Predicting Preterm Labour by Cervical Length Measurement

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ABSTRACT *Objective: To ascertain the role of cervical length measurement by TVS as a predictor for preterm labour.*

Methods: Routine Antenatal cases at 18-24 weeks of gestation were subjected to transvaginal ultrasound. The STUDY group consisted of 50 patients with cervical length being <25mm. The CONRTOL group consisted of 50 patients with cervical length being >25mm. Patients were followed up to observe the outcome of their pregnancies.

Result: The positive and negative predictive value of cervical length <25mm was 50% and 86% respectively for delivery before 37 weeks. A relative risk of 15 and 3.75was observed for spontaneous preterm birth before 34 weeks and 37 weeks respectively. Babies born in study group had greater morbidities and greater mortality rates as compared to the control group.

Conclusion: Measurement of cervical length aids in early detection of patients who are likely to go into preterm labour and identification of high-risk group.)

"Being born too soon is an unrecognized killer."
-Joy Lawn[1]

Preterm birth is the leading cause of neonatal morbidity and mortality, and its prevention is an important healthcare priorit[2]. The prevention of preterm labour remains a major challenge in contemporary obstetrics. Identification of patients who are at an increased risk for preterm labour requires the use of diagnostic tools that can be applied to both asymptomatic and symptomatic pregnant women. Current methods of identifying women at increased risk of preterm delivery involve analyzing a combination of factors such as obstetric history and demographic features as well as assessment of uterine contractions, biochemical markers and evaluation of the cervix. Ultrasonic assessment of uterine cervix has emerged as an alternative method to assess cervical length and morphology, and thus establish the risk of developing preterm labour.

OBJECTIVE: This study was undertaken to ascertain the role of cervical length measurement by Transvaginal Ultrasonography as a predictor for preterm labour.

METHODS: A prospective analysis was conducted at the department of Obstetrics and Gynaecology, Kasturba Hospital, New Delhi. Routine Antenatal cases presenting to the O.P.D. of Obstetrics and Gynaecology at 18-24 weeks of gestation were enrolled in the study. A detailed history and examination was done and an informed written consent was taken. These patients were subjected to transvaginal ultrasound for measurement of cervical length. Cervical length was measured from the internal os to the external os along the endocervical canal. The shortest of three consecutive readings was noted.

After measuring cervical length by transvaginal sonography, the patients were divided into two groups: 50 patients with cervical length < 25 mm were placed in study group and 50 patients with cervical length >25 mm were taken as controls.

All the patients included in the study were followed up in routine antenatal O.P.D. and their maternal and foetal outcome was noted. Patients detected with a cervical length < 15 mm were admitted and treated as per hospital protocol.

The data collected during the study was analysed using Statistical Package for Social Sciences (SPSS) version 15.0 software. Quantitative variables were compared between the two groups using unpaired t-test. Qualitative variables were compared using the Chi-square/Fisher's exact test.

OBSERVATIONS AND RESULTS: The mean cervical length as measured by transvaginal sonography in the study group was 21.56mm (SD 4.07). The minimum length measured was 9mm and the maximum length measured was 25mm in the study group.

The mean cervical length as measured by transvaginal sonography in the control group was38.00mm (SD8.23). The minimum length measured was 26mm and the maximum length measured was 60mm in the control group. The difference in mean cervical length between the two groups was statistically significant, with a p-value of <0.001.

Five patients (10%) in the study group required admission to the hospital in the antenatal period for management of very short cervical length (< 15mm).

In the study group, 25 out of 50 (50%) patients delivered before completing 37 weeks of gestation whereas in the control group, only 7 out of 50 (14%) patients delivered before completing 37 weeks of gestation.

The mean gestational age at delivery was 35.44 weeks (SD 3.90) in the study group. The mean gestational age at delivery was 38.17 weeks (SD 1.51) in the control group. The p-value was <0.001, making the difference between the two groups highly significant.
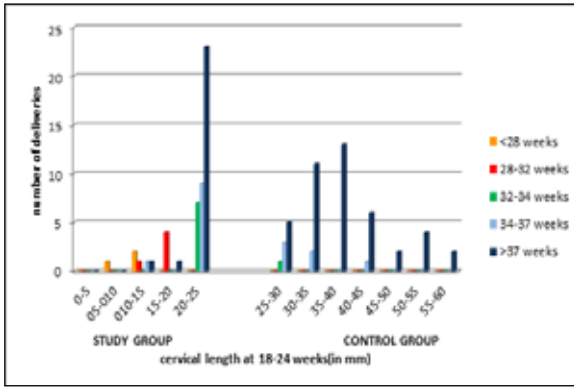
FIG.PERIOD OF GESTATION AT DELIVERY ACCORDING TO CERVICAL LENGTH

The patients in the two groups were comparable for the duration of labour and mode of delivery and gave birth to live babies with comparable APGAR scores.

The mean birth weight in the study group was 2.23kg (SD 0.71); and in the control group was 2.72 kg (SD 0.31). The p-value was <0.001, making the difference in the two groups highly significant. The minimum birth weight was 530gms and 2.1kgs in the study and control groups respectively.

A total of 20 out of 50 babies (40%) in the study group required admission to the NICU, of which four babies died during their stay in the NICU. Only 3out of 50 babies (6%) in the control group required admission to the NICU, all of them were healthy at the time of discharge from the hospital. The difference in NICU admissions between the two groups was statistically significant.

The indications for admission of babies to the NICU in the study group were respiratory distress at birth (12 cases, 60%), low birth weight <1.5kg (8 cases, 40%), Meconium Aspiration Syndrome (3 cases, 15%) and hyperbilirubinemia (2 cases, 10%). Five babies were admitted with more than one indication for admission. During their stay in the NICU, eight out of twelve babies with respiratory distress were identified as Respiratory Distress Syndrome, three babies (15%) developed Necrotising Enterocolitis and three babies (15%) developed sepsis. All four babies who died during NICU stay were born with extremely low birth weight and developed respiratory distress syndrome.

Of the three babies admitted to the NICU in the control group, two were for meconium aspiration syndrome and one was for sepsis. No baby was admitted with more than one indication for admission and no mortality was reported.

The difference in neonatal morbidities due to respiratory distress syndrome, necrotising enterocolitis and low birth weight was statistically significant between the study and control groups , with p-value <0.05.

The mothers and the rest of the babies in the study and control group had an uneventful follow-up at one month post delivery of baby.

DISCUSSION: A statistically significant inverse relationship between mid- trimester cervical length on transvaginal sonography and the subsequent risk of preterm birth has been observed in our study.

Table1. Predictive value of cervical length <25mm

POG at delivery	PPV	NPV	RR
≤28weeks	6	100	_
≤32weeks	16	100	_
≤34weeks	30	98	15
≤37weeks	50	86	3.57

For predicting preterm birth before 28 weeks, the positive predictive value of cervical length <25mm was 16% and negative predictive value of cervical length <25mm was 100%.

For predicting preterm birth before 32 weeks, the positive predictive value and negative predictive value of cervical length <25mm was 16% and 100%respectively.

For predicting preterm birth before 34 weeks, the positive predictive value and negative predictive value of cervical length <25mm was 30% and 98%respectively.

For predicting preterm birth before 37 weeks, the positive predictive value and negative predictive value of cervical length <25mm was 50% and 86%respectively.

A cervical length of < 25 mm at the initial sonographic examination was associated with a relative risk (RR) for spontaneous preterm birth before 34 weeks of 15 (95% confidence interval [CI], 3.74-60.22).

A cervical length of < 25 mm at the initial sonographic examination was associated with a relative risk (RR) for spontaneous preterm birth before 37 weeks of 3.57 (95% confidence interval [CI], 1.87-6.81).

There was no observable difference in the maternal outcome in the study and control groups. However, the babies born in the study group had greater morbidities associated with prematurity, lower birth weight, higher NICU admission rates, longer duration of NICU stay and greater mortality rates as compared to the babies born in the control group.

Table below shows the predictive values and relative risks of cervical length measurement for prediction of preterm labour as measured by various studies over time. Although low positive predictive value limits the usefulness of cervical length measurement, the high negative predictive value helps avoid unnecessary interventions and can be used in screening of asymptomatic obstetric populations.

Table2. Comparison of predictive value and relative risk of various studies over time

Study	Year	Sample size	POG at TVS	Cervical length cut-off	POG Cut-off	PPV	NPV	RR
Iams et al [3]	1996	2915	24	25mm	35weeks	18	97	6.19
Owen et al [4]	2001	183	16-22.6	25mm	35weeks	55	_	4.5
Hebbar et al[5]	2006	200	20-24	25mm	37weeks	56	98	_
Present Study	2014	50+50	18- 24	25mm	34weeks	13	98	15
					37weeks	50	86	3.57

Iams et al[3], in 1996, found an inverse relation between the length of the cervix, as measured by ultrasonography during pregnancy, and the frequency of preterm delivery. Although the predictive value of ultrasonography was low in their low-risk study population, it was expected to rise with the risk of prematurity in the population studied.

Owen et al[4] also support that the length of the cervix is an indirect indicator of its competence and should recognise that the relationship between cervical length and spontaneous preterm births functions along a continuum. The high positive predictive values observed in their study can be attributed to their selection of women with a prior early spontaneous preterm birth as the study subjects.

The study by Hebbar et al[5] was a prospective study conducted in India involving 200 low risk singleton pregnancies. Even after excluding women with a cervix shorter than 20mm, (prophylactic circlage was done in these patients), these investigators found that when cervical length was less than 25mm, only 33% delivered beyond term, where as those with more than 25mm, 87.5% of women could achieve term delivery.

CONCLUSION

The outcome of our study indicates that screening antenatal women for a short cervical length helps us recognize asymptomatic women at risk of a subsequent preterm birth. Though the incidence of preterm labour is low in the general population, it increases manifold in the presence of a concomitant short cervix. Transvaginal ultrasonography is a simple, safe, non invasive OPD procedure for exact measurement of cervical length. The length of the cervix is found useful in predicting the risk of premature delivery, with a shorter cervix predicting a higher risk of preterm labour.

Measurement of cervical length aids in early detection of patients who are likely to go into preterm labour and identification of high-risk group. Universal cervical length screening will help prevent preterm births and reduce neonatal morbidity and mortality.

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