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Original Research Article

Analysis of clinico-sonological parameters of women with preterm pregnancy with complaint of lower abdominal pain

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ABSTRACT

Background: Cervical length and dilatation are important parameters to be evaluated for the diagnosis of threatened preterm labor, and they may have an important role in the risk stratification of women presenting with preterm labor. Thus, the study was planned to analyse clinicosonological parameters in women with preterm pregnancy who came with complaint of lower abdominal pain.
Methods: A total of 200 pregnant women with 28 to 35±6 weeks of gestation admitted with pain abdomen underwent complete history and examination, followed by relevant antenatal investigations. Transvaginal ultrasonic CL and dilatation measurement at the time of admission and after 4-6 hours of observation were done. The subjects were followed and admission-delivery interval was noted. Statistical analysis was done by applying the appropriate Chi-square test for the comparison of proportions.
Results: Four percent of patients had a cervical length <2 cm at admission, 40% had a cervical length between 2-3 cm and 56% of patients had a cervical length ≥3 cm. The difference between the 3 groups was statistically significant (p value <0.000001) and 100% of patients with cervical length <2 cm were delivered within one week. Fifteen percent of patients had changes in cervical length after 4-6 hours of observation and 85% did not have any change in cervical length. The difference was statistically significant (p value <0.0000001).
Conclusions: Cervical length and dilatation measurement by transvaginal sonography (TVS) has a positive correlation with the admission to the delivery interval.

Keywords: Admission-delivery interval, Cervical dilatation, Cervical length

INTRODUCTION

Preterm delivery is the most common and the leading cause of neonatal mortality and morbidity with its long-term neurological and developmental problems. It is related to cerebral palsy, bronchopulmonary dysplasia, retinopathy of prematurity, and many other morbidities that come with prematurity.

Identification of actual preterm labor can avoid costly and unnecessary interventions in almost 50% of patients who present with suspected preterm labor (PTL) and subsequently deliver at term gestation without any need for tocolytic therapy.[1] In 2010, there were 15 million preterm births worldwide, with a prevalence of 5-18% of live births.[2] In 2015, preterm birth (PB) rate in the United States was 9.62% among 3,977,745 births which meant a significant number of neonates needed further medical care.

Only a few of the women admitted to our tertiary care hospital with preterm pregnancy and complaints of lower abdominal pain are in true labor. Other factors causing pain in the lower abdomen include false labor pains, gastrointestinal and urological causes, etc. It is often a big challenge to differentiate between true and false preterm labor, as approximately 15% of those presenting with threatened preterm labor will deliver prematurely.

Although many studies have investigated the mechanisms involved in the process of preterm delivery and the methods for the prevention and early diagnosis of PTL (preterm labor), few studies have been performed on the clinicosonological factors of preterm labor. Cervical length (CL) measurement and dilatation of the cervix is one of the parameters to be evaluated for the diagnosis of threatened PTL, and it may have an important role in the risk stratification of women presenting with PTL.

Measurement of cervical length is the most cost-effective method that is used in clinical practice. Thus, the study was conducted to analyse the causes of lower abdominal pain and to study the clinicosonological parameters of these females.

METHODS

The present study was conducted in the department of obstetrics and gynaecology from January 2020 to September 2021, in LLRM Medical College and associated SVBP Hospital, Meerut after taking permission from the institutional ethics committee and had been performed in accordance with the ethical standards described in an appropriate version of the 1975 Declaration of Helsinki, as revised in 2000.

Research question

According to the PICO format- in preterm pregnant women with lower abdominal pain (P), is the cervical length and internal ors diameter measurement by ultrasound (I), reliable predictors of time of delivery (O)?

Type of study

It was a prospective observational study.

Sample size

A total of 200 subjects were enrolled for the study.

Inclusion criteria:

Pregnant women with lower abdominal pain, fulfilling the following criteria: age 18-38 years, pregnancy of 28 to 356 weeks of gestation, singleton pregnancy, longitudinal lie.

Exclusion criteria

Extreme of age (<18 and >38 years), women in active labor (defined as cervical dilatation exceeding 4 cm), women with <28 weeks of gestation and >36 weeks of gestation, multifetal pregnancy, women requiring termination of pregnancy, antepartum hemorrhage-placenta previa/abruptio placentae, PPROM (preterm prelabor rupture of membrane), women with history of conization/amputation of the cervix, women who have a cerclage placed in the current pregnancy, known congenital uterine anomalies, associated bladder and bowel complaints.

All pregnant women from 28 to 356 weeks of gestation admitted with complaints of lower abdominal pain were enrolled after calculating the exact gestational age by the first-trimester scan. Informed consent was obtained from all the subjects fulfilling the inclusion criteria.

All women underwent complete history taking and thorough general, systemic and obstetrical examination, and relevant antenatal care (ANC) investigations were done. Data collection included demographics, medical and obstetric history, uterine contractions (by external tocography using cardiotocography machine), dilatation and effacement of the cervix at the time of admission, transvaginal ultrasonic cervical length, and dilatation measurement at the time of admission and after 4-6 hours of observation, treatment received, and delivery information. The subjects were followed through delivery and the feto-maternal outcome was noted. All the details were filled in the working proforma.

Method to measure CL by transvaginal sonography (TVS)

Hitachi Akola ultrasound machine, located in the obstetrics and gynecology department was used for all cases to measure the cervical parameters A clean transvaginal probe covered by a condom was inserted in the anterior fornix of the vagina after emptying the bladder. When a sagittal long-axis view of the entire endocervical canal was obtained, the image was enlarged until the cervix occupied at least 2/3rd of the screen and both the external and internal os was seen. The length of the cervix was measured from the internal os to the external os along the endocervical canal. After obtaining 3 measurements, the average measurement was recorded.

On the basis of cervical length on admission, patients were divided into 3 groups- those having CL of ≥3 cm, 2 to 3 cm, and <2 cm. Reassessment was done to find any progressive changes after an interval of 4-6 hours.

The primary outcome was to see the association of CL and cervical dilatation with admission delivery interval.

Statistical analysis was done by applying the appropriate Chi-square test which was used for the comparison of proportions (categorical variables). P value of <0.05 was considered significant.

RESULTS

Out of total 200 women who came with complaints of pain in the abdomen in their preterm pregnancy, only 14% delivered within one week of admission, 36% delivered in >1 week of admission, and 50% delivered at/near term (Table 1).

Table 1: Admission to delivery interval.

Admission to delivery interval	No. of patients (%)
<1 week	28 (14)
>1 week	72 (36)
At/near term	100 (50)
Total	200

When various demographic data like age, gravidity, and BMI (body mass index) were compared in terms of admission delivery interval, the results were found to be statistically insignificant (p value >0.05) except for gravidity status. It was noted that 34% of patients were primigravida and 66% were multigravida. The difference was statistically significant (p value- 0.03123) and it was found that 68% of primigravida who were preterm and came with complaints of pain in the abdomen, delivered at/ near term, and 6% delivered within one week of admission. Whereas only 41% of multigravida delivered at/near term and 18% delivered within one week of admission (Table 2).

Table 2: Relation between demographic parameters and admission to delivery interval.

Demographic parameters		No. of patients	<1 week (%)	>1 week (%)	At/near term (%)	Chi-square statistic	P value
Age distribution (years)	18-24	60	10 (17)	18 (30)	32 (53)	3.8056	<0.05
	25-31	94	12 (13)	30 (32)	52 (55)		
	32-38	46	6 (13)	24 (52)	16 (35)		
Gravida status	Primigravida	68	4 (6)	18 (26)	46 (68)	6.9328	0.03123
	Multigravida	132	24 (18)	54 (41)	54 (41)		
BMI (kg/m^2)	Low (<18.5)	32	10 (31)	14 (44)	8 (25)	6.2778	0.179342
	Normal (18.5-24.9)	156	18 (12)	52 (33)	86 (55)		
	High (≥25)	12	2 (17)	4 (33)	6 (50)		

Table 3: Relation between various clinical parameters and admission to delivery interval.

Clinical parameters		No. of patients	<1 week (%)	>1 week (%)	At/near term (%)
History of PTL	Present	18	10 (56)	6 (33)	2 (11)
	Absent	182	18 (10)	64 (35)	100 (55)
History of abortions	Present	42	10 (24)	14 (33)	18 (43)
	Absent	158	18 (11)	58 (37)	82 (52)
Hemoglobin status (gm/dl)	<7 (severe anemia)	20	2 (10)	8 (40)	10 (50)
	7-8.9 (moderate anemia)	54	8 (15)	18 (33)	28 (52)
	9-10.9 (mild anemia)	66	8 (12)	26 (39)	32 (48)
	≥11 (normal)	60	12 (20)	20 (33)	28 (47)
Uterine contractions	Present	68	28 (41)	22 (32)	18 (27)
	Absent	132	2 (2)	48 (36)	82 (62)

Table 4: Relation between sonological parameters and admission to delivery interval.

Parameter (N)	<1 week (%)	>1 week (%)	At/near term (%)	Chi-square statistic	P value
Cervical length at admission (n=200)					
<2 cm (8)	8 (100%)	0	0	43.77	<0.000001
≥2-3 cm (80)	20 (25%)	36 (45%)	24 (30%)		
≥3 cm (112)	0	36 (32%)	76 (68%)		
Change in cervix length after 4-6 hours (n=200)					
Present (30)	28 (93%)	0	2 (7%)	92.31	<0.0000001
Absent (70)	0	72 (42%)	98 (58%)		
Cervical dilatation on TVS (n=200)					
0-1 cm (160)	6 (4%)	56 (35%)	98 (61%)	40.4989	<0.00001
1.1-2 cm (26)	10 (38%)	14 (54%)	2 (14%)		
2.1-3 cm (14)	10 (72%)	2 (14%)	2 (14%)		

Clinical history and other parameters (anemia, history of previous preterm labor and abortion, presence or absence of uterine contractions) when compared, in terms of admission delivery interval, there was no correlation seen with either prior history of abortion (p value 0.341153) or anemia (p value 0.97717). But prior history of preterm labor (p value 0.00478) and presence of uterine contractions (p value <0.00001) were significantly related to admission delivery interval (Table 3).

Table 5: Feto-maternal outcome and admission to delivery interval.

Feto-maternal outcome	No. of patients (200)	<1 week (%)	>1 week (%)	At/near term (%)	Chi-square statistic	P value
Mode of delivery						
Vaginal	142	26 (18%)	48 (34%)	68 (48%)	2.803	0.246226
Cesarean	58	2 (3%)	26 (45%)	30 (52%)		
Birthweight of new born						
VLBW (1-1.5 kg)	6	4 (67%)	2 (33%)	0	15.6	0.003608
LBW (1.6-2.5 kg)	160	22 (14%)	66 (41%)	72 (45%)		
Normal (>2.5 kg)	34	2 (6%)	4 (12%)	28 (82%)		
Admissions in NICU for >24 hours						
Present	12	4 (33%)	6 (50%)	2 (17%)	3.4701	0.17639
Absent	188	24 (13%)	66 (35%)	98 (52%)		

Sonological parameters on TVS in terms of CL (at admission and after 4-6 hours) and cervical dilatation were compared with admission delivery interval and it was seen that 4% patients had CL <2 cm at admission, 40% had CL between 2-3 cm and 56% patients had CL ≥3 cm. The difference between the 3 groups was statistically significant (p value <0.000001) and 100% of patients with CL <2 cm delivered within one week. Fifteen percent of patients had changes in CL after 4-6 hours of observation and 85% did not have any change in CL. The difference was statistically significant (p value <0.0000001) and it was observed that 93% of patients who had a change in CL delivered within one week of admission and only 7% delivered at or near term. Cervical dilatation was 0-1 cm in 80% patients, between 1-2 cm in 13% and 2-3 cm in 7% patients. The difference between the 3 groups was statistically significant (p value <0.00001) and 61% with cervical dilatation 0-1 cm delivered at or near term, 35% delivered in more than a week, and only 4% delivered within one week of admission. Whereas, 72% of patients with cervical dilatation of 2-3 cm delivered within one week of admission, 14% of patients delivered after one week, and 14% of patients delivered at or near term (Table 4).

Six percent of newborns were admitted to the neonatal intensive care unit (NICU) for more than 24 hours. The difference was statistically insignificant (p value 0.17639) and hence no correlation was found between preterm births and NICU admissions for >24 hours (Table 5).

DISCUSSION

Preterm delivery (PTD) is the most common cause of neonatal mortality and morbidity. Signs and symptoms of preterm labor include four or more uterine contractions in one hour. In contrast to false labor, true labor is associated with cervical changes.

CL is normally distributed and remains relatively constant in pregnancy until the third trimester. Decreased CL before 34 weeks (<3 cm) is a very good predictor of preterm birth in all populations, while a long cervix (≥30 mm) has a high negative predictive value for premature delivery. Thus, knowing consistently long cervix in women with threatened preterm labor may improve outcomes, especially avoidance of unnecessary interventions and hospitalization when the cervix is normal, but such data are limited.

Admission to delivery interval

In our study, 50% of patients were admitted with lower abdominal pain and delivered at or near term, 36% delivered after more than a week, and 14% delivered within one week. Similar to this, a study by Chao et al, concluded that women sent home with a diagnosis of false preterm labor are not at increased risk for early preterm birth or neonatal mortality.[3]

In a study by Dudášová et al, it was concluded that it is possible to predict preterm labor by transvaginal ultrasonographic measurement of CL.[8] Similarly, in a study by Berghella et al, it was concluded that knowledge of transvaginal ultrasound-measured CL, used to inform the management of women with singleton pregnancies and symptoms of preterm labor, appeared to prolong pregnancy by about four days over women in the no knowledge groups.[9]

In another study by Melamed et al it was concluded that the women presenting with threatened preterm labor and dilated cervix were at increased risk of preterm birth.[10]

Tocolytic therapy

In our study, 34% of patients had uterine contractions and were chosen for tocolytic therapy and 66% of patients were not given tocolytic therapy as they were not in labor. The difference was found to be statistically significant (p value <0.00001) and it was observed that 41% who were given tocolytic therapy delivered within one week of admission as they were already in established preterm labor, 33% delivered in more than a week and 26% delivered at or near term.

Admission in NICU >24 hours

Six percent of newborns were admitted to NICU for >24 hours and 94% did not require NICU admission for >24 hours. No significant correlation was found (p value 0.17639).

The relatively small sample size was one of the major limitations of the current study. Studies with larger sample size and metacentric design should be used to validate the results further and help forming meaningful recommendations.

CONCLUSION

The study confirms a strong correlation between CL and admission delivery interval in women presenting with symptoms of preterm labor. It is suggested that these women may be managed for preterm labor if, at the time of admission, the cervix is ≤2 cm, or CL shortens within 4-6 hours. observation. If the cervix is ≥3 cm on admission and remains unaltered after 4-6 hours. interval, she is unlikely to deliver remote from term, hence may be discharged with proper advice. Those falling in between may require careful analysis of risk factors and management is more individualized.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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