The Journal of
OBSTETRICS AND GYNECOLOGY of India

J Obstet Gynecol India Vol. 59, No. 2 : March/April 2009 pg 131-135

Original Article

Prediction of risk of preterm delivery by cervical assessment by transvaginal ultrasonography

Kore SJ [1], Parikh MP [2], Lakhotia S [2], Kulkarni V [3], Ambiye VR [4]

[1]Associate Professor, [2]Registrar, [3]Lecturer, [4]Head of Unit

Department of Obstetrics and Gynecology, L.T.M.G. Hospital, Sion, Mumbai – 400 022.

Abstract

Objectives: To evaluate cervical length assessment by transvaginal sonography at 22-24 weeks for predicting women at risk of preterm delivery. *Methods:* Cervical assessment by transvaginal sonography was done in 115 low risk asymptomatic women at 22-24 weeks of gestation. The length of cervix and status of internal os were recorded. The period of gestation at delivery in these patients was then correlated with sonography findings. The gestations at delivery in women with cervical length more or equal to 30 mm (Group A, n=96) were compared with that in women with cervical length less than 30 mm (Group B, n=19). The statistical analysis was done using Chi square test. *Results:* The mean cervical length in the study population was 36.43±7.98 mm with no significant difference between primigravidas and multigravidas. There was definite positive correlation between cervical length at 22-24 weeks and period of gestation at delivery. The average gestation at delivery in group A women was 38.03 weeks as compared to 32.72 weeks in group B women (P<0.005). *Conclusion:* Endovaginal ultrasonographic examination of cervix is simple, sensitive and cost effective method of assessing risk of preterm delivery.

Key words: ultrasonography, transvaginal sonography, cervical length, preterm labor

Introduction

Preterm birth defined as delivery before 37 weeks of pregnancy continues to be a leading cause of perinatal complication. Despite availability of aggressive treatment protocols for preterm labor, it is responsible for approximately 80% of neonatal mortality. The frequency of preterm delivery in live births ranges between 5% and 16% [1,2]. Meta-analysis of various studies has failed to show significant beneficial effect of tocolytic treatment [1]. The major factor influencing the success of treatment of preterm labor is early institution of tocolytic therapy [1,2]**.** This makes the early diagnosis of preterm labor a prime objective.

Identification of those women who are likely to deliver before term requires use of simple diagnostic tools that can be applied to both asymptomatic and symptomatic pregnant women. Unfortunately current methods of identifying women at risk of preterm delivery like scoring system based on demographic factors, digital examination of cervix, and biochemical tests have very low sensitivity and specificity making them useless in clinical practice [3-7].

Paper received on 02/01/2007 ; accepted on 20/01/2009

Correspondence :
Dr. Kore S J
4-A/26, Saraswati, Sangh Mitra CHS
Ambekar Nagar, Chunabhatti,
Sion, Mumbai - 400 022, India
Tel. 56219388 Email : shaileshkore@hotmail.com

Over the past few years, ultrasonographic assessment of the cervix has emerged as objective method to assess the risk of development of preterm labor [8].

This study was undertaken to evaluate cervical length assessment by transvaginal sonography for predicting women at risk of preterm delivery.

Other objectives were to find out mean the cervical length and frequency distribution of cervical lengths in low risk asymptomatic pregnant population, and to find the correlation of a short cervix having open internal os and funneling with preterm delivery.

Methods

This prospective study was done over a period of two years. Sonographic cervical assessment in 115 low risk women at 22-24 weeks was done using 7.5MHz transvaginal probe on Toshiba machine. All women were explained the procedure and their consent was obtained. The sonography was done on an empty bladder, in a dorsal position. The vaginal probe was manipulated to obtain a sagittal view of the entire cervix with echogenic endocervical mucosa along the length of cervical canal. Care was taken to avoid undue pressure on the cervix.

Calipers were used to measure distance between triangular echogenicity of the external os and the V-shaped notch of internal os. Two measurements were taken and the shortest distance was considered. The status of the internal os and the presence or absence of funneling was recorded. Internal os was considered as open if its diameter exceeded 5 mm. The term funneling was used to describe the morphology observed with ultrasonography in the upper part of the endocervical canal during the process of cervical ripening. The examination was done over a period of 3-5 minutes.

The cervical assessment findings were not used in further management of the patient. Women developing any high risk factor or requiring delivery for any other obstetric indications were excluded from the study.

All women were regularly followed up in our antenatal clinic till delivery. The findings of cervical assessment were then correlated with period of gestation at delivery. Preterm delivery was defined as delivery before 37 completed weeks.

Mean cervical length in the given patient population and the significance of difference in primigravidas and multigravidas were calculated. The gestation at delivery of the women in group A was compared to that of the women in group B. Statistical analysis was done using Chi-square test.

Results

Majority of the women were in the age group of 20-30 years. There were 58 primigravidas and 57 multigravidas. The mean cervical length in all these women was 36.43±7.98 mm. The values in primigravidas and multigravidas were almost similar.

The frequency distribution of cervical lengths in these women is shown in Figure 1. The incidence of preterm delivery was 13.5% in group A as compared to 89.5% in group B ($p<.005$). Average period of gestation at delivery in group A was 38.03±2.16 weeks compared to 32.6±3.06 weeks in group B ($p<0.005$).

In group A of the 96 women 13 delivered preterm, 10 of them between 33 and 36 weeks of gestation. In group B, 17 of the 19 women delivered preterm (one before 28 weeks, eight between 28 and 32 weeks and eight between 33 and 37 weeks), Table 1.

Table 1. Relation of cervical length and period of gestation at delivery (n=115).

Group	Period of gestation at delivery (weeks)			
	<28	28-32	33-37	>37
Group A (n=96)	0	3	10	83
Group B (n=19)	1	8	8	2

A positive correlation was found between cervical length and gestation at delivery in both primigravidas and multigravidas (Figures 2 and 3).

There was also definite correlation between open internal os or funneling and incidence of preterm delivery. In both the groups all the women with open internal os and funneling delivered preterm while none with closed internal os delivered preterm (Table 2).

Table 3 shows that sensitivity, specificity, positive predictive value and negative predictive value of less than 30 mm cervical length is 76%, 56%, 25% and 93% respectively.

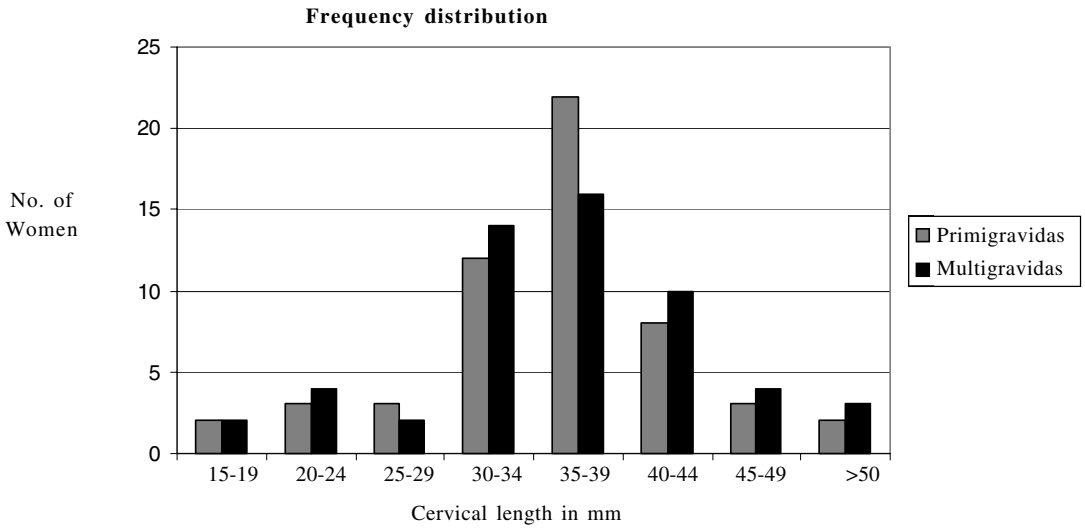

Figure 1. Frequency distribution of cervical lengths.

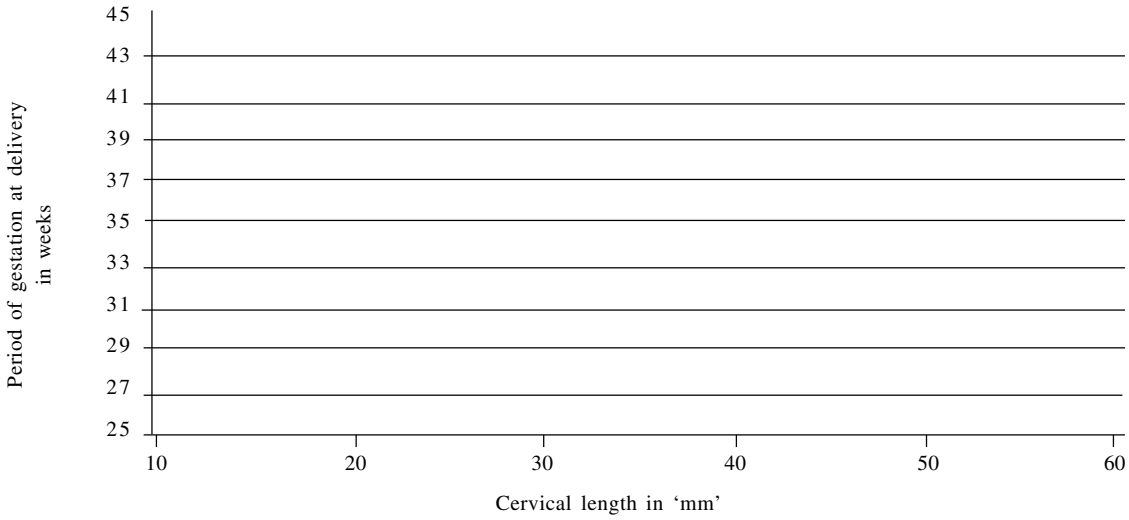

Figure 2. Relationship of cervical length and period of gestation at delivery in primigravidas (n=58).

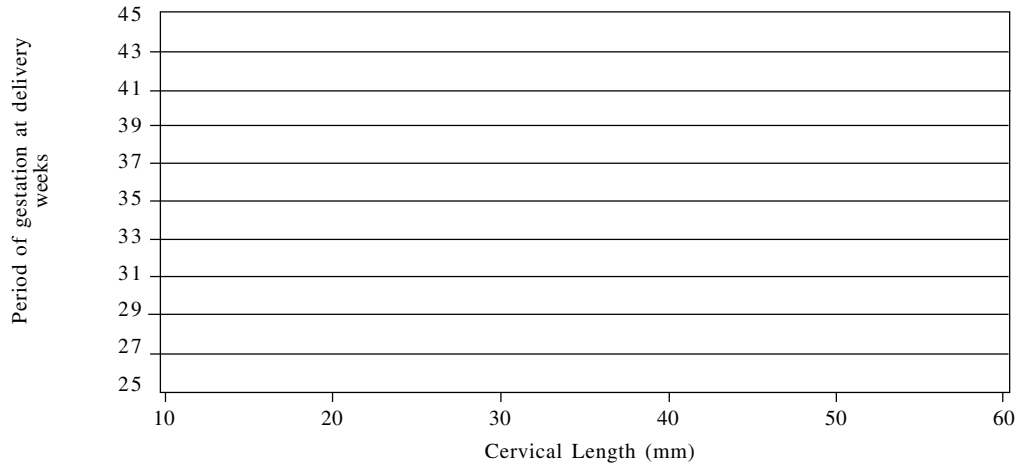

Figure 3. Relationship of cervical length and period of gestation at delivery in multigravidas (n=57).

Table 2. Correlation of open internal os and funneling and preterm delivery (n=115).

Group	Internal os	Period of gestation at delivery (weeks) <28	28-32	33-37	>37	Total
A (n=96)	Closed	-	-	-	83	83
	Open	-	3	10	-	13
B (n=19)	Closed	-	-	-	2	2
	Open	1	8	8	-	17

Table 3. Sensitivity and specificity of cervical length for predicting preterm labor in different studies.

Author	Number	Gestation (weeks)	Cervical length cut off +ve	Sensitivity %	Specificity %	Positive predictivie value %	Negative predictive value %
Anderson et al.[8] (1990)	112	<30	<39mm	76	59	25	93
Iams et al[10] (1996)	2915	24	<20mm	23	97	26	97
Murakawa et al[11] (1993)	32	18-37	<30mm	100	72	65	100
Present Series	115	22-24	<30mm	57.6	97.6	89.5	89.2

Discussion

Though preterm birth occurs in approximately 5-15% of all deliveries, it accounts for the major bulk of perinatal and especially postnatal deaths [1,2]. The risk of neonatal morbidity and mortality mainly depends on the gestational age at delivery. Survival rate increases with an increasing period of gestation [9]. In a developing country like ours, where intensive care facilities are often unavailable, mortality figures would be much higher at a lower gestation period at delivery.

The main reason for low success rate of tocolytic therapy is failure to detect patient at an early stage [1-3]. Thus, it becomes essential to identify women, both symptomatic and asymptomatic, who are at risk of preterm delivery early enough so that an optimum treatment in the form of tocolysis or cerclage can be given in time.

Unfortunately current methods of identifying women at risk of preterm delivery like a scoring system based on demographic factors and digital examination of cervix have low sensitivity and specificity [2-4]. Objective methods such as evaluation of the presence of cervicovaginal fibronectin, direct or indirect assessment of subclinical infection including bacterial vaginosis, and assessment of cervical or amniotic cytokine concentration are accurate but expensive and often unavailable [4-7]. Ultrasonographic assessment of the cervix has emerged as an alternative method to objectively assess cervical length and morphology for prediction of preterm labour [7,8]. Acceptability and repeatability of this procedure were found to be good.

In the present study patients with the cut off value of <30 mm cervical length for screen positive at 22-24 weeks of gestation had a sensitivity of 56.7%, specificity of 97.6%, positive predictive value of 89.5%, and negative predictive value of 89.2%. Our study has proved the positive relationship between cervical length and period of gestation at delivery. Similar results have been reported in other studies [4,10,11] as shown in Table 3. Recent study by Caglar at al[12] reports that sensitivity

and accuracy of transvaginal sonography for cervical assessment is better than abdominal sonography. They also found a definite relationship between funneling of cervix and preterm delivery. Rust et al[13] also report similar findings.

Positive predictive value can be considerably improved if cervical assessment is combined with presence of cervicovaginal fetal fibronectin[8,14] or by using transfundal pressure test[15].

Conclusion

Mean value of cervical length in pregnant women at 22-24 weeks of gestation in our study was 36.43 mm. There is a definite correlation between short cervical length with an open internal os and the occurrence of preterm delivery. Transvaginal sonography of the cervix is safe, acceptable, sensitive, and a cost-effective screening test to assess risk of preterm delivery.

References

1. Creasy R.K. Preterm birth prevention: where are we? *Am J Obstet Gynecol 1993;168:1223-30.*
2. Feresu SA, Harlow SD, Woelk GB. Risk factors for prematurity at Harare Maternity Hospital, Zimbabwe. *Int J Epidemiol 2004;33:1194-201.*
3. Savitz DA, Blackmore CA, Thorp JM. Epidemiologic characteristics of preterm delivery: etiologic heterogeneity. *Am J Obstet Gynecol 1991;164:467-71.*
4. Gomez R, Galasso M, Romero R et al. Ultrasonographic examination of the uterine cervix is better than cervical digital examination as a predictor of the likelihood of premature delivery in patients with preterm labor and intact membranes. *Am J Obstet Gynecol 1994;171:956-64.*
5. Gibbs RS, Romero R, Hillier SL et al. A review of premature birth and subclinical infection. *Am J Obstet Gynecol 1992;166:1515-28.*
6. Lockwood CJ, Ghidini A, Wein R et al. Increased interleukin-6 concentrations in cervical secretions are associated with preterm delivery. *Am J Obstet Gynecol 1994;171:1097-102.*
7. Rizzo G, Capponi A, Arduini D et al. The value of fetal fibronectin in cervical and vaginal secretions and of ultrasonographic examination of uterine cervix in predicting premature delivery for patients with preterm labor and intact membranes. *Am J Obstet Gynecol 1996;175:1146-51.*
8. Andersen HF, Nugent CE, Wanty SD et al. Prediction of risk for preterm delivery by ultrasonographic measurement of cervical length. *Am J Obstet Gynecol 1990;163:869-7.*
9. Copper RL, Goldenberg RL, Creasy RK et al. A multicentre study of preterm birth weight and gestational age specific neonatal mortality. *Am J Obstet Gynecol 1993;168:78-84.*
10. Iams JD, Goldenberg RL, Meis PJ et al. The length of the cervix and 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.*
11. Murakawa R, Utumi T, Hasegawa I et al. Evaluation of threatened preterm delivery by transvaginal ultrasonographic measurement of cervical length. *Obstet Gynecol 1993;82:829-32.*
12. Caglar G, Soguk C, Kalyoncu S et al. Evaluation of the length of the cervix by transvaginal and transabdominal ultrasonography in the second trimester. *J Ostet Gynaecol India 2005;55:318-21.*
13. Rust OA, Atlas RO, Kimmel S et al. Does the presence of a funnel increase the risk of adverse perinatal outcome in a patient with a short cervix? *Am J Obstet Gynecol 2005;192:1060-6.*
14. Gomez R, Romero R, Medina L et al. Cervicovaginal fibronectin improves the prediction of preterm delivery based on sonographic cervical length in patients with preterm uterine contractions and intact membranes. *Am J Obstet Gynecol 2005;192:350-9.*
15. Guzman ER, Rosenberg JC, Houlihan C et al. A new method using vaginal ultrasound and transfundal pressure to evaluate the asymptomatic incompetent cervix. *Obstet Gynecol 1994;83:248-52.*