

Original Research Article

Role of cervical length in assessment of Preterm birth

Dr. Anjali Gurjar¹ (Consultant Radiologist and Fetal Medicine Specialist) & Dr. Akash Chaturvedi² (Resident)

Dept. of Radio diagnosis, Sri Aurobindo Institute of Medical Sciences, Indore, M.P.^{1&2}

Corresponding Author: Dr. Anjali Gurjar

Abstract:

Background & Method: The aim of present study is to study Role of cervical length in assessment of Preterm birth. Prematurity causes 70% of fetal/neonatal deaths, with 11.4% of births occurring at < 37 weeks gestation. The rate of prematurity increases with the number of fetuses - singletons 10%; twins 54.9%; and triplets 93.6%. The expansion of the bladder that is required with the transabdominal approach results in cervical lengthening and the translabial or transperineal technique do not give accurate measurement of cervical length. Therefore, the transvaginal approach is the most accurate method to assess the cervical length.

Result: The incidence was 14% low birth weight; while in group B it was 17% and in group C it was 83%. Group A all delivered at term and no baby required NICU admission. Reduction in cervical length between 11-14 weeks to 20-22 weeks of gestation in prediction of preterm delivery. At the cut-off value of reduction in cervical length between 11-14 weeks and 20- 22 weeks of gestation of >0.6 cm, sensitivity was 66.67%, specificity was 87.5%, PPV was 42.11%, NPV was 95.06%, and p value was < 0.00001.

Conclusion: Considering the magnitude of preterm labor, cost of management of preterm babies and morbidity-mortality associated with it, transvaginal ultrasonography of the cervix during routine NT scan and anomaly scan has emerged as a safe, acceptable and a cost-effective test to assess risk of preterm delivery.

Keywords: cervical length in assessment of Preterm birth.

Study Designed: Observational Study

1. INTRODUCTION

Transvaginal sonographic measurement of the cervix is a reliable alternative method for the assessment of cervical length as it allows better quality and more accurate visualization of the uterine cervix. Cervical length is inversely related to the risk of preterm labor. In this important study, a cervical length of 25 mm corresponded to the 10th percentile and was identified as a clinically appropriate threshold of identifying preterm delivery risk.

Short cervical length increases the preterm delivery risk by approximately six-fold. Uterine contractions and the inherent tensile strength of the cervix can interfere with accurate measurement of cervical length. Transvaginal sonographic measurement of the cervix is a reliable alternative method for the assessment of cervical length as it allows better quality and more accurate visualization of the uterine cervix. Cervical length is inversely related to the risk of preterm labor.

In this important study, a cervical length of 25 mm corresponded to the 10th percentile and was identified as a clinically appropriate threshold of identifying preterm delivery risk.

Short cervical length increases the preterm delivery risk by approximately six-fold. Uterine contractions and the inherent tensile strength of the cervix can interfere with accurate measurement of cervical length.

2. MATERIAL & METHOD

Present study is conducted at Sri Aurobindo Institute of Medical Sciences, Indore, M.P. Prematurity causes 70% of fetal/neonatal deaths, with 11.4% of births occurring at < 37 weeks gestation. The rate of prematurity increases with the number of fetuses - singletons 10%; twins 54.9%; and triplets 93.6%. The expansion of the bladder that is required with the transabdominal approach results in cervical lengthening and the translabial or transperineal technique do not give accurate measurement of cervical length. Therefore, the transvaginal approach is the most accurate method to assess the cervical length.

The variables analysed:

- (i) The mean cervical length at 11-14 weeks and at 20-22 weeks.
- (ii) The rate of shortening of cervical length in those who deliver at term and preterm.
- (iii) The cervical length at 11-14 weeks and 20-22 weeks was correlated with gestational age at delivery and the predictive value of the same were determined

Statistical analysis

The appropriate statistical analysis method was applied based on data analysis. The mean cervical length was calculated at 11-14 weeks and 20-22 weeks scans. Student's 't' test was used to determine in the differences in the cervical lengths at the first and second scans for the group of patients who delivered either at term or preterm. Logistic regression analysis was used to determine the independent contribution of shortening of the cervix, the cervical length at the 11-14 week and 20-22 week scans, and the demographic characteristics in predicting preterm delivery in women.

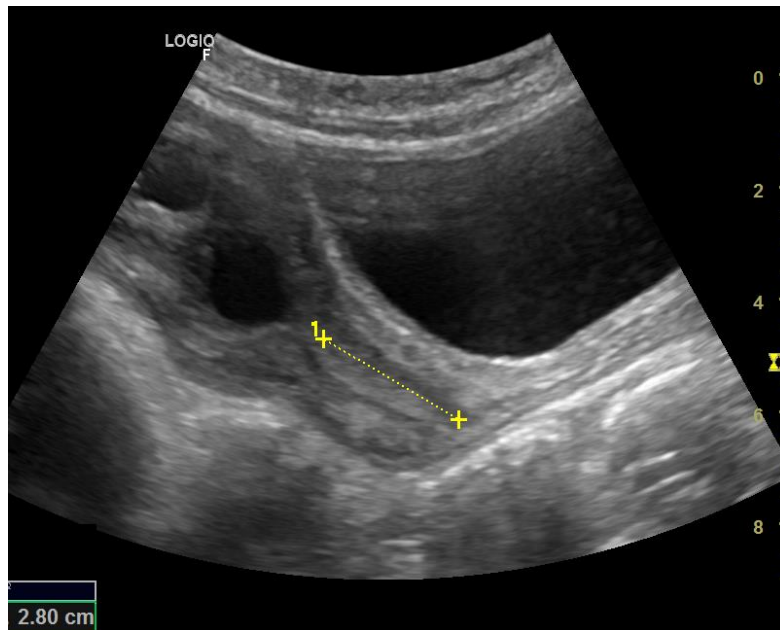


Fig 1: Trans abdominal measurement of cervical length in a 12 weeks of gestation. Cervical length measures 2.8 cm.



Fig 2: Trans abdominal measurement of cervical length in a female with 13 weeks 4 days of gestation. Cervical length

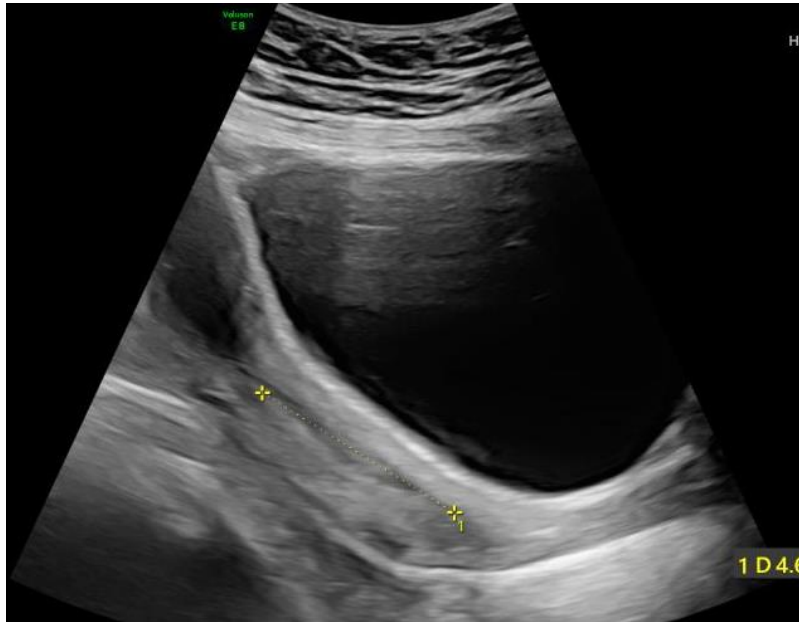


Fig 3: Trans abdominal measurement of cervical length in female with gestation age of 19 weeks 2 days. Cervical length measures 4.6 cm.



Fig 4: Trans abdominal measurement of cervical length in female with gestation age of 22 weeks 1 days. Cervical length

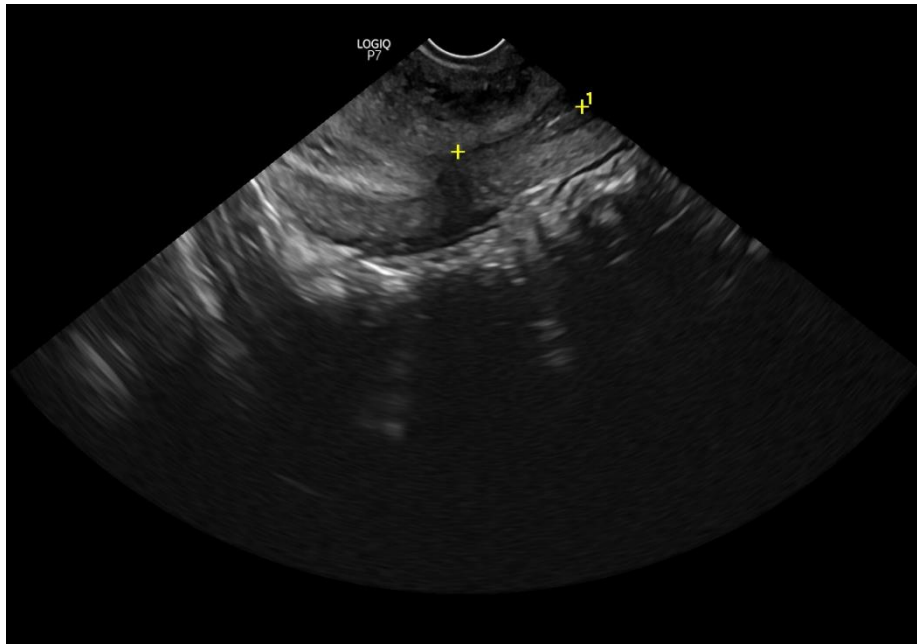


Fig 5: Trans vaginal measurement of cervix in 8 weeks of gestational age, cervical length measures 2.8 cm.

NOTE: In females with borderline cervical length measurement on trans abdominal scan, always trans vaginal measurement should be done for accurate measurement.

3. RESULTS

Table 1: Patient distribution according to the age

Age in year	No of pregnant women	%
<20	33	33
21-25	53	53
26-30	13	13
31-35	1	1
Total	100	100

The Table shows 53% of women in the study group are in the age group of 21-25 years. Median age was 22 years. Minimum age of the subject studied being 18 years and maximum being 33 years.

Table 2: Patient distribution according to cervical length at 11-14 weeks

Cervical length in cm	No. of pregnant women	%
2.1-2.5	0	0
2.6-3.0	2	2
3.1-3.5	16	16
3.6-4.0	56	56
4.1-4.5	17	17
4.6-5.0	9	9
Total	100	100

Cervical length at 11-14 weeks in majority of the pregnant women studied was between 3.6-4.0 cm with mean cervical length being 3.94cm. Minimum cervical length measured was 3 cm and maximum 5cm. Mean \pm SD= 3.94 cm \pm 0.41, Median= 4 cm.

Table 3: Patient distribution according to cervical length at 20-22 weeks

Cervical length in cm	No. of pregnant women	%
2.1-2.5	7	7
2.6-3.0	25	25
3.1-3.5	39	39
3.6-4.0	20	20
4.1-4.5	9	9
4.6-5.0	0	0
Total	100	100

Cervical length at 20-22 weeks in majority of the pregnant women studied was between 3.1-3.5 cm with mean cervical length being 3.37 cm. Minimum cervical length measured was 2.2 cm and maximum 4.5cm. Mean \pm SD = 3.37 cm \pm 0.48, Median= 3.4 cm.

Table 4: Delivery outcome

Maturity	No of pregnant women (n=100)	%
Preterm	12	12
Full term	88	88
Total	100	100

Table shows 88% of the subjects studied, had full term 100 women included in the present study were divided in 3 groups according to reduction in cervical length measured with TVS at 11-14weeks and 20-22 weeks.

- Group A-With reduction in cervical length < 0.5 cm.
- Group B-With reduction in cervical length 0.5 cm-1cm.

- Group C-With reduction in cervical length >1cm.

Table 5: Patients distribution according to reduction in cervical length

Reduction in cervical length (cm)	No of patients	%
Group A (< 0.5 cm)	28	28
Group B (0.5-1.0 cm)	66	66
Group C (> 1.0 cm)	6	6
Total	100	100

In the present study , 28 (28%) patients had < 0.5cm reduction in cervical lengths (Group A), 66 (66%) had reduction in cervical lengths from 0.5-1cm (group B) and 6 (6%) had reduction in cervical lengths >1cm (Group C). deliveries, whereas 12% had preterm deliveries

Table 6: Patient distribution according to gestational age

Gestational age at delivery	Group A (n=28)	Group B (n=66)	Group C (n=6)
Early preterm delivery (<34 weeks)	0 0%	2 3%	3 50%
Late preterm delivery (> 34 weeks)	0 0%	4 6%	3 50%
Term gestation (> 37 weeks)	28 100%	60 91%	0 0%

Table shows, in group A (n= 28); 0 (0%) patient had preterm delivery (34weeks) and remaining 60 (91%) were delivered at term gestation. In group C (n=6); 3 (50%) patients had early preterm deliveries (\leq 34 weeks); 3 (50%) had late preterm deliveries (>34 weeks) and no term delivery.

Table 7: Patient distribution according to birth weight

Birth weight (In kg)	Group A	Group B	Group C
< 2.5	4 14%	11 17%	5 83%
> 2.5	24 86%	55 83%	1 17%

In group A, the incidence was 14% low birth weight; while in group B it was 17% and in group C it was 83%. Group A all delivered at term and no baby required NICU admission.

Table 8: Diagnostic Indices

Test	Cut off value	Sensitivity	Specificity	PPV	NPV	P Value
Cervical length at 11-14 wk	3.85 cm	66.67 %	61.36%	19.5%	93.10%	0.03
Cervical length at 20-22 wk	2.75 cm	75%	100%	100%	96.70%	<0.00001
Reduction in cervical length	> 0.6 cm	66.67%	87.5%	42.11%	95.06%	<0.00001

In this study above table shows reduction in cervical length between 11-14 weeks to 20-22 weeks of gestation in prediction of preterm delivery. At the cut-off value of reduction in cervical length between 11-14 weeks and 20- 22 weeks of gestation of >0.6 cm, sensitivity was 66.67%, specificity was 87.5%, PPV was 42.11%, NPV was 95.06%, and p value was < 0.00001 (EXTREMELY SIGNIFICANT)

4. DISCUSSION

Cervical length measured by endovaginal ultrasound to predict preterm birth was first noted by Andersen et al. Present study was undertaken to assess cervical length by transvaginal ultrasonography during routine NT scan at 11-14weeks and anomaly scan between 20-22 weeks of gestation in 100 booked pregnant women attending the outpatient department of obstetrics, SAIMS, INDORE meeting the inclusion criteria and were followed up till delivery for pregnancy outcome such as time, and mode of delivery, birth weight etc.

In this study majority of subjects belonged to the age group of 21-25 years, i.e. 53%. In a similar study done by Kore S Jet al majority of women were in the age group of 20-30 years. Mean age of the subjects studied was 23years. The mean age of similar study done by Leslie A. Moroz et al was 23 years as well.

In this study cervical length at 11-14 weeks, in majority of the patients was between 3.6cm to 4cm. Mean cervical length in the population studied was 3.94cm. In this study minimum, cervical length measured was 3.0cm and maximum cervical length measured was 5.0cm. Cervical length at 20-22 weeks in same patients, in majority of the patients was between 3.1cm to 3.5cm. Mean cervical length in the population studied was 3.37cm. In this study, minimum cervical length measured was 2.2cm and maximum 4.5cm. In a similar study by P. Arora et al mean cervical length was 3.2cm with minimum measurement of 2.1 cm and maximum measurement of 4.4 cm.

In this study, among those who delivered extreme to early preterm, i.e. 1cm cervical length reduction from 11-14weeks to 20-22 weeks gestation through TVS. Among those who delivered moderate to late preterm, i.e. between 32-36 weeks of gestation, 40% had >1cm cervical length reduction from 11-14weeks to 20-22 weeks gestation through TVS. 60% had 0.5-1cm cervical length reduction from 11-14weeks to 20-22 weeks gestation through TVS. Among those with cervical length of 0.6 cm cervical length reduction between 11-14 weeks and 20-22 weeks gestation is better predictor of preterm delivery.

In our study, when cervical length difference cut-off value > 0.6 cm was applied for predicting preterm delivery, sensitivity was 66.67%, specificity was 87.5%, PPV was 42.11%, NPV was 95.05. In this study, cervical length with cut-off point >0.6 cm predicted preterm labor with P-value of <0.00001

5. CONCLUSION

Our findings confirm those of previous studies that have found an inverse relation between the length of the cervix, as measured by trans-vaginal ultrasonography during pregnancy, and the frequency of preterm delivery. We found that the cervical length measured at 11-14 weeks and 20-22 weeks gestation was decreased in asymptomatic women with single to n pregnancies was useful for identifying patients at increased risk for preterm delivery.

Mean value of cervical length in pregnant women at 11- 14 weeks was 3.94 cm and 20-22 weeks of gestation in our study was 3.38 cm, there is reduction in cervical length as the pregnancy advances. There is a definite correlation between short cervical length and rate of reduction in cervical length from 1st trimester to 2nd trimester with occurrence of preterm delivery.

Our data suggests that the length of the cervix is an indirect indicator of its competence and should be seen as a continuous variable. The length of the cervix is directly correlated with the duration of pregnancy: the shorter the cervix, the greater the likelihood of preterm delivery.

Considering the magnitude of preterm labor, cost of management of preterm babies and morbidity-mortality associated with it, transvaginal ultrasonography of the cervix during routine NT scan and anomaly scan has emerged as a safe, acceptable and a cost-effective test to assess risk of preterm delivery.

6. REFERENCES

1. Carvalho MH, Bittar RE, Brizot ML, Maganha PP, Borges da Fonseca ES, Zugaib M. Cervical length at 11-14 weeks' and 22–24 weeks' gestation evaluated by transvaginal sonography, and gestational age at delivery. *Ultrasound Obstet Gynecol.* 2003;21:135-9.
2. McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. *N Engl J Med.* 1985;312:82-90.
3. Bulletin of the World Health Organization; 2010;88:31-38.
4. Iams JD, Goldenberg RL, Meis PJ. The length of the cervix and the risk of spontaneous premature delivery. National Institute of Child Health and Human Development Maternal Fetal Medicine Unit Network. *N Engl J Med.* 1996;334:567-72 .
5. Elena G, prediction of spontaneous preterm delivery by endocervical length at 11 to 13 weeks. *Prenatal Diagnosis Special Issue: 1st Trimester Screening and Diagnosis.* 2011;31(1):84-9.
6. Meir YJ, D'Ottavio G. Does cervical length at 13-15 weeks' gestation predict preterm delivery in an unselected population? *Ultrasound Obstet Gynecol.* 2003;21:128-34.
7. Skentou CA, Royston P, Yu CK, Nicolaides KH. Prediction of patient-specific risk of early preterm delivery using maternal history and sonographic measurement of cervical length: a population-based prospective study. *Ultrasound Obstet Gynecol.* 2006;27:362-7.
8. Kagan KO, To M, Tsoi E, Nicolaides KH. Preterm birth: the value of sonographic cervical length measurement. *BJOG.* 2006;113:52-6.
9. Hebbar S, Samjhana K. Role of mid-trimester transvaginal cervical ultrasound in prediction of preterm delivery. *Med J Malaysia.* 2006;61(3):307- 11.
10. Andersen HF, Nugent CE, Wanty SD, Hayashi RH. Prediction of risk for preterm delivery by ultrasonographic measurement of cervical length. *Am J Obstet Gynecol.* 1990;163(3):859-67.
11. Kore SJ, Parikh MP, Lakhota, Kulkarni, Ambiyee VR. Prediction of risk of preterm delivery by cervical assessment by transvaginal ultrasonography. *J Obstet Gynecol India.* 2009;59(2):131-5.
12. Moroz LA, Simhan HN. Rate of sonographic cervical shortening and the risk of spontaneous preterm birth. *Am J Obstet Gynecol.* 2012;206:234:1- 5.
13. Celik E, M, Gajewska K, Smith GC, Nicolaides KH. Cervical length and obstetric history predict spontaneous preterm birth: development and validation of a model to provide individualized risk assessment. *Ultrasound Obstet Gynecol.* 2008;31(5):549-54.
14. Arora P, Maitra NK, Agarwal S. Cervical length measurement by transvaginal ultrasound at 20-24 weeks gestation and the timing and mode of delivery. *J South Asian Feder Obst Gynae.* 2012;4(1):22-4.