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Partogram for Managing Active Labor: A Study in Rural Area

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Abstract

Early detection of prolonged labor is important, as postpartum hemorrhage, infection, birth tract injuries and childbirth-related death are common in women with prolonged labor, especially in primigravida women where protracted labor is more common. The risk of experiencing one or more of these complications is greater in countries with few resources, due to lack of early detection especially in rural areas where partogram is not explored. To assess the benefits and adverse effects of using modified World Health Organization (WHO) partogram on primigravida women in active labor in a rural area, a clinical trial was carried out at Ad-dilinjat Central Hospital where the course of labor of 210 primigravida women with uncomplicated full-term pregnancies with a cephalic presentation in active labor was studied. Labor management according to the modified WHO partogram was compared to labor management without partogram. Compared to the non-partogram group, women in the partogram group had a short labor duration, a lower rate of caesarean section, and lower risk of needing a blood transfusion. However, they were at higher risk of perineal tears. Postpartum fever was more common in the non-partogram group (14.3%) than group A (8.6 %). A low APGAR score was observed more in non-partogram group (30.5%) compared to the partogram group (19%). No significant difference was seen in rates of NICU admission between the two groups. The use of partogram in a rural setting helps in the early detection of abnormal labor, guides timely intervention, and leads to the avoidance of prolonged labor and its sequelae, whereas application of partogram negatively affect rate of perineal tears.

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Keywords

primigravida; partogram; labor; cephalopelvic disproportion; postpartum hemorrhage

I. Introduction

In 2015, approximately 830 women died every day around world due to complications of pregnancy and child birth. Almost all of these deaths occurred in low-resource settings and most could have been prevented [1, 2].In Egypt, the maternal mortality ratio was estimated to be 33/100,000 live births in 2015 [1]. The primary causes of childbirth-related death include postpartum hemorrhage, hypertension, infections, birth tract injuries and indirect causes that are mostly due to interactions between pre-existing medical conditions and pregnancy. Early detection of abnormal progression of labor and the prevention of prolonged labor are important, as postpartum hemorrhage, maternal sepsis, neonatal infection and low APGAR score are more common in women with prolonged labor. In developing countries, prolonged labor is commonly due to cephalopelvic disproportion (CPD), which may result in obstructed labor, uterine rupture and vesico-vaginal fistula.

Partogram has been used since the 1970s (Philpott RH. Graphic records in labour) and in 1994, the WHO recommended using the partograph to follow labor and delivery, with the objectives of improving maternal and fetal outcomes [3]. The partogram or partograph is a graphic recording of key maternal and fetal events during labor plotted against time. It is an inexpensive tool that provides a continuous pictorial overview of labor and is beneficial for monitoring and managing labor. It is practical for busy labor rooms and in rural areas with limited personnel to screen for an abnormal labor [3].The partogram early detects abnormal labor, reducing operative intervention, helps in timely decisions on augmentation or termination of labor. Aim of this study is to assess the benefits and risks of a modified WHO partogram on primigravida women in active labor in a rural area.

II. Material and Methods

Ethical approval: Before starting the study and in accordance with the local regulations, the protocol and all corresponding documents were approved by the local ethical committee of the OB/Gyn department at Al-Azhar University. Prior to enrollment, informed consent was obtained from all patients.

Study design and setting: This non-randomized trial was carried out at Ad-dilinjat Central Hospital for a period of 11 months. Primary hospital's data as follows: number of beds 110, 9 resident doctor , annual birth rate 2495, midwives only assist resident obstetricians ,no insurance policies . The

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course of labor of 210 women (according to the G power software sample size calculator Germany 2008, assuming an effect size d = 0.5, α (type 1 error probability) = 0.05, power (1 − β [type 2 error probability]) = 0.85 and 95% confidence interval (CI).) with uncomplicated, singleton, full-term pregnancies with a cephalic presentation in active labor was studied. Labor management and outcomes using a partogram were compared with labor management in which no partogram was used. Patients were recruited as follows:

Partogram group: 105 patients managed using documented partograph for first time in this hospital after 3months training for residents in duty.

Non-partogram group: 105 patients managed without a partograph according to the hospital routine care.

Inclusion criteria: primigravida, singleton, full-term in labor (37-40 weeks), cephalic presentation, fetal size <1800 gm and> 4000 gm, no fetal distress, cervical dilatation ≥ 4 cm, intact membrane.

The following exclusion criteria were: anemia, hypertension, diabetes and immune compromised status, preterm labor, multiple pregnancies, antepartum hemorrhage (APH), intrauterine growth restriction (IUGR), premature rupture of membranes (PROM), intrauterine fetal death (IUFD), indication for the induction of labor.

The following data were collected from the studied patients:

On admission: History was taken upon admission (personal, obstetric, past medical and surgical). All women in labor were tested for CBC, blood typing and RH .Ultrasound was performed to confirm fetal presentation, fetal size, gestational age, alcohol content and the position of the placenta. Clinical and Vaginal examination was performed to exclude any contraindication to vaginal delivery and to assess the Bishop score.

1. Intrapartum for the partogram group: Patient name, age, gravida and parity status, hospital number, and dates of attendance were plotted on the graph.

2. Progress of labor was monitored while following the modified WHO partogram .F.H.R (fetal heart rate) was recorded by intermittent auscultation every 30 minutes in the first stage and every 5 min in the second stage. Duration of first, second and third stages of labor were recorded. Plotting on the partograph was started in the active phase of labor, when the cervix was 4 cm dilated or more. The action line was four hours right of the alert line. When the rate of cervical dilatation shifted to the right of the alert line, it indicated a slow progress of labor and necessitated appropriate action, such as amniotomy or augmentation of labor. When the cervical dilatation curve crossed the action line, it indicated a dangerously slow progress of labor, and likely intervention such as C S (cesarean section)

Cervical dilatation was assessed by vaginal examination every four hours or more frequently if indicated. After full dilatation of the cervix, we continued to record uterine contractions, blood pressure, pulse rate, and fetal heartbeat. A normal fetal heartbeat was between 110–160 ;< 110 or >160 beats per minute indicated fetal bradycardia or fetal heart tachycardia, respectively, which required immediate action. We monitored the fetal

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heartbeat for at least one minute every half hour; immediately after the peak of a uterine contraction. The fetal heart rate was plotted with dots; consecutive dots were connected by a solid line. The state of the amniotic membranes was evaluated. We recorded the head position on the partograph with an "O". The number of contractions in a ten-minute period was used to describe the frequency of contractions. The duration of each contraction was recorded from the beginning and it was felt abdominally to the time at which contraction had passed and was measured in seconds. Contractions were recorded every 30 minutes on the partograph. If inadequate uterine contractions were found to be the cause of unsatisfactory progress of labor, amniotomy was considered first, followed by oxytocin infusion to augment labor. There was a separate area to record oxytocin titration and drugs used. Maternal Blood pressure, temperature, and volume and content of urine were recorded on the bottom of the partograph. Neonatal outcome was monitored with the APGAR score and recorded on the partograph.

3. Intrapartum for the non-partogram group:

In the non-partogram group, all women were observed randomly on an irregular basis according to the hospital's routine. Most of them routinely received oxytocin augmentation, and the durations of the stages of labor were collected by the resident on duty. Mode of delivery, post-partum complications and neonatal outcomes were recorded in patient files.

Study outcomes: The duration of the first, second and third stages, mode of delivery, post-partum complications (PPH: defined as a loss of 500 ml blood or more within the first 24 hours after delivery; tears: defined as cervical, vaginal or perineal; and blood transfusion), fetal outcomes: APGAR scoring < 7 or > 7, NICU admission were recorded as study outcomes.

Statistical analysis: The collected data were reviewed and coded, and statistical analysis of the collected data was performed using SPSS (statistical package of social science; SPSS Inc., Chicago, IL, USA) version 16 for Microsoft Windows. The mean and standard deviation were used for quantitative data; numbers and percentages were used for qualitative data. The Chi-square test (χ^2) was used for the comparison of qualitative data, Student's t test was used to determine the significance of the differences between two means, and the Mann-Whitney U test was used to determine the significance of the differences between two non-parametric variables. The level of significance was set at a p-value of <0.05.

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III. RESULTS

The duration of the first stage of labor and total duration of labor was more prolonged in the non-partogram group. All patients in the non-partogram group received augmentation, while only 16.2% patients required augmentation in the partogram group and it was statistically significant. The rate of caesarean section in the partogram group (19.0%) was lower than the non-partogram group (32.4%) and it was statistically significant. Blood transfusion and PPH (post-partum hemorrhage) were less common in the partogram group (3.8% and 14.3%, respectively) when compared to the non-partogram group (10.5% and 16.2%, respectively) but these results were not statistically significant. However, the presence of tears, especially perineal tears, was more frequent in the partogram group (16.2%) in comparison to the non-partogram group (14.3%) {Statistically insignificant}. Postpartum fever was more common in the non-partogram group (14.3%) than group A (8.6 %) {Statistically insignificant}. . A low APGAR score was observed in more patients in the non-partogram group (30.5%) compared to the partogram group (18.1%) and it was statistically significant. No significant difference was seen in rates of NICU admission between the two groups.

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Table 1: Gestational age, cervical dilatation and duration of labor of the study population

	Partogram group (n=105)	Non-partogram group (n=105)	Statistical test	*p*-value
Gestation/week (mean±SD)	38.73± 3.43	38.88±1.21	Student's t test t=0.40	0.688
1st cervical exam., (mean± SD)	4.70± 0.98	5.08± 1.37	Student's t test t=2.30	0.022
2nd cervical exam., (mean± SD)	7.51±2.13	7.09±2.26	Student's t test t=1.41	0.160
3rd cervical exam., (mean± SD)	9.10± 1.87	8.19± 2.38	Student's t test t=2.51	0.013
First stage/h (mean± SD)	5.98± 3.99	6.62± 3.28	Mann-Whitney U test Z= 2.16	0.030
Second stage/min (mean± SD)	40.19± 25.37	43.16± 27.51	Mann-Whitney U test Z=0.81	0.414
Third stage/min (mean± SD)	6.71± 6.08	7.18± 7.22	Mann-Whitney U test Z=0.85	0.392
Total duration/min (mean± SD)	363.71±149.71	420.40±203.60	Student's t test t=2.30	0.022
Augmentation	17 (16.2%) 88 (83.8%)	105 (100%) 0	Chi-square test χ^2 =148.05	0.000

significance was set at a *p*-value of <0.05.

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Table 2: Mode of delivery and indications for caesarean section in the study population

Groups / Delivery	Partogram group (n=105)	Non-partogram group (n=105)	Chi-square test	*p*-value
Mode of delivery:				
Normal	85(81.0%)	71(67.6%)	χ^2 =4.88	0.027
CS	20(19.0%)	34(32.4%)		
Indications of CS:				
Failure to progress	9(45.0%)	18(52.9%)		
Fetal distress	9 (45%)	7(20.6%)	χ^2 =2.54	0.467
Obstructed labor	0	5(14.7%)		
Undescended head	2(10.0%)	4(11.8%)		

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Table 3: Complications recorded in the study population

Groups / Complications	Group (A) (n=105)	Group (B) (n=105)	Chi- square test	*p*- value
Blood Transfusion:				
Yes	4(3.8%)	11(10.5%)	χ^2=3.51	0.061
No	101(96.2%)	94(89.5%)		
PPH:				
Yes	15(14.3%)	17(16.2%)	χ^2= 0.15	0.701
No	90(85.7%)	88(83.8%)		
Tears:				
Yes	17(16.2%)	15(14.3%)	χ^2=0.15	0.701
No	88(83.8%)	90(85.7%)		
Perineal and Vaginal	11 (64.7%)	5 (33.3 %)		
Cervical	4 (23.5 %)	8 (53.4%)	χ^2=3.47	0.176
	2 (11.8 %)	2 (13.3 %)		
Fever:				
Yes	9 (8.6%)	15 (14.3%)	χ^2= 1.69	0.193
No	96 (91.4 %)	90 (85%)		

significance was set at a *p*-value of <0.05.

Table 4: Neonatal outcomes in the study population

Groups / Baby's condition	Partogram group (n=105)	Non-partogram group (n=105)	Chi-square test	*p*-value
APGAR Score:				
< 7	19(18.1%)	32(30.5%)	χ^2= 4.37	0.036
>7	86(81.9%)	73(69.5%)		
NICU Admission:				
Yes	10(9.5%)	13(12.4%)	χ^2=0.44	0.507
No	95(90.5%)	92(87.6%)		

significance was set at a *p*-value of <0.05.

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IV. DISCUSSION

Present study proved that implementation of partogram in the management of labor in primigravida women was helpful in a low-resource country with poor access to healthcare resources and where trained doctors are lacking. It improved labor outcomes, as demonstrated by a reduction in the caesarean section rate and reduction in maternal and fetal morbidity, by indicating the proper time for intervention in cases of protracted labor.

The present study recorded a statistically significant prolongation of the total duration of labor, especially first-stage labor, among women managed without partogram. Additionally, labor was augmented more frequently in the non-partogram group with no definite indication.

The majority of patients delivered vaginally in both groups, but a significant reduction was observed in the caesarean section rate in the partogram group. Regarding the indications for caesarean section, failure to progress and fetal distress were the most common labor complications whereas failure to progress was less frequently seen as an indication of CS in women monitored by the partogram.

Obstructed labor was nearly absent in the partogram group but was observed in 14.7% of patients in the non-partogram group. Partogram-enabled early detection resulted in higher patient numbers recorded for women exhibiting an undescended fetal head in the partogram group.

As a result of following the WHO partogram in half of the study participants, we noticed that a shortening of the total duration of labor, especially the first stage, led to a decreased incidence of postpartum hemorrhage and consequently the need for blood transfusion.

Although the present study recorded an increased incidence of superficial perineal tears in the partogram group (which is commonly related to the personnel monitoring the labor), deeper vaginal tears of higher degrees were more commonly seen in the non-partogram group due to the prolongation of the duration of the first stage of labor and frequent vaginal examinations. Additionally, maternal postpartum fever was more commonly seen in the non-partogram group for the same reason.

Regarding neonatal outcomes, the present study recorded a reduction in the number of babies with a 5-minute low APGAR score in the partogram group. A reduction was also observed in the number of babies that required NICU admission in the partogram group.

The present study recorded statistically significant differences between the two groups regarding the duration of the first stage of labor, the total duration of labor and the need for labor augmentation, which was reflected by the rates of caesarean section and adverse perinatal outcomes. The shortening of the duration of the 1st stage and total duration of labor among the women managed by the partogram was related to regular vaginal examinations, the regular registration of the events of labor, early intervention when indicated and early discussion with senior staff when checking the partogram sheet.

Our findings were comparable to Tayade and Jadhao's 2012 [4] study of 200 laboring women with uncomplicated full-term pregnancies; there was a significant reduction in the caesarean section rate when using the WHO partogram, and vaginal deliveries increased from 53% among controls to 78% among cases (versus 81% among the partogram group and 67.6% among the non-partogram group in the present study). The emergency caesarean section rate was reduced significantly by 23%: 44% in controls compared to 21% in cases (versus 19% in the partogram group and 32.4% in the non-partogram group in the present study).
They also found that 13% of women required blood transfusion in the control group compared to 7% when the partograph was used (compared to 3.8% in the partogram group and 10.5% in the non-partogram group in the present study). Furthermore, they found that NICU admission was less common in the partogram group compared to the non-partogram group.

In a larger study, Javed et al. (2007) [5] assessed 1000 women in labor of which 500 women were managed with a partogram and 500 without a partogram. Among each group, 250 were primigravida and 250 were multigravida. The authors found that by using the partogram, the frequency of prolonged and augmented labor, postpartum hemorrhage, and perinatal morbidity was reduced.
They found that the use of a partogram caused a significant reduction in the number of augmented labors and vaginal examinations. The frequency of obstructed labor and PPH also decreased from 4.4% and 4.8% to 0%, respectively (in the present study, obstructed labor occurred in 14.7% of the non-partogram group and 0% of the partogram group, and PPH was 16.2% in the non-partogram group and 14.3% in the partogram group)
However, in contrast with the present study, Lavender and Smyth (2012) [6] recorded no difference in rate of caesarean section (risk ratio (RR) 0.64, 95% confidence interval (CI) 0.24 to 1.70) or instrumental vaginal delivery (RR 1.00, 95% CI 0.85 to 1.17) between women managed with and without the partogram.
Also Sinha et al.'s 2016 [7] study reported that there was no statistically significant difference in the neonatal outcome found between partogram and non-partogram groups, although the authors reported numerical differences. Patients who were managed using partogram had 4 out of 500 babies with a 1-minute APGAR score below 7, and only 2 babies had a 5-minute APGAR score below 7. However, in the control group, 10 out of 500 babies had a 1-minute APGAR score below 7, and 6 babies had a 5-minute APGAR score below 7.
One of the limitations of our study is that we could not stratify the groups regarding the duration of labor because the data from the non-partogram group was not sufficient. As the sample size in this study was small, we recommend a larger randomized trial in the future.
The present study results encourage the use of partogram in areas where operative and newborn facilities are lacking, to facilitate early referral, as it allows doctors to predict the expected course of labor and helps them to address any problems in a timely manner. The

partogram is a time- and resource-saving tool, and it decreases maternal and neonatal morbidity.

We concluded that the use of partogram in a primary maternity unit led to a reduction in labour duration along with a reduction in unfavorable consequences related to prolonged labour such as cesarean section, post-partum hemorrhage, need for blood transfusion and labour augmentation.

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