervical length cut-off of 25 mm at 23 weeks in predicting spontaneous early preterm delivery in both twins and triplets is approximately 50% and this sensitivity is achieved with a screen positive rate of about 13% in twins<sup>10</sup> and 16% in triplets.

The widespread use of assisted reproductive techniques has led to a substantial increase in the prevalence of triplet

pregnancies. Preterm delivery is the major cause of the high rate of neonatal and infant death and cerebral palsy among survivors of triplet pregnancies. The findings of this study suggest that approximately 50% of spontaneous early preterm deliveries can be predicted by measurement of cervical length at 23 weeks. Further larger studies are needed to confirm these findings and to investigate the possible value of antenatal interventions in reducing the risk of preterm delivery as well as postnatal death and handicap.

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