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Original Research Article

A prospective study of prediction of preterm delivery by cervical assessment by transvaginal sonography

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ABSTRACT

Introduction: Preterm birth is a major cause of death and a significant cause of long-term loss of human potential amongst survivors all around the world. Complications of preterm birth are the single largest direct cause of neonatal deaths, responsible for 35% of the world's 3.1 million deaths a year, and the second most common cause of under-5 deaths after pneumonia.
In this study, an attempt has been made to evaluate the usefulness of cervical assessment by TVS in prediction of risk of preterm delivery in low risk pregnant women, thereby earlier management option can be planned and patients specific treatment can be given at the earliest.
Materials and Methods: The present study was carried out in tertiary care teaching hospital for 1 year from 1 Jan 2019 to 31 Dec 2019. Total of 100 study participants who underwent TVS assessments of cervix regularly followed up who underwent TVS assessment of cervix and were regularly follow up and delivered.
Result: The mean cervical length in all these women was 30±6.68 mm. It was observed that 51.72% of patients with short cervical length less than 25 mm had preterm labour compared to the patients with cervical length more than 25mm i.e. 4.22%.
Conclusion: Cervical assessment by TVS is effective in predicting preterm labour.

1. Introduction

Approximately 15 millions babies are born premature every year i.e. more than 1 in10. Almost 1 million children die every year due to complications of preterm birth. Many survivors face lifetime disability which include learning disabilities, visual and hearing problems. Globally prematurity is leading cause of death in children under the age of 5 years. India is among the top ten countries with greatest number of preterm birth. [1]

Preterm birth as defined by WHO, American academy of Paediatrics and American Congress of Obstetrician and Gynaecologist, is the birth of a baby before 37 weeks of gestation. Preterm labour has multifactorial etiopathogenesis. A variety of maternal and fetal factors are known to increase the risk of preterm labour. Although there are unique aspects to each cause of preterm labour these diverse processes culminate in common end point which is premature cervical dilation and effacement premature activation of uterine contractions. [2]

The fundamental change in the strategy of the preterm birth prevention has been the understanding of a need to

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intervene earlier in the development of a pathophysiology leading to this undesired outcome of preterm labour. The concept of tocolysis has been shown to beneficial in other outcome in preparation for preterm birth such as gaining opportunity for steroid benefit to enhance fatal neonatal functions or to allow the transport of a patient from facility without the potential for neonatal intensive care to one with that capability.

Several methods like home uterine monitoring, cervical examination, fetal fibronectin in cervico-vaginal secretions etc. have been used for identifying women at risk of preterm delivery. But these methods have been associated with either low sensitivity or specificity or are not cost effective. Sonographic evaluation of cervix determined by trans-abdominal or trans-vaginal scanning has significant role to predict the preterm labour. Sonographic evaluation is more precise procedure as compared to digital assessment. When performed by trained operator cervical length analysis using TVS is safe, highly reproducible more predictive than TAS screening.

2. Aims

To find out the effectiveness of assessment of cervical length by TVS in predicting preterm delivery.

3. Objective

To find out the corelation of short cervix, open internal os and funnelling with preterm delivery.

4. Materials and Methods

Observational prospective study was done in department of obstetrics and gynaecology at GMC Gondia for 1 year from 1 Jan 2019 to 31 Dec 2019 with a sample size of 100.

100 women who underwent TVS assessment of cervix regularly followed up and delivered in one institution were distributed in two groups-

Group A- with cervical length <25mm

Group B- with cervical length >= 25mm

4.1. Inclusion criteria

1. Pregnant women age 18-35 year.
2. Single live intrauterine pregnancy with gestational age 20-25 weeks.
3. No bad obstetrics history.
4. Booked and registered ANCs.
5. Patient willing to participate, follow up and deliver in the institute.

4.2. Exclusion criteria

1. History of first trimester bleeding, symptoms like pain in abdomen or features suggestive of threatened abortion.
2. History of preterm labour during previous pregnancy, previous second trimester abortion, previous cessarean section or myomectomy.
3. Medical disorders complicating pregnancy such as essential hypertension, renal disease, diabetes mellitus or other risk factors which might influence gestational age at delivery.
4. Uterine malformation and fibroid.
5. Multiple gestations, foetal malformation.
6. Cervical surgical treatment.
7. Patients who are not willing to participate in pregnancy.

4.3. Methodology

All study participants were explained the purpose of study. The study was conducted after taking the permission of institutional ethics committee. A written consent was taken from all participants. Detailed history about their demography, socioeconomic status, obstetric history and relevant medical, surgical and past history was obtained.

The subjects then underwent trans-vaginal sonography. All the measurements were taken by same operator using 7.5 MHz TVS probe with empty bladder in dorsal position. 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 internal os and presence or absence of funneling was recorded. Internal os considered open if its diameter exceeded 5mm.

The preterm delivery was defined as delivery before 37 completed weeks the findings of cervical assessment were then correlated with period of gestation. Statistic analysis was done.

5. Results

The maximum number of patients in the study belong to the age group of 23-27 years with mean age±SD being 25.95+-3.8 years. Out of total 100 patient, 44 patients were primigravida and 56 patients were multigravida.

Table 1: Frequency distribution for cervical length

Cervical length (mm)	Total
17-20.0	09
20.1-25.0	20
25.1-30.0	17
30.1-35.0	25
35.1-40.0	21
40.1-45	8

In similar study done by Kore SJ et al[3]all patient enrolled in study underwent TVS between 22-24 weeks of gestation,majority of the women were in the age group of 20-30 years, 58 were primigravidas and 57 were multigravidas. The mean cervical length in all these women

Table 2: Cervical length characteristics

Mean+-SD	30+-6.68 mm
Range	17-40.5 mm
Groups	Number (%)
A	29 (29%)
B	71 (71%)

was 36.43±7.98 mm. The values in primigravidas and multigravidas were almost similar.

Table 3: Internal OS status and gestational age at delivery

OS status	Cervical length		
	Group A	Group B	
Closed	10	58	68
Open	11	3	14
Funneling	08	10	18
Total	29	71	100

OS Status	Preterm	Term	Total
Closed	3 (4.41%)	65 (95.58%)	68(100%)
Open	9(64.28%)	5 (35.71%)	14(100%)
Funneling	6 (33.33%)	12 (66.66%)	18(100%)

Out of total 14 cases with open internal os 9(64.28%) delivered preterm and out of 18 cases of funneling 6 (33.33%) delivered preterm. Among those with closed internal os, only 4.41% delivered preterm. This corresponds to study conducted by Bhonsale et al. Bhosale et al.[4] reported that of the 88 patients that had preterm delivery, in 36 patients there was presence of funneling and only 2 of these could carry their pregnancies till term and 34 of them i.e. 94.4% had preterm deliveries.

Table 4: Gestational age of patient recruited

Parameters	Group A	Group B
Mean Gestational Age (Weeks) At Delivery	35.99+-3.28	38.51±1.29
Range (weeks)	24.6-40.5	32.6-41.0
Preterm n(%)	15(51.72%)	3(4.22%)
Term n(%)	14(48.27%)	68(95.77%)

GR Shinde et al.[5] reported mean gestational age at birth in group B (cervical length > 25 mm) was 38.94 ± 2.3 weeks and in group A (Cervical length ≤ 25 mm) 35.3 ± 3.2 weeks with 75% preterm deliveries in group A.

Among 18 preterm deliveries 15 patients (83.33%) has cervical length < 25 mm and 3 patients(16.66%) of them had cervical length >=25mm. This shows that most of the preterm deliveries short cervical length.

Statistic analysis done by chi-square test.

Applying chi – square test

The chi-square statistic is 31.4728. (Chi 2 =31.47 DF=1)

Table 5: Cervical length in preterm and term delivery

Cervical length	Preterm delivery N(%)	Term delivery N(%)	Total
Group A	15(83.33%)	14(17.07%)	29
Group B	3(16.66%)	68(95.77%)	71
Total	18	82	100

Table 6:

	Preterm	Term
Group A	O=15	O=14
	E=5.22	E=23.78
	O-E=9.78	O-E=-9.78
Group B	O=3	O=68
	E=12.78	E=55.76
	O-E=-9.78	O-E=12.24

O – observed E- expected

The two-tailed P value is less than 0.0001. By conventional criteria, this difference is considered to be extremely statistically significant.

6. Discussion

In our study mean cervical length was 30.0mm ± 6.68(SD). Among 29 patients with cervical length <25mm 51.72% delivered preterm and rest 48.27% delivered term, whereas out of 71 patients with cervical length >/= 25mm only 4.22% delivered preterm and majority of (95.77%) patients delivered at term. This is statistically significant and suggest that shorter the cervical length more is the risk of preterm delivery. This is consistent with the result of study by Mathur S et al[6] and Tanvir et al[7] which also shows positive correlation.

Table 7:

Study	Percentage of preterm deliveries in cases of short cervical length <25mm
Mathur S et al[6]	88%
Tanvir et al[7]	40.62%
Present Study	51.72%

Hence, it can be concluded that nearly 1/2 to 2/3 of women with short cervical length <25mm deliver preterm unless certain precautions are taken.

Though preterm birth occurs in approximately 5-15% of all deliveries it accounts for the major bulk of perinatal and especially postnatal deaths. The risk of neonatal morbidity and mortality mainly depends on the gestational age at delivery. Survival rate increases with increasing period of gestation. 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. 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. Objective methods such as evaluation of the presence of cervico-vaginal 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.

Ultrasonographic assessment of the cervix has emerged as an alternative method to objectively assess cervical length and morphology for prediction of preterm labour. Acceptability and repeatability of this procedure were found to be good and cost- effective.[8]

7. Conclusion

Short cervical length predispose to preterm labour. The risk of preterm delivery is inversely proportional to cervical length. Doing a TVS measurement of cervical length between 20-25 weeks of gestation can be a helpful strategy to identify pregnant women at risk of preterm delivery.

8. Source of Funding

None.

9. Conflict of Interest

The authors declare no conflict of interest.

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