A comparison of the predictive value of transvaginal cervical length at 11-14 weeks and at 18-22 weeks of gestation in preterm labour

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Abstract

Preterm labor is the major cause of preterm birth that affects 12–18% of all births in India. Cervical shortening or effacement is one of the first steps in the parturition process. In the present study the mean cervical length at 11-14weeks for the term delivered group is 4.04+-0.35cms and the mean cervical length for the preterm delivered group 3.85±0.33 cms. The cervical length at 18-22 weeks was significantly shorter in the group that had preterm deliveries (2.77 cms) than in those who had term deliveries (3.74 cms) (P < 0.001). The cervical length at 18-22 weeks in the group that delivered preterm was significantly shorter than in those who had delivered at term. The mean cervical length showed a gradual decrease from the first to the second scan and an increased risk for preterm delivery was seen in those cases which demonstrated a rapid shortening in cervical length.

Keywords: Cervical length, Preterm labor, Predictive value, Transvaginal ultrasound

Introduction

Preterm birth, defined as birth at less than 37 weeks of gestation, is the most important single determinant of adverse infant outcome in terms of both survival and quality of life. Preterm deliveries present a problem, because of the several neonatal complications and the long term sequelae which includes cerebral palsy, developmental delay, chronic lung diseases, visual loss and hearing loss. Preterm labour is the major cause of preterm birth that affects 12 –18% of all births in India[1,2].

Cervical length is considered as one of the key predictors of preterm delivery[3]. Cervical length assessment by ultrasound is now routinely used during obstetric scan. Transvaginal scan (TVS) of the cervix is now considered as an important screening tool for preterm delivery. When cervical length (CL) on TVS is less than 15 mm, 40-47% of these women will deliver within 7 days, irrespective of any interventions or use of tocolysis[4]. In contrast, a CL ≥15mm is reassuring since less than 1-2% will deliver within 7 days. In asymptomatic women, TVS of the cervix is most beneficial for the identification of women at low risk for preterm delivery[5]. However, a short cervix detected by ultrasound around mid trimester increases the risk of preterm delivery in this group. Transvaginal cervical length as a tool for prediction of preterm delivery has been reported by several studies. Many studies have found that cervical length at 20-24 weeks is a reliable predictor of preterm delivery[6]. This study is aimed at comparing the predictive value of transvaginal cervical length at 11-14 weeks and at 18-22 weeks in preterm labour. In asymptomatic women, TVS of the cervix is most beneficial for the identification of women who is otherwise considered low risk for preterm delivery. However, a short cervix detected by ultrasound at mid gestation increases the risk of preterm delivery in the low risk group. Although different studies have quoted different cutoff points, a CL less than 25 mm is usually used as the threshold to detect pregnancies at risk for preterm labour.

Materials and Methods

This observational clinical study was conducted in the Department of Obstetrics and Gynecology, Jubilee Mission Medical College and Research Institute in the time period of December 2013 to May 2015. During this period 150 pregnant women attending the OPD at 11-14 weeks of gestation were selected using inclusion and exclusion criteria.

Primigravidae with singleton pregnancy at the gestational age of 11-14 weeks were included in the study provided they were not having any complications like pregnancy induced hypertension, pre eclampsia, uterine anomalies, polyhydramnios, or a previous history of surgery on the cervix like conization. Women with medical complications like diabetes mellitus, hypertension, renal disorders, maternal anemia or poor nutrition and those with congenital fetal anomalies were also excluded from the study.

Informed consent was obtained and a detailed history was taken from these patients as per the proforma. Complete clinical examination was done. Cervical length was measured using transvaginal ultrasonography with the standard longitudinal view of cervix while the patient's bladder was empty. GEL VOLUSON 730 PRO TVS probe IC 5-9 H instrument with 5-9 mHz was used to measure cervical length. The patients were asked to insert the transducer by themselves. If they were uncomfortable, the sonographer herself inserted the probe with their consent. Cervix was visualized in its sagittal view. The cervical length was defined as the length between the internal os and external os. The transducer was slowly withdrawn until a blurred image is seen. The transducer was then reinserted until the image is clear. Fifty percent to seventy five percent of the screen should be occupied by the cervix. The cervical length was measured from the internal os to the external os. The cervical glands also help in determining the total length of the cervical canal. If the cervix was curved, two end-to-end straight measurements or curved length measurement was taken to obtain an accurate length of cervix. The cervical canal measured should be equally distant from the anterior and posterior walls of cervix. At least 3 measurements were obtained; the shortest, best measurement was recorded. It was measured by keeping the probe 3 cms away from the posterior fornix[7]. The patients were then followed up and cervical length measurement was repeated at 20-22 weeks of gestation. These patients were then followed up to determine time and mode of delivery.

The variables analyzed were

1. The mean cervical length at 11-14 weeks and at 18-22weeks.
2. The rate of shortening of cervical length in those who deliver at term and preterm.
3. The cervical length at 11-14 weeks and at 18-22 weeks correlated with gestational age at delivery and its predictive value.

Patients were then analyzed for the mode of delivery and the perinatal outcome with regard to the Neonatal Intensive Care Unit (NICU) admissions needed. Observations were processed and analyzed statistically.

Statistical Analysis

Student's't 'test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (inter group analysis) on metric parameters. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc. The measured parameters were expressed as Mean±Standard deviation. The mean cervical length was calculated at 11-14 weeks and 18-22 weeks scan. Student's 't' test was used to determine the shortening of cervical lengths at the first and second ultrasound for the patients who delivered either at term or preterm.

Results

The study was conducted on 150 uncomplicated primigravidae attending Jubilee Mission Medical College outpatient department. Among the 150 patients, 21 patients delivered preterm, before 37 weeks and 129 delivered after 37 weeks. So 14% of the study group delivered preterm, among which 3 were before 28 weeks. 5 patients delivered between 28 to 32 weeks and 13 between 32 and 37 weeks (Table 1). At 11-14 weeks, cervical length has been assessed on the whole study group (Table 2). The mean cervical length at 11-14 weeks for the study group was 3.96±0.39 (Table 1). The mean cervical length for the term delivered group is 4.0±0.35cms and the mean cervical length for the preterm delivered group 3.85±0.33 cms (Table 1). Although there is a difference between the mean values of cervical length between two groups, it cannot be considered statistically significant (P value of 0.0165). but there was 1 patient who had a cervical length of 3 cms and delivered at 32 weeks .Hence cervical length at 11-14 weeks was not reliable for predicting preterm labour except may be for high risk groups.

The cervical length of these patients at 18 - 22 weeks were assessed (Table 3) and their association to gestational age of delivery was observed. The mean cervical length of the study group at 18-22 weeks was 3.60±0.50cms (Table 3). This is a statistically significant difference of 0.97 cm (P value <0.001). A stable cervical length at a subsequent examination at 18-22 weeks is associated with a lower risk for spontaneous preterm birth while a shorter cervical length increases the risk of preterm birth. On assessing the shortening of cervical length between the scan at11-14 weeks and at 18-22 weeks, it was found that mean shortening of cervical length for the whole study group was 0.3 5±0.27 cm.

The shortening of cervix for those who delivered preterm was 0.67±0.47 and those who delivered at term was 0.29±0.17. Maximum shortening (>1.5cms) was found in two patients who delivered before 30 weeks. This difference in shortening between term and preterm delivery was found to be statistically significant (p value<0.001) (Table 4).

Nine neonates had 1' APGAR of less than 6 of which 4 were preterms (P<0.001**). This constituted 19% of total preterms whereas only 3.9% of term neonates had 1' APGAR less than 6, signifying increased neonatal morbidity among preterm infants. Three preterms had a birth weight of less than 1000grams, and 61.9% of preterms had weight between 1 and 2.5kg. NICU admissions were required for 66.7%

of preterm newborns when compared 8.5% of term newborns and this was found to be statistically significant (P value< 0.001).

Table 1: Cervical Length distribution of patients studied

Cervical Length	No. of patients (n=150)	%	Mean ± SD
11-14 weeks			
<2.5	0	0.0	
2.5-3.0	2	1.3	
3.0-3.5	19	12.7	
3.5-4.0	66	44.0	3.96±0.39
4.0-4.5	57	38.0	
>4.5	6	4.0	
18-22 weeks			
<2.5	2	1.3	
2.5-3.0	18	12.0	
3.0-3.5	36	24.0	
3.5-4.0	73	48.7	3.60±0.50
4.0-4.5	21	14.0	

Table 2: Correlation of Cervical length at 11-14 and 18-22 weeks in relation to preterm and term of patients studied

Cervical length	Preterm/Term		Total (n=150)	P value
	Preterm (n=21)	Term (n=129)		
11-14 weeks				
<2.5	0(0%)	0(0%)	0(0%)	
2.5-3.0	1(4.8%)	1(0.8%)	2(1.3%)	
3.0-3.5	11(52.4%)	8(6.2%)	19(12.7	
3.5-4.0	8(38.1%)	58(45%)	66(44%)	0.0165
4.0-4.5	1(4.8%)	56(43.4	57(38%)	
>4.5	0(0%)	6(4.7%)	6(4%)	
18-22 weeks				
<2.5	2(9.5%)	0(0%)	2(1.3%)	
2.5-3.0	14(66.7%)	4(3.1%)	18(12%)	
3.0-3.5	4(19%)	32(24.8	36(24%)	
3.5-4.0	1(4.8%)	72(55.8	73(48.7	<0.001**
4.0-4.5	0(0%)	21(16.3	21(14%)	

Table 3: Comparison of Cervical length (cm) according to preterm/Term

Cervical length (cm)	Preterm/Term		Total	P value
	Preterm	Term		
11-14 weeks	3.85±0.33	4.04±0.3	3.96±0.39	0.0165
18-22 weeks	2.77±0.58	3.74±0.3	3.60±0.50	<0.001

Table 4: Comparison of Shortening, according to preterm/Term

Variables	Preterm/Term		Total	P value
	Preterm	Term		
Shortening	0.67±0.4	0.29±0.17	0.35±0.27	<0.001**

Discussion

The array of randomized studies conducted has stated that interventions such as progesterone and or cervical cerclage may be of benefit for women otherwise considered low risk of preterm birth and found to have a short cervix in the midtrimester[5,6]. In the past 4 years, cost effectiveness of universal screening of cervical length and vaginal progesterone treatment if short cervix was found was performed by 2 groups. Both studies came to a conclusion that universal screening for cervical length and treatment with vaginal progesterone is a cost- effective method and reduces the preterm birth rate at <34 weeks. Indeed, surveillance of cervical length early in pregnancy and timely interventions can reduce the preterm burden.

The main aim in delaying preterm birth is to avoid the morbidities of prematurity. Because of its long term implications, effective strategies for early diagnosis of preterm birth and timely intervention are of utmost importance. This study reports that transvaginal sonography can be used to measure maternal cervical length during pregnancy to predict the risk of preterm delivery. The cervical length difference at 11-14 weeks for those who delivered at term and those delivered preterm was not statistically significant. The cervical length at 18-22 weeks in the group that delivered preterm was significantly shorter than in those who had delivered at term. The mean cervical showed a gradual decrease from the first to the second scan, and increased risk for preterm delivery was seen in those cases which demonstrated a rapid shortening in cervical length.

These findings confirm with those of previous studies which have shown an inverse relation between length of cervix and duration of pregnancy. This data suggests that the duration of pregnancy is directly correlated to the length of the cervix measured using a transvaginal scan with strict criteria and a short cervix has a greater association with preterm labour.

Conclusion

The main aim in delaying preterm birth is to avoid morbidities of prematurity. Because of its long term implications, the development of effective strategies for early diagnosis of preterm birth and timely intervention is of utmost importance. In the past 4 years, cost effectiveness of universal screening of cervical length and vaginal progesterone treatment if short cervix was found was performed by 2 groups[8,9]. Both studies came to a conclusion that universal screening for cervical length and treatment with vaginal progesterone is a cost- effective method and reduces the preterm birth rate at <34 weeks. Our study also shows that the cervical length measured transvaginally at 18–22 weeks can correctly predict preterm labour. So universal screening should be recommended in all pregnancies so that proper interventions can be carried out in time in order to reduce the preterm burden. So our recommendation is that all pregnant women should undergo cervical length screening along with the anomaly scan at 18–22weeks of gestation and if it is found to be less than 2.5 cms prophylactic cerclage or vaginal progesterone should be prescribed in order to prevent preterm birth and the associated morbidities and mortalities.

Acknowledgement

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