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Evaluation of second stage partogram in predicting outcome in labour and foetal outcome in low risk pregnant women

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Abstract
Background: The first stage of labour is monitored by the WHO partogram and it stops thereafter. The second stage of labour is not graphically represented and is monitored by arbitrary time limits rather than true measures of progress making additional variables necessary to assess the progress of labour like descent and position.
Objectives: To evaluate a second stage partogram and to observe the outcome of labour in low risk pregnant women based on score at onset of second stage and second stage duration.
Methods: A prospective observational study was done at St. Philomena's hospital, Bangalore during August 2021 to July 2023. 1000 cases of low risk pregnant women with singleton, cephalic presentations were monitored with the second stage partogram. The maternal and foetal outcome were recorded. From onset of second stage of labour, vaginal examinations were done after half an hour and every 15 min till delivery in primigravida and after every 15 min in multigravida. A scoring system based on station and position of foetal head which was developed by Sizer *et al* was used to plot on a second stage partogram. The outcome of labour was noted.
Results: The median duration of second stage of labour for primigravidas and multigravidas were 29.7 min & 22.3 min respectively. The median Sizer's partogram score at the onset of second stage was 4. There was a significant association between scores at onset of second stage, second stage duration and outcome in labour.
Conclusion: The second stage partogram would be an effective tool to assess the outcome of labour based on combined scoring of station and position of the foetal head at the onset of second stage of labour

Keywords: Second stage partogram, low risk, duration, scoring system

Introduction

The second stage of labour (SSL) begins when the cervix is fully dilated and completely retracted past the presenting part and is no longer palpable vaginally and ends with delivery of the fetus. [1][2]. Partogram is a pictorial representation of key events in labour presented chronologically on a single page. It includes composite graphical record of cervical dilatation and descent of head against duration of labour in hours and also gives information about maternal & foetal conditions. It is an essential feature of management of labour and was first described in 1861 by Eberman. After evolving over many years with different modifications, finally it was modified by WHO in 1992 to make it more easier [3].Latent phase has been removed. This partogram would help obstetricians in making decisions during second stage of labour as many women are unnecessarily subjected to instrumental and cesarean deliveries due to hasty decisions made in second stage thereby increasing the morbidity and complications of the procedures associated. Two cardinal factors in monitoring SSL are descent (station) and position of foetal head as cervical dilatation is no longer an useful tool in second stage.WHO multi-centre trials demonstrated that the use of partogram reduced the cesarean rates, low APGAR scores, need for augmentation and perinatal mortality. It was useful in reducing the incidence of prolonged labour and hence it encourages the widespread use of partogram in institutions and peripheral health centers. Hopefully, the introduction of a second stage partogram would help in achieving an optimal outcome in labour [4].

Materials and Methods

It was a prospective observational study of 1000 booked and un-booked cases of low risk term pregnant women with singleton cephalic presentation reporting at this tertiary care centre spanning from Aug 2021 to Jul 2023. The study included only those with no significant risk factors and had attained second stage of labour (full dilatation of cervix). The cases having risk factors, macrosomia, severe pre-eclampsia, cardiac disease /renal disease, multi-foetal gestation, malpresentations, preterm, PPROM (Preterm Premature Rupture of Membranes) and CPD (Cephalo-Pelvic Disproportion) detected in active labour were excluded from the study. Hospital ethical committee clearance was taken and informed consent was taken from all these women. The position and station of the foetal head was observed and was scored at diagnosis of the second stage of labour, 1/2 hour later and then at 15 min intervals in case of primigravida and at 15 min intervals in case of multigravida until delivery. Scoring was based on position of foetal head (Occipitoanterior - 2,Occipitotransverse - 1,Occipitoposterior - 0) and based on station of foetal head (at the level of the ischial spines i.e. 0 station - 0 at +1 station - 1, at +2 and lower than that - 2, maximum score of station plus position - 4, anal dilatation and vertex at introitus - 5, delivery - 6 (indicates completion of second stage)[5]. Bishops score noted and modified first stage partogram devised by WHO was maintained. The following observations were made: duration of first stage of labour, mode of delivery (spontaneous, instrumental, Caesarean), scoring at onset of second stage of labour, scoring at the time of delivery, indications for instrumental delivery apart from prolonged second stage, indication for cesarean delivery, maternal complications, foetal outcome : Birth weight, APGAR, NICU admission

The sum of descent and position scores was plotted against time elapsed in the second stage at regular intervals to give an indication of progress in each individual labour.A nomogram was constructed for progress in the second stage by taking the median score at each time point of vaginal examination. Only scores less than 5 at the time of diagnosis of the second stage were used to construct the nomogram. Progress in the second stage was monitored. Second stage labours that progressed on or to the left of the nomogram line were classified as normal. Second stage labours that had any point to the right of the nomogram line were classified as abnormal.Analysis of variance (ANOVA), Student t test, Chi square/ Fisher Exact test were used for comparison of data. The Statistical software namely SAS 9.2, SPSS 15.0 were used for the analysis of the data.

Results

In the present study, the maximum number of cases were in the age group of 21 - 30 years accounting to 80.2% of cases. Out of 1000 cases, 489 (48.9%) were primigravida and 511 (51.1%) were multigravida. Majority of the gestational age of the patients were between 37 to 40 weeks, i.e. 865 (86.5%) and above 40 weeks were 135 (13.5%). The types of labour onset were divided into spontaneous [882 (88.2%)] and induced [118 (11.8%)]. Majority of primigravida- 267 (54.6%) had 6-12 hours of first stage of labour compared to multigravida- 252 (49.3%) who had 1-6 hrs of first stage of labour implying that the duration of first stage of labour was significantly high in primigravida compared to multigravida with p value of < 0.001.The duration of second stage of labour was 1- 30 min in 617 (61.7%) women, 31-60min in 343 (34.3%) women and more than 60 min in 40 (4%) women. Duration of second stage of labour was significantly higher in primigravida (more than 60 min) with p value of < 0.001.

Majority of the women, both primigravida and multigravida had a scoring of 6 at decision/ delivery and a score of 4 at the onset of second stage of labour. The outcome in labour was normal in both the groups, ie 853 (85.3%), instrumental in 124 (12.4%) and LSCS in 23 (2.3%). The commonest indication was non-progression of labour for LSCS and foetal distress for instrumentation. The APGAR score at one minute and five minutes was both more than 7 in (984 (98.4%) majority of the patients.

Table 1: Correlation of Second stage onset score with outcome of labour

Scoring at onset of second stage	Number of subjects	Outcome of labour			P value
		Spontaneous	Instrumental	LSCS	
0	3	0(0%)	0(0%)	3(100%)	<0.001**
1	3	0(0%)	0(0%)	3(100%)	<0.001**
2	24	11(45.8%)	8(33.3%)	5(20.8%)	<0.001**
3	399	311(77.9%)	79(19.8%)	9(2.3%)	<0.001**
4	411	371(90.3%)	37(9%)	3(0.7%)	<0.001**
5	160	160(100%)	0(0%)	0(0%)	<0.001**
Total	1000	853(85.3%)	124(12.4%)	23(2.3%)	-

The second stage onset score of ≥ 3 was associated with a favourable outcome than compared to a score < 3 with p value <0.001. (table 1)

Table 2: Correlation of Second stage onset score with Duration of second stage labour (in min)

Scoring at onset of second stage	Duration of second stage of labour(in min)		
	Total	Primigravida	Multigravida
0	85.00±8.66	90.00	75.0
1	80.00±17.32	90.00	75.0
2	43.75±28.52	49.33±32.39	34.44±18.61
3	28.38±20.06	33.27±22.27	23.66±16.37
4	23.67±16.72	25.48±19.16	21.88±13.69
5	20.73±10.90	24.93±10.85	17.46±9.82
P value	<0.001	<0.001	<0.001

The second stage onset score of ≥ 3 was associated with a lesser duration of second stage of labour than compared to a score < 3(table 2).

Table 3: Correlation of type of labour and mode of delivery according to parity.

Parity	Type of labour	Mode of delivery			P value
		Spontaneous	Instrumental	LSCS	
Primigravida	Spontaneous	352(86.7%)	62(87.3%)	12(100.0%)	χ^2=1.84; P=0.185
	Induced	54(13.3%)	9(12.7%)	0	
	Total	406(100.0%)	71(100.0%)	12(100.0%)	
Multigravida	Spontaneous	398(89.1%)	48 (90.6%)	10(90.9%)	χ^2=0.148; P=0.929
	Induced	49(10.9%)	5(9.4%)	1(9.1%)	
	Total	447(100.0%)	53(100.0%)	11(100.0%)	

Table 4: Correlation of Birth weight (kg) with Duration of second stage labour.

Birth weight (kg)	Duration of second stage of labour(in min)		
	Total	Primigravida	Multigravida
<2.50	28.51±18.93	33.00±21.84	23.41±13.74
2.51-3.0	23.16±15.47	26.64±17.34	20.15±12.95
3.1-3.5	27.33±19.90	31.10±23.44	23.27±14.22
>3.5	35.22±26.03	38.22±26.95	32.16±24.99
P value	<0.001	0.003	<0.001

A small but positive correlation between the birth weight and the duration of second stage of labour in both primigravida and multigravida. Birth weight of the neonate more than 3.5 kg was associated with a longer second stage of labour. (Table 4)

Discussion

The partogram helps in early recognition of maternal [6] (postpartum hemorrhage, sepsis, uterine rupture and its sequelae) or foetal problems [7] (death, anoxia, infections, etc.). We studied 1000 term pregnancies of low risk, singleton, cephalic presentation coming to our hospital to evaluate the effectiveness of the second stage partogram. O Connell *et al* studied on factors associated with prolonged second stage of labour and nullipara and concluded that women with short second stage of labour were significantly younger and had significantly smaller babies[8].The types of labour onset were divided into spontaneous and induced. Majority were spontaneous onset of labour i.e., 882 (88.2%) and induced were 118 (11.8%). Duration of second stage of labour was significantly higher in primigravida (more than 60 min) with p value of < 0.00101. Majority of the women, both primigravida and multigravida had a scoring of 6 at decision/ delivery and 4 at the onset of second stage of labour.The outcome of labour in multigravida was predominantly normal (87.5%), followed by instrumental delivery (10.4%) and LSCS (2.2%). This is similar to the study by Sizer *et al*. The outcome of labour was normal delivery in both the groups, i.e. 853 (85.3%), instrumental in 124 (12.4%) and LSCS in 23 (2.3%). In a similar study by Basu *et al* in 2009, of the 79 women studied, 73 (92.4%) had spontaneous vaginal delivery [9]. The commonest indication was non-progression of labour for LSCS and foetal distress for instrumentation [10]. The maternal outcome was good in majority. Janni at al concluded that there was a significant increase in maternal blood loss after a prolonged second stage [11]. Most of the neonates had a favourable outcome in our study.The second stage onset score of ≥ 3 was associated with a favourable outcome than compared to a score < 3 similar to study by Sizer *et al* [4].The second stage onset score of ≥ 3 was associated with a lesser duration of second stage of labour than compared to a score < 3[12]. A small but positive correlation between the birth weight and the duration of second stage of labour in both primigravida and multigravida was noticed. Piper JM *et al* showed a significant association between second stage duration and parity (p-0.0001) with birth weight (p-0.0003) [13].

Conclusion

This prospective observational study shows that the second stage partogram may play a significant role in predicting the outcome in the second stage of labour by analyzing the score at onset of second stage. The advantages of this are ease of plotting, properly spaced and lesser vaginal examination and the short learning curve.

Overall the second stage partogram would be an effective tool to assess the outcome of labour based on combined scoring of station and position of the foetal head at the onset of second stage of labour especially in lower resource settings thereby helping in decision making during the second stage.

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None.

Conflict of Interest

None.

Ethical Clearance

The study was approved by the institutional ethical committee.

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