RESEARCH ARTICLE

A study of association of cervical length at 18 weeks and 23 weeks gestation in predicting preterm delivery in twin pregnancies

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ABSTRACT

Background: Twin pregnancy complicates 1.4% of all pregnancies but accounts for 15% of neonatal mortality. The ability to predict preterm delivery could allow targeted intervention such as antenatal steroid induction, cervical encerclage and tocolysis, which might improve neonatal outcome. The length of cervix may be useful in predicting the risk of premature delivery, with a shorter cervix predicting a higher risk. **Objectives:** The present study was undertaken to evaluate the cervical length during 18th and 23rd week period of gestation in twin pregnancy for predicting preterm delivery and also find the correlation between cervical length and occurrence of preterm birth. **Method:** In this prospective observational study, a total of 69 antenatal patients underwent cervical length screening at 18 weeks and 23 weeks period of gestation at a tertiary level teaching hospital were recruited. 17 women did not deliver at the study site and were lost to follow up. 3 patients have been excluded from the study as they have been electively terminated because of obstetrical reasons. **Results:** 22.4% women at 18 weeks period of gestation and 42.9% women at 23 weeks period of gestation with cervical length <25mm delivered preterm, making the relationship of short cervix to preterm delivery statistically significant (P value< 0.001). Sensitivity was 18.92% at 18 weeks and sensitivity was 54.05% at 23 weeks period of gestation while specificity and positive predictive value (PPV) was 100% at 18 week and 23 weeks period of gestation. **Conclusion:** The present study shows that there is fair amount of negative correlation between cervical length and the occurrence of pre-term birth. Which means that as the cervical length increases the chance of preterm birth decreases. Shorter the cervix greater is the likelihood of preterm delivery.

Keywords: Twin pregnancy, cervical length, preterm delivery, short cervix, gestation.

Twin pregnancy complicates 1.4% of all pregnancies but accounts for 15% of neonatal mortality and prematurity is the major cause of neonatal morbidity and mortality.[1] Spontaneous preterm delivery occurs approximately 7-10 times more commonly in twin than singleton pregnancies and tends to occur at an earlier gestation.[2] However, delivery before 37 weeks occurs in less than 10% of pregnancies but accounts for more than 75% of all neonatal deaths.[3] Survival of preterm infants is mainly dependent on gestational age at delivery and survival increases from less than 5% for those born at 23 weeks to more than 95% by 32 weeks.[4, 5] The risk of severe handicap in survivors decreases from more than 60% for those born at 23 weeks to less than 5% by 32 weeks.[4–6]

The length of cervix may be useful in predicting the risk of premature delivery, with a shorter cervix predicting a higher risk. Transvaginal sonographic (TVS) cervical length at 20 to 24 weeks gestation is supposed to be a predictor of spontaneous preterm birth in asymptomatic women with twin pregnancies.[7] In one study, 89 women at high risk for premature delivery had TVS measurements of the cervical length taken at least twice between the 15th and 24th weeks of gestation. The authors found that the incompetent cervix can begin to shorten at as early as 15 weeks' gestation and that

the rates of cervical shortening were greater in the group with an incompetent cervix than in that with a normal cervix [8]

Furthermore, several studies have shown that ultrasonographic cervical assessment is more accurate than digital examination for identifying cervical changes. But transvaginal cervical length measurement has several technical advantages as it allows better quality and more accurate visualization of the uterine cervix and has fewer limitations than does the trans-abdominal approach.[9] Hence, in present study cervical lengths was measured by transvaginal sonography during 18th and 23rd week period of gestation and find the association between cervical length and preterm delivery.

Materials and methods

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology in a tertiary care centre from 1st December 2016 to 1st June 2018. The study was approved by Institutional Ethical Committee. Inclusion criteria were patients with twin pregnancy attending antenatal OPD and who have higher order multiple gestation reduced to twin pregnancy. All cases of previous history of preterm delivery, cervical incompetence, triplet/quadruplet pregnancy and history of uterine malformations were excluded from the study. A total of 69 antenatal patients were recruited after having met the inclusion/exclusion criteria and underwent cervical length screening at 18 weeks and 23 weeks period of gestation. 17 women did not deliver at the study site and were lost to follow up. Three patients have been excluded from the study as they have been electively terminated because of obstetrical reasons as: hypertensive disorders – 1, inevitable abortion – 1, missed abortion – 1.

All patients had their cervical length measured by transvaginal sonography (TVS) using the 8 MHz transducer at 18 weeks and 23 period weeks of gestation. The women were asked to empty their bladder and examination was carried out in dorsal lithotomy position. The transvaginal ultrasound probe covered with sterile condom was inserted in the anterior fornix of the vagina until an adequate sagittal image of the cervix is visualised. The external os is identified by its triangular echo density and internal os by its 'V' shaped appearance. The distance between the two was taken as cervical length. An adequate image for the measurement of cervical length was defined as the visualisation of the internal os, external os and endocervical canal with at least 75% of the image occupying the screen. The cervical length was measured in millimetres (mm) and the measurements were taken twice. The mean of two measurements was taken as the cervical length for that patient.

The primary outcomes of the study were to determine period of gestation at delivery and correlated with cervical length at 18 weeks and 23 weeks gestation. The variables which we considered as: 1) short cervix - cervix < 25 mm, funnelling of the internal os> 1 cm, on speculum examination - detection of the dilatation of internal os with herniation of the membranes. 2) Early preterm delivery - delivery between 28 weeks and 33 weeks & 6 days period of gestation. 3) Late preterm delivery - delivery after 34 weeks but before 37 weeks and 6 days period of gestation.

Statistical analyses were performed using SPSS software, version 12.0. The association between cervical length and preterm delivery was assessed by fisher's exact test. A p value of 0.05 was taken as level of significance and $p < 0.001$ was taken as statistically highly significant.

Results

Out of 49 women analyzed in the study, 37 had preterm delivery (75.5%), in which 11 (22.44%) patients delivered at 18 weeks and 26 (53.06%) at 23 weeks. There were 11 patients had cervical length <2.5 cms at 18 weeks period of gestation, for whom the calculated mean gestational age was 33.01weeks. The cervical length further decreased in 10 more patients when they reached the 23 weeks period of gestation, making the mean gestational age as 33.21 weeks as shown in table 1.

There was significant correlation between preterm delivery and short cervix at 18 weeks and 23 weeks period of

Table 1: Association of gestational age at delivery with cervical length at 18 weeks and 23 weeks period of gestation

Cervical length at 18 weeks in cm	Number of patients	Gestational age (weeks)	p-value
≤ 2.5	11	33.01±2.82	
2.51 - 3.00	14	34.36±2.73	
3.01 - 3.50	10	36.19±1.13	< 0.001
3.51 - 4.00	12	36.77±1.34	
> 4.00	2	37.57±0.00	

Cervical length at 23 weeks	Number of patients	Gestational age (weeks)	p-value
≤ 2.5	21	33.21±2.68	
2.51 - 3.00	9	36.27±0.80	
3.01 - 3.50	14	36.64±1.42	< 0.001
3.51 - 4.00	4	37.18±1.29	
> 4.00	1	36.86±0.00	

Table 2: Association of cervical length (CL) at 18 weeks and 23 weeks period of gestation and preterm delivery

Mode of delivery	CL 18 weeks in cm	Pre term		Total	p-value
		Yes	No		
LSCS	≥ 2.5	22	04	26	
	< 2.5	04	00	04	0.621
	Total	26	04	30	
Vaginal	≥ 2.5	08	08	16	
	< 2.5	03	00	03	0.228
	Total	11	08	19	

Mode of delivery	CL 23 weeks in cm	Pre term		Total	p-value
		Yes	No		
LSCS	≥ 2.5	15	4	19	
	< 2.5	11	0	11	0.268
	Total	26	4	30	
Vaginal	≥ 2.5	2	8	10	
	< 2.5	9	0	9	0.001
	Total	11	8	19	

LSCS – Lower segment caesarean section

gestation as shown in table 2.

Sensitivity was 18.92% at 18 weeks and sensitivity was 54.05% at 23 weeks period of gestation while specificity and positive predictive value (PPV) was 100% at 18 week and 23

Table 3: Association of cervical length at 18 weeks and 23 weeks period of gestation and preterm delivery in study group

CL 18 weeks in cm	Pre term		Total
	Yes	No	
< 2.5	7	0	7
≥ 2.5	30	12	42
Total	37	12	49
Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
18.92	100.00	100.00	28.57

CL 23 weeks in cm	Pre term		Total
	Yes	No	
< 2.5	20	0	20
≥ 2.5	17	12	42
Total	37	12	49
Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
54.05	100.00	100.00	41.38

weeks period of gestation. Negative predictive value (NPV) was 28.57% at 18 weeks and NPV was 41.38% at 23 weeks period of gestation (Table 3).

Discussion

Women with a multiple pregnancy face greater risks for themselves and their infants than women pregnant with one child. Preterm birth accounts for 43.6% of all twin births, compared with 5.6% in singleton pregnancies. [10] Preterm birth (PB) is common in twin pregnancies. Twin pregnancies nonetheless are associated with increased morbidity and mortality, almost always related to the effects of prematurity. [11]

The screening of cervical length by transvaginal ultrasound is a good predictor of PB risk. Women with twin gestation were screened for serial cervical length measurements between 14-18 weeks and 28-32 weeks; it was reported that cervical length had four pattern sas stable,

early-rapid shortening, late-shortening, and early shortening with a plateau and each pattern had different risk of PB while highest risk was in early-rapid shortening group. [12] However, cervical length assessed in mid-trimester asymptomatic twin pregnancies was a poor predictor of PB <32 weeks' gestation. [13] Within 3 weeks period, a shortening in cervical length >10% was found associated with increased risk of PB. [14] It was reported that risk for PB was higher in women with cervical dilatation, while short cervical length was independently associated with preterm birth. [15] A cervical length ≤15mm was reported as the most optimal cut-off with 81% specificity and 83% positive predictive value for predicting the true preterm labor. [16] Likewise, optimal cut off values of CL for preterm labour have varied in various studies ranging from 18 to 30mm, however we took 25mm as the cut off for CL which was measured twice at 18 weeks and 23 weeks period of gestation.

There were 11 patients, who had cervical length <2.5 cms at 18 weeks period of gestation, for whom the calculated mean gestational age was 33.01weeks. The cervical length further decreased in 10 more patients when they reached the 23 weeks period of gestation, making the mean gestational age as 33.21 weeks. This can be explained by the fact that as pregnancy progresses further, the number of women with short cervix increases because the shortening of cervix is a continuous process with the pregnancy advancement. The current study found significant correlation between preterm delivery and short cervix at 18 weeks and 23 weeks period of gestation. Souka et al[17] studied cervical length in 215 twin pregnancies at 23 weeks period of gestation and found that cervical length distribution was skewed towards shorter length and the median value was 38 mm. They found that in 11.2% and 4.2% of cases, length was up to 25 mm and up to 15 mm, respectively. Skentou et al[18] studied 464 twin pregnancies and found that the cervical length distribution was skewed to the left and the median value was 36 mm. The rate of spontaneous delivery before 33 weeks was inversely related to cervical length at 23 weeks which is similar to present study.

Gibson et al [19] did transvaginal ultrasound assessments of cervical length serially at 18, 24, 28 and 32 weeks' gestation for 248 twin pregnancies, in which he found that the cervical length ≤ 25 mm at 18 weeks (LR+ 9.7, sensitivity 14.3%) and ≤ 22 mm at 24 weeks (LR + 9.6, sensitivity 28.6%) were the best predictors of preterm delivery. They also concluded that the poor sensitivity of this test makes it unsuitable as a single predictor of preterm delivery, which is similar to present results in which sensitivity was 18.92% at 18 weeks and sensitivity was 54.05% at 23 weeks period of gestation. Yang et al [20] analysed 65 twin pregnancies and measured the cervical length at 22 weeks period of gestation and 24 weeks period of gestation and found out that both cervical length <30 mm and cervical funnelling in twin pregnancies under 26 weeks period of gestation are independently and strongly associated with high risk for preterm birth. A long cervix of length > 35 mm, is associated with very low risk (4%) of preterm birth. Berghella et al [21] concluded from their study that transvaginal ultrasound cervical length is clearly superior to the clinically used manual dilatation in predicting preterm labour.

Cervical length is the most reproducible and valid variable for transvaginal ultrasound cervical assessment in prediction of preterm birth.[22] The addition of funnelling does not improve the prediction based on cervical length alone. In the study by Vendittelli [23], it was seen that funnelling (>5mm) was not found to be predictive of preterm labour but cervical length was significantly predictive.

Conclusion

The present study shows that there is fair amount of negative correlation between cervical length and occurrence of preterm birth, which means that as cervical length increases chance of preterm birth decreases. Also the short cervix is a good predictor of preterm birth in twin pregnancy and can be used as screening method for prediction of preterm labour.

Conflict of interest: None. **Disclaimer:** Nil.

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