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Research Article

THE IMPACT OF CERVICAL DILATATION AT ADMISSION ON LABOUR OUTCOMES

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ABSTRACT

Objective of the study was to examine the outcome differences between women presenting in early and late phase of labor. We evaluated all low-risk women with term (37 – 42 weeks), singleton ,vertex presentation who presented in early labor (<4 cm) or late labor (≥4 cm) at R G Kar Medical College and Hospital, Kolkata in a one year period (Jan to Dec 2007). A total of 2463 women in early labor (group 1) were compared to 2704 women in late labor (group 2). The primary outcome was the rate of caesarean section (CS) and secondary outcomes were length of labor, labor augmentation with artificial rupture of membrane (ARM) and oxytocin, operative vaginal delivery, fetal weight, and five minute apgar score. The risk of caesarean section was seen to decrease with increasing cervical dilatation on admission to labor ward (Correlation coefficient – 0.87 for nulliparous and – 0.68 for parous women and $p < 0.001$ for both). 16.1% of nulliparous and 14% multiparous presenting with <4cm dilatation underwent caesarean sections whereas of those who had >4cm cervical dilatation at admission only 9.6% nulliparas and 5.9% multipara required Caesarean section. Women presenting at <4 cm dilatation also spent less time in labor before their first vaginal examination; they had a higher rate of ARM and oxytocin administration as methods for labor augmentation. The study confirms that interventions like caesarean delivery, operative vaginal delivery and augmentation of labor are increased if patients are admitted in the early labor. However, the fact that delayed admission has advantages in this regard needs to be corroborated through further studies.

Keywords: cervical dilatation at admission, Labor outcome, Low risk pregnancy

INTRODUCTION

Caesarean sections performed for various indications ,maternal and fetal ,are rising throughout the world due to increased safety of anaesthesia and infection prevention by antibiotics. The most common indication for primary caesarean delivery is dystocia[1] and for previous caesareans in second pregnancy. A Canadian study estimated that over 40% of caesarean sections for dystocia were performed before the establishment of true labor [2]. Surprisingly, latent phase of labor admissions could be a risk factor for caesarean delivery[3]. The patients presenting early in hospital may have a higher incidence of dysfunctional labor. The increased CS may also be due to more prolonged exposure to hospital care providers.

The study of intra partum predictors of caesarean section would be very useful but has not yet been established with high sensitivity and specificity[4,5]. One such predictor could be the initial cervical dilatation at admission.

Determining when a woman is in labor and needs hospital admission can also be difficult specially in nullipara patients who have not experienced labor pains before.

The clinical differentiation between true and false labor or active and latent labor is at times difficult to decide. This distinction may have implications for labor outcomes. A Cochrane review found that Labor assessment programs, which aim to delay hospital admission until active labor, may benefit women with term pregnancies but has emphasized the need for larger multicentric randomized controlled trials[6].

The objective of this study was to determine the effects of the timing of admission to labor unit on the labor interventions including the method of delivery.

MATERIALS AND METHODS

5167 low risk women in spontaneous labor were enrolled from a tertiary care teaching hospital, in Eastern India. Inclusion criteria were nulliparous or parous women in spontaneous labor with a singleton cephalic presentation at 37 – 42 weeks of gestation. The cervical dilatation at first vaginal examination was identified from the bedside records for each woman. Women were categorized as having presented early if they attended at < 4 cm cervical dilatation or late if they attended with cervical dilatation at ≥ 4cm. All women delivering within 24 hours of labour admission were included.

We excluded women with prelabor rupture of membranes, contraindications for vaginal delivery, medical or obstetric complications and those who had induction of labor. The outcome of labor was noted with regards to cesarean section, operative and spontaneous vaginal delivery, fetal weight, five-minute Apgar score. The need for labor augmentation with artificial rupture of membrane (ARM) and oxytocin were also noted.

The onset of labor was recorded as the time when the women reported the onset of painful, regular, increasing intensity uterine contractions. This was used to calculate the length of labor and duration of labor spent at home before the labor ward admission. The time taken to reach the hospital was enquired and women were classified as living locally if women took less than 30 minutes to reach the hospital from their residence.

Statistical Analysis

Data in early and late admission groups were compared using chi square test for categorical variables and t test for continuous variables. A p-value of < 0.05 was considered statistically significant. Spearman's rank correlation coefficient Rho was used to test the association between dilatation at presentation and the risk of caesarean section. Data were analyzed using Statistical Version 6 (Statsoft corporation, 2001) and Graph pad prism Version 4.03 (Graph pad software incorporation, 2005) software.

RESULTS

During the study period 14593 deliveries took place of which 5167 formed our study population. Of the total deliveries, 4284 excluded as they were induced labors, 1560 needed caesarean section before the onset of labor, 2800 had prelabor rupture of membranes and malpresentation. A further 132 women had a initial vaginal examination- to- delivery interval of > 24 hours, 400 had one or more medical disorders such as diabetes, hypertension. For 250 women, initial vaginal examination findings were lost.

3074 nulliparous and 2093 parous women formed the study group (5167) . Demographic data are shown in Table 1 and number of women presenting at each dilatation is shown in Figure 1. Some of the statistically significant baseline differences were not clinically important such as maternal age and religion.

There was a decreasing risk of caesarean section with increasing cervical dilatation at initial vaginal examination at admission (Rho was – 0.87 for nulliparous and – 0.68 for parous women and $p < 0.001$ for both). [Figure 2] The odds ratio for caesarean section for women who presented at 0-3 cm was 1.8 [95 % CI 1.45 – 2.23] for nulliparous women and 2.6 [95 % CI 1.91 – 3.56] for parous women. [Table 3]

Women presenting at <4 cm dilatation spent less time in labour before their first vaginal examination and admission [Table 2]. They also had a higher rate of ARM (OR 8.9 for nulliparous and 5.3 for parous) and oxytocin administration (OR 8.4 for nulliparous and 6.4 for parous) as methods for labor augmentation. [Table 3] and there were no adverse neonatal outcome in either group.

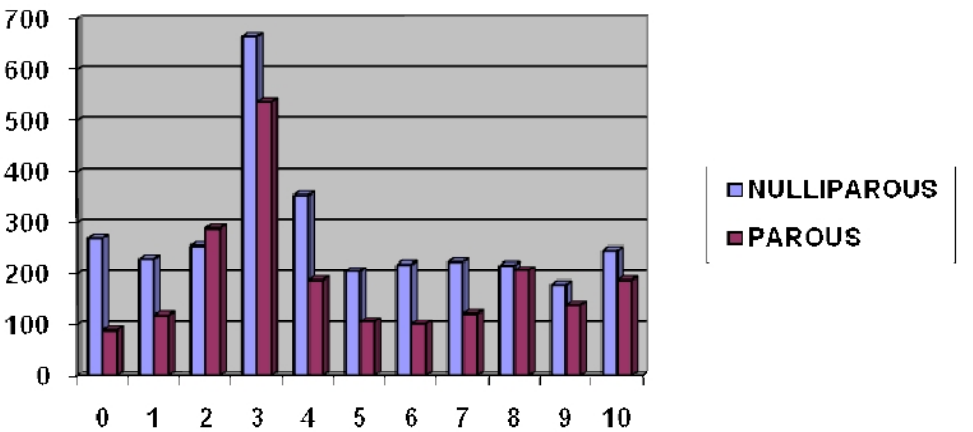

Figure 1: Number of women presenting at each cervical dilatation

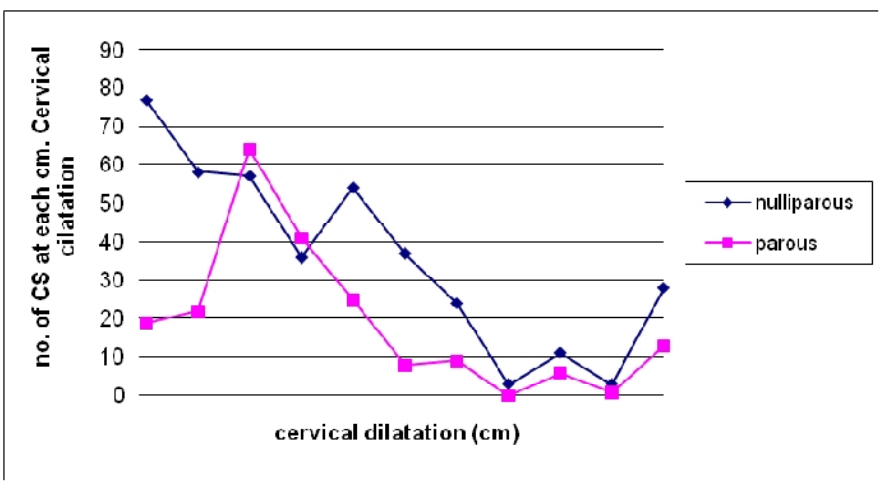

Figure 2: Cesarean section rates by cervical dilatation at admission

Table 1: The comparison between demographic and obstetric parameters between two groups of women presenting at 0-3 dilated versus 4-10 cm dilated

	Nulliparous			Parous		
	< 4 cm n= 1423	≥4 cm n= 1651	p	<4 cm n= 1040	≥4-10 cm n= 1053	p
Maternal age(years) [a]	21.8 [3.0]	21.8 [2.9]	0.673	24.3 [3.3]	23.4 [3.2]	<0.001
GA (weeks) [a]	38.5 [0.9]	38.6 [0.9]	0.11	38.5 [0.8]	38.5 [0.8]	0.305
Maternal weight (kg) [a]	50.0 [1.3]	50.3 [1.6]	<0.001	50.4 [1.6]	50.2 [1.5]	0.009036
Birth weight (kg) [a]	2.7 [0.3]	2.7 [0.3]	< 0.001	2.7 [0.3]	2.7 [0.3]	0.147
Education(%)[b]						
Illiterate	111 (7.8)	518 (31.37)		140(13.46)	393(37.32)	
Primary Edu	1191(83.7)	1123(68.02)	< 0.001	842(80.96)	653(62.01)	< 0.001
Secondary Edu	121 (8.5)	10 (0.61)		58 (5.58)	7 (0.66)	
Religion (%)[b]						
Hindu	954(67.04)	1087(65.84)	0.482	600(57.69)	687(65.24)	0.001
Muslim	469(32.96)	564(34.16)		440(42.31	366(34.76)	

a-Student t- test, b-Chi square test

(Values are given as mean [SD] or n (%). GA = gestational age)

Table 2: Comparison of labour characteristics, interventions and outcomes for women presenting at 0-3 cm dilated versus 4- 10 cm dilated

	Nulliparous			Parous		
	<4 cm n= 1423	≥4 cm n= 1651	p	<4 cm n= 1040	≥4 cm n= 1053	P
Total labor length (min) [a]	847.0[140.3]	814.1[94.9]	<0.001	458.9[106.5]	472.4[98.9]	<0.001
Length of labor spent at home (min) [a]	205.7[116.7]	564.0[157.8]	<0.001	324.8[107.2]	335.8[110.8]	<0.001
Length of labor spent in hospital (min) [a]	641.4[190.6]	250.1[137.0]	<0.001	324.8[107.2]	136.7[84.4]	<0.001
Mean cervical dilatation at admission (cm) [a]	1.96 [1.3]	6.74 [2.1]	<0.001	2.24[1.0]	7.17 [2.1]	<0.001
Mean dilatation at CS (cm) [a]	3.98 [2.1]	6.25 [2.2]	< 0.001	3.14[1.5]	6.24 [2.3]	<0.001
ARM[a]	1194 (84.0)	611 (37.0)	< 0.001	752 (72.3)	347 (33.0)	< 0.001
Oxytocin[a]	1026 (72.1)	387 (23.4)	< 0.001	559 (53.8)	161 (15.3)	< 0.001
CS[a]	229 (16.1)	159 (9.6)	< 0.001	146 (14.04)	62 (5.9)	< 0.001
Operative vaginal delivery[a]						
Mid and low forceps other than outlet	79 (5.6)	30 (2.1)	< 0.001	25 (2.4)	3 (0.3)	< 0.001
Outlet	54 (3.27)	30 (1.8)	< 0.001	21 (2.0)	14 (1.3)	< 0.001

a-Student t- test, b-Chi square test

(Values are given as mean [SD] or n (%). CS = cesarean section)

Table 3: Outcomes of latent phase admissions compared to active phase admissions

	Nulliparous		Parous	
Outcome	Odds ratio	Confidence interval	Odds ratio	Confidence interval
Non – progress of labor	3.0	2.24 – 4.11	4.5	1.74 – 12.16
ARM	8.9	7.44 – 10.59	5.3	4.39 – 6.43
Oxytocin	8.4	7.15 – 9.96	6.4	5.21 – 7.97
Operative vaginal delivery				
Mid and Low forceps other than outlet	1.7	1.20 – 2.51	1.2	0.65 – 2.26
Outlet	1.2	0.68 – 2.0	0.20	0.06 – 0.80
Apgar (< 7)	1.3	0.93 – 1.85	0.6	0.36 – 0.85

(ARM = Artificial rupture of membrane; LBF = Long blade forceps)

DISCUSSION

The study evaluates the labor course of women admitted in early(latent) and late(active) phases of labor to examine association between cervical dilatation on admission and subsequent outcomes. We limited potentially confounding factors by restricting our data collection to low-risk term gravidas who were candidates for vaginal delivery. This study clearly demonstrates that women who present early in labor have a higher risk of caesarean section, ARM and oxytocin augmentation than those who present late in labor whether nulliparas or multiparas.

Similar results were found in several other studies, which concluded that women who are admitted to hospital at < 4 cm are more likely to have obstetric intervention than those admitted in more advanced labor[3,7-10]. There are two possible reasons for this observation. Women who present early maybe more anxious and less tolerant of pain and such patients are known have more difficult labors[11,12]. On the other hand early admission before active labor encourages or provokes unnecessary interventions by their care givers. Early admission also decreases ambulation and normal activity of women.

Undocumented baseline differences between groups are always a source of confounding in cohort studies. Only a randomized trial can ensure comparability of the groups at baseline. However, given the large sample size and the exclusion of high risk factors in our study, we feel that such an effect would have been minimal.

The only randomized trial reported till date comparing early with later admissions did find higher caesarean delivery rates and oxytocin use for latent phase admissions (Mc Niven)[13]. The study however was small and was not adequately powered. Nevertheless, the findings do suggest that it is longer exposure to hospital rather than intrinsic patient characteristics that are responsible for increased interventions.

Dystocia tends to be over diagnosed in women with early admission. There is evidence that longer the labour is perceived to be by the physician, the higher the chances of intervention. One major distinction between the early and late presenters is the absence of data relating to the duration of the latent phase of labor in the late presenters.

Potential drawback of this study firstly was the lack of data for women who were deferred admission and were admitted later on. Secondly the timing of onset of labour may have been biased as it was based on women's recollection.

The present study confirms that labor ward admission in the latent phase can increase the rate of obstetric interventions including operative delivery (caesarean /vaginal). There are advantages if women are admitted to the labor unit only when they are in active labor (>4cm dilatation). The use of strict criteria for the diagnosis of active labor may prevent the misdiagnosis of dystocia.

Although some benefits seem apparent, a large multicentric randomized controlled trial would be needed to confirm the advantages of delayed admission over early admission.

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