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ROLE OF PARTOGRAM IN PREVIOUS CAESAREAN SECTION

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Abstract- The benefits of partogram and its individual components have been a debatable issue amongst the obstetricians of developed countries. There are numbers of reports conflicting WHO recommendations in the recent years. The authors of the present paper assessed the efficacy of partogram in patients of having previous caesarean birth. The present study was carried out screening of 77 patients for giving trial of labor using WHO recommended partograms to evaluate the effectivity of partogram in patients in labor with a previous LSCS and the predictability of the progress and outcome of labor. It was observed that incidence of cesarean section were reduced in 88%, demonstrating the higher efficacy of partogram.
Keywords- Eeficacy of Partogram, Cervical dialation, Labor, Vaginal birth after Caesarean (Vbac)

Introduction

WHO emphasized the need to use partograms in management of labor as necessary tool to records the intrapartum details pictorially [1]. Different aspects of a partogram provide a warning for detection of abnormal progress of labor and thus provide the obstetrician an objective tool for decisions related to intervention and termination of labor.

There are number of reports available in the literatures [2,3] related to use of partograms but very few have undertaken in the form of randomized controlled trials to evaluate the effectiveness of partograms in birth outcome and its individual component. It has been suggested that perception of the labor progress and decision-making by the obstetrician be influenced based on the presentation of partogram's component[4]. Similar observations have been reported by the other studies [4,5,6] indicating that different component of partograms such as slope and position of the action line affect cesarean delivery, intervention, and maternal satisfaction.

Mathai et al suggested that partograms when used with defined management protocols, this inexpensive tool can effectively monitor labor and prevent obstructed labor. The author however added that the challenges to implementation exist and these should be addressed urgently [7]. Hence the potential importance of action line positioning on clinical and emotional outcomes and the inconclusiveness of the available evidence and needs further studies to assess the effect of using a 2- or 4-hour partogram on cesarean delivery. The present study was undertaken to study the component of to determine its effectiveness in terms of birth outcome and patients experiences.

The relevance of trial of labour after caesarean section becomes more pertinent with the help of a systematic tool such as partogram. The present study tries to explore upon the utility in current setup and to also identify the risk factors that ultimately lead to inevitability of caesarean section as a last resort

Material and Methods

A prospective observational study was conducted from 2008 to 2009 in 77 patients with a previous LSCS for a trial of scar. Patients who underwent LSCS for non-recurrent indication, favorable presentation in present pregnancy and with adequate maternal pelvis, willing for vaginal birth after caesarean (VBAC) were selected for the study and were explained the pros and cons of vaginal birth after caesarean (VBAC). A written informed consent for VBAC signed by all the patients were obtained before trial of scar

Patients with more than one CS, Previous classical CS, Placenta praevia, Malpresentation and Previous scar of poor integrity were excluded from the study. All the patients included in the study were subjected to Obstetric history to ascertain the indication and the place of previous caesarean section along with details of the post-operative period followed by general and systemic examination, with special emphasis on pulse, blood pressure and cardiovascular examination. Abdominal examination was also carried out with a view to find out any tenderness of the scar, height of fundus, presentation of the fetus, any evidence of hydramnios or

multiple pregnancies. Uterine contractility was assessed by palpation. Duration of contraction in seconds along with its intensity was noted down. Interval between the occurrences of two contractions in minutes was recorded. Oxytocin was used for the same indications as in nulliparous both for induction and acceleration of labor. Fetal well-being was assessed by auscultation of fetal heart sounds by stethoscope. Change in rate and rhythm of fetal heart sound were given special attention and pregnancy terminated shortly for an acute fetal distress. Per speculum examination was done whenever indicated. Leaking with special attention to the color of liquor, present was noted.. Per vaginum examination was carried out at the time of admission, then repeated every 4 hours or earlier according to the progress of labor.

The findings on a per vaginum examination like dilation of cervix in centimeters, Consistency of the cervix, Effacement of the cervix, Position of the cervix, Application of the cervix to the presenting part, Station of presenting part in relation to the level of ischial spines, Presence or absence of membranes, Presence of shape of the bag of membranes if present, Caput or molding and pelvic assessment were noted.

The details of labor were plotted on a graph called the partograph for each patient, with details of Name, Age, Registration, Number Parity, Date of Admission, Expected date of delivery, Gestational age (in weeks), Fundal height (in weeks), Time of onset of labor, Time of rupture of membranes for graphic and mathematical view of the progress of labor. Other details of patients such as mode of delivery of baby with indication for abdominal or instrumental deliveries, Time of delivery, Birth weight in kilograms, Sex of baby, Apgar score and Remarks if any were also recorded on the partograph.

The graph was divided into the following columns

- **Fetal Heart Rate**: It was recorded by auscultation method by stethoscope. This recording was done from 80 beats/minute to 180 beats/minute. The scale used was 20 beats/minute variation represented by 1 centimeter.
- **Status of Membranes and Liquor**: When on pelvic examination membranes were found to be present, it was denoted by '+' in the column, when found to be absent it was represented by '-'.

  The color of liquor was important for assessment of fetal well-being and status of oxygenation. When it was clear it was marked 'C' and when it was meconium stained it was denoted as 'M'.
- **Cervical Dilatation**: It was plotted against Y-axis. Column of length 10 cm was subdivided into 10 subdivisions. Here 1 cm dilatation was represented by 1 cm on graph. The first pelvic examination was done at the time of admission. The time when the patient entered the active phase of labor was regarded as zero hour and from there on plotting on the partogram was commenced.

  Subsequent vaginal examination was repeated after 4 hours or earlier if required. A line then joined all the readings of cervical dilation. After the onset of active phase (3 cm cervical dilatation), a 1-cm/hour line was used to indicate an '***alert line'*** on the partogram. The ***'action line'*** was plotted parallel to the alert line after a lag time of 2 hours of alert line.
- **Station of Presenting Part**: It was plotted on the Y-axis in the lower seven subdivisions from -3 to +3 station. The station was marked as 'X' against this particular time. All the points were joined and this showed the descent of presenting part with the progress of labor.
- **Time**: Time was plotted along the abscissa in hours. One hour was represented by 1 cm on the graph. The time when patient entered the active phase of labor was taken as zero hour.
- **Uterine Contraction**: Half hourly recording of contraction in seconds.
- **Drugs and Intravenous Fluids**: Various drug sedatives; antispasmodics and intravenous fluids given were charted against time.
- **Oxytocin**: This column was used to denote the amount of oxytocin given per minute. A total unit of oxytocin in 500 ml of normal saline and the number of drops per minute infused was noted down against time. Usually 2.5 units syntocinon was added in 500 ml normal saline and started at 8 drops/minute. This was then accelerated by 8-drops/30 minute till optimum uterine contractions were obtained. Simultaneously maternal and fetal well-being and progress of labor was assessed very carefully.
- **Vital parameters of the Patient**: Pulse, blood pressure and temperature were plotted against time. A vertical line, the upper limit of which represented systolic blood pressure and the lower end depicting diastolic blood pressure, denoted blood pressure.

Statistical Analysis

The data so collected was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) version 17.0. Data was compared using chi-square test and independent samples "t" test. The confidence limit of the study was kept at 95% hence a "p" value less than 0.05 indicated a statistically significant difference.

Observations

Our study screened a total of 77 parturient; having mean age of the subjects was 26.08±4.08 years with minimum age of a subject being 18 years while the maximum age was 39 years.

Majority of subjects enrolled in the present study were Para 1 (70.1%). There were 22 (28.6%) subjects who

were Para 2. Only 1 subject (1.3%) had Para 4.The gestational age of the subjects enrolled ranged from 36 to 42 weeks. 63.6% subjects enrolled had gestational age <40 weeks while one third (36.4%) subjects had gestational age above 36.4%. For further evaluation, the subjects (88.3%) delivered through vaginal/forceps delivery were grouped as "A" and 11.7% subjects required LSCS for delivery were labeled as "B."

Majority of subjects in both the groups were in the age group 21-30 years. The proportion of subjects with age ≤20 years was higher in Group B (22.2%) as compared to Group A (5.9%). Both the subjects with age 36 years or above were in the Group A. Though the proportional differences were seen in the age of the subjects in both groups yet statistical evaluation did not reveal them to be of significance (p=0.295)

In both the groups majority of subjects were Para 1, followed by Para 2. Only one subject had parity above 2. This subject was in Group A.

Around two-third subjects in Group A and more than half (55.6%) subjects in Group B had gestational age <40 weeks. Statistically, no significant association between gestational age and mode of delivery could be deduced (p=0.592)

In Group A, the mean duration of labor was 5.699±2.368 hrs., while in Group B, this duration was 5.778±1.649hrs. Statistically, there was no significant difference between the two groups (p=0.923)

In Group B no delivery took place between alert and action line while majority (66.7%) took place after crossing action line whereas in Group A, in majority (58.8%) delivery took place before crossing alert line, in 15 women (22.1%) it took place between alert and action line and in 13 women (19.1%) the delivery took place after crossing action line. Thus the *phase of action line* had a *significant association* with the mode of delivery, which was also significant statistically (p=0.006)

In both groups, Oxytocin was not given in almost one-third subjects. In Group A in majority Oxytocin was used *for acceleration* only, while in Group B in one third subjects Oxytocin was used *for induction* and in another one third it was used *for acceleration*. Thus, statistically there was a significant difference between the two groups (p=0.024)

Artificial rupture of membranes (ARM) was required in majority of cases in both the groups. Statistically, there was no significant difference between the two groups (p=0.664)

In Group A, ARM/Oxytocin was required in majority while in Group B, only 1 women (11.1%) required it. The requirement of ARM/oxytocin was significantly higher in Group A as compared to Group B (p=0.023).

Mean cervical dilatation was 1.55±0.31 cm/hour in Group A, while in Group B, it was just 0.39±0.15. This shows a statistically significant difference between the two groups (p<0.001)

Majority of subjects in both the groups had babies with birth weight ≥2500 gm. statistically there was no significant difference (p=0.772)

In both the groups, majority of the babies had Apgar score of 7 or above at 1 minute. There was no statistically significant difference between the two groups.

Non-progress of labor, acute fetal distress and breech were the common indications for LSCS in previous delivery in both the groups. Statistically there was no significant difference between two groups (p=0.364).

In Group B, the indication of non-progress of labor (NPL) and acute fetal distress (AFD) was significantly higher as compared to Group A (p<0.001).

Discussion

The reported evidence and safety of vaginal birth following caesarean section over an obligatory repeat caesarean section in selected women with a previous lower segment scar has given encouragement to both obstetrician and patients alike. However, in order to achieve vaginal delivery some obstetricians may be inclined to pursue a prolonged trial of scar. In the present study, it was found that although such prolonged trials of labour did not result in scar dehiscence or rupture but resulted in repeat caesarean delivery or delivery by forceps application. "Onset of labor" starts from the time of regular uterine contractions. In the beginning labour progresses slowly during the latent phase till 3 cm dilatation is reached when the active phase of labour starts. Beazley and Kurjak [8] ignored the latent phase of labour. In present study too the latent phase has not been taken into consideration. Progress of labour was charted on the cervicograph only in the active phase of labour.

Parity

Majority of the participants in the present study were primiparous (Para1). The incidence of 46/54 (85.19%) primiparous women undergoing TOL delivered vaginally while 22/23 (95.65%) multiparous women undergoing TOL delivered vaginally. Friedman [9] defined prolonged latent phase to be greater than 20 hours in nulliparas and 14 hours in porous woman.

While *Hendricks and Brenner* reported the cervical dilatation rate to be of same magnitude amongst primiparous and multiparous women [10]. Thus the findings in present study are in proximity with the findings of *Friedman.* Apart from the experience from previous birth, the physical adaptation and psychological preparedness amongst multiparous women can be held responsible for this difference. Interestingly *Qublan et al.* have reported a swinging rate of caesarean section among different parity groups [11]. They reported the rate of caesarean section in P0-P3 parity groups to be 8.5, 7.1, 7.4, 6.3 and 12.9%. In our study this rate was 14.81% and 4.35% respectively in primiparous and multiparous women. One of the reasons for this difference could be the inclusion of nulliparous women in the study of *Qublan et al.* whereas in our study no such patient was enrolled.

Age

In the present study the rate of vaginal delivery after CS in different age groups varied from 66.7% (≤20 years) to 96.3% (26-30 years). The incidence was 30/35 (85.71%) in age group 21-25 years, 6/7 (85.71%) in age group 31-35 years and 100% in women aged above 35 years. In contrast Qublan *et al* [11] showed an increasing trend of caesarean section with increasing age, in their study the incidence was minimum (5.2%) in age group <25 years and was maximum (20.9%) in age group >35 years. One of the reasons can be few cases in extreme lower (≤20 years; n=6) and extreme higher (36-30 years; n=2) in the present study. As regards the difference in major age groups 21-25% years the success rate of 85.71% and 26-30 years with success rate of 96.3%, can also be attributed to chance only. As such, in present study no statistically significant association of rate of vaginal delivery was seen with age.

Gestational Age

In present study 44 out of 49 (89.8%) women with gestational age <40 weeks delivered vaginally while 24/28 (85.71%) women with gestational age ≥40 weeks delivered vaginally showing no statistically significant association between gestational age and mode of delivery. Similar trends were reported by *Hammoud et al [*12*];* He observed that advanced gestational age was found to be associated with higher rates of failed TOL and uterine rupture. In our study too the rate of caesarean section was higher amongst the higher gestational age group and followed the same trend as reported by *Hammoud et al.*

Duration of Labour

Friedman found mean duration of active phase of labour as 5.8 hours in primigravidae and 2.43 hours in multigravidae**.** *Chazotte et al.* [13] in their study of labour patterns of women with previous caesarean section found that women with a previous caesarean section and no vaginal delivery behaved like a nulliparas whereas labours of women with a previous caesarean and vaginal deliveries were indistinguishable from those of multiparas. We also observed the mean duration of active phase of labour to be 5.699 hours in patients delivering vaginally and 5.778 hours in patients undergoing a repeat caesarean section after a trial of labour. Thus showing no virtual effect on the mode of delivery.

Rate of Cervical Dilatation

In the active phase, rate of dilatation in cm/hour during the phase of maximum slope is a good measure of the progress of labour. The mean rate of cervical dilatation observed by *Friedman* [9**]** was 2.2 cm/hr while Philpott & Castle [14] reported it to be 1.6 cm/hr. In studies from India, it was reported to be 1 cm/hour. The lowest limit of rate of cervical dilatation according to Friedman was 1.2 cm/hour in nulliparas and 1.5 cm/hr in multiparas; 1 cm/hr by Philpott & Castle and 0.8 cm/hour by Drouin and Nasah [15]**.** In the present study the rate of cervical dilatation in full term normal deliveries after previous caesarean section was 1.68±0.24 cm/hour, in forceps it was 1.19±0.23 cm/hour and in repeat caesarean section it was 0.39±0.15 cm/hour. The results obtained in the present study are consistent with the findings of Kumar & Rao [16] who reported that women who delivered vaginaly had a dilatation at the rate of 1.5 cm/hour while those who finally had caesarean section dilated only at the rate of 0.3 cm/hr. In patients undergoing a trial of labour there were 3 patients where a repeat caesarean section had to be performed in the latent phase itself. All these cases were due to sudden development of fetal distress only.

Occurrence of Delivery in Relation to the alert line and action lines on the partogram

In patients undergoing a repeat caesarean section in active phase 33% delivered before crossing the alert line whereas 67% delivered after crossing the action line. In patients delivering vaginally (FTND+ Forceps) 59% delivered before crossing the alert line, 22% delivered between alert line and action line and only 19% delivered after crossing the action line.

However, on further breaking up vaginal deliveries into FTND and Forceps it was seen that 70% of full term normal deliveries took place before crossing the action line, 20% between alert and action line and 10% after crossing the action line. In case of forceps deliveries 28% each took place before crossing the alert line and between alert and action line while the remaining 44% took place after crossing the action line. Thus the incidence of various modes of delivery before crossing the action line can be tabulated as

Table.1 Incidence of various modes of delivery before crossing the alert line

	Mode of delivery	**Incidence (%)**
1.	Full term normal delivery	70
2.	Forceps delivery	28
3.	LSCS	33.3

Hence the incidence of a normal vaginal delivery was greatest if the duration of labour was short and the labour curve did not cross the alert line.

Table.2 Incidence of various modes of delivery after crossing the action line

	Mode of delivery	**Incidence (%)**
1.	Full term normal delivery	10
2.	Forceps delivery	44
3.	LSCS	66.7

The incidence of a repeat caesarean section was increased if despite augmentation with amniotomy and oxytocin labour curve crossed the action line.

Khan and Rizvi [18] found in their study that 83% of all vaginal deliveries occurred within 2 hours after the progress of labour had crossed the alert line. In our study this incidence was 84.21%.

Use of Oxytocin

Flamm et al. found no significant differences with respect to uterine rupture, maternal morbidity, fetal morbidity or mortality with the judicious use of oxytocin in patients with a previous LSCS [19]. Similar view was expressed by *Paul et al* who has found the incidence of repeat caesarean section to be equal when oxytocin was used for induction of labour (33.3%) as compare to those where oxytocin was not given (33.3%) and where oxytocin was given for acceleration (33.3%) [20]. However, in case of vaginal/forceps delivery the need of oxytocin for induction was very low (5.9%). Thus the success rate for achieving vaginal delivery was significantly less in those patients receiving oxytocin for the purpose of induction of labour. However, the total incidence of vaginal delivery was increased where labour was augmented by means of oxytocin. Hence, oxytocin was found to be a safe and effective means of usual obstetric indications***.*** *Miller* also reported that vaginal delivery rate was increasing vaginal delivery rate and it may be used for the not influenced by use of oxytocin [21].

Birth Weight

In the present study no significant difference in birth weight was seen between vaginal/forceps delivery and caesarean section. In majority of women the birth weight was found to be $\geq$2500 gm. Similar findings have been reported by *Miller* who also did not find a significant difference in birth weight amongst vaginal delivery and caesarean delivery following a previous caesarean section [21]. Similar findings were reported by *Molloy et al.* too reported no significant relationship between birth weight and the incidence of caesarean section [22]. However, *Ollendorf* reported 81% success rate if neonates weighed less than 4000 gm whereas only 40% success rate with neonates weighing more than 4000 gm. However, in our study the criteria chosen was <2500 gm and $\geq$2500 gm [23].

Overall Vaginal Delivery

Ever since 1920 when lower segment transverse caesarean section came into favor, trials on vaginal delivery after a prior caesarean section have flooded the world's obstetric literature convincing that vaginal delivery is the optimal mode of delivery in subsequent pregnancy unless contraindicated.

In this study there were 77 patients selected for a trial of labour from a total admission of 157 patients with a previous caesarean section. Of these 77 patients 50 had a vaginal delivery yielding an overall incidence of 31.85% of the total admissions and 64.94 of the total patients undergoing a trial of labour. [See Table. 3]

Table. 3 Worldwide Rates of Vaginal deliveries after a previous caesarean section

S.No.	Country	1980	1985	1990
1.	Norway	56.9	53.8	56.2
2.	Scotland	38.7	56.3	50.0
3.	Sweden	40.7	47.4	52.9
4.	USA	3.0	7	19.5

It is evident that of the patients given a trial of labour, the success rate was as high as 64.94% in the present series. This indicates that if the trial of labour is given to appropriately chosen patients, the chances of the former being successful are fair.

Scar Dehiscence

Khan and Rizvi in their study on previous caesarean patients found uterine scar rupture rate of 2.9%. 70% of these cases occurred more than 2 hours after the alert line had been crossed. In our study there was no case of scar rupture attributable to the trial of labour process [18]. There was one case where scar dehiscence was detected when the patient underwent a repeat caesarean section. However, the risk of instrumental vaginal delivery or a repeat abdominal delivery was higher whenever the labour curve was allowed to cross the alert line. [See Table. 4]

Thus our results were in proximity with the results of Javed et al [24] and Anand [25].

Maternal Morbidity and Mortality

No mentionable incidence of maternal morbidity was found to be in the study group. No maternal mortality took place.

Perinatal Outcome

Perinatal morbidity was observed in 4 (22.22%) cases of forceps delivery that had to be rushed to neonatal ICU. Out of these 4 one neonate expired during the 24 hours after admission to NICU. This was because of fetal distress developing in the late stages of the labour where vaginal delivery was the best mode of delivery. No mortality was associated with a repeat caesarean section or FTND modes. No stillbirth took place. This might be because of stricter inclusion criteria of the cases.

Conclusion

Both the groups were matched for various risk factors and demography and patient characteristics. The partogram was able to reduce the CS in present study by around 88%. The LSCS in present study were only due to their crossing over of alert line on partogram indicating the higher efficacy of partogram. Thus with a careful selection of cases the trial of labour resulted in a successful vaginal delivery can be predicted successfully. With the better infrastructure and antenatal and postnatal care, the chances of maternal and perinatal morbidity and mortality can also be reduced successfully

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Table 4- Incidence of Scar Dehiscence in relation to the trial of labour given

Author	**Trial of labour given**		**No trial of labour given**	
	No.	**% Dehiscence**	**No.**	**% Dehiscence**
Dayal (1985)	140	2.1	116	2.5
Jerrel (1985)	216	0.4	583	1.3
Phelan (1987)	1796	2.1	847	2.3
Schneider (1988)	339	NIL	239	1.6
Rosen (1991)	NA	1.8	NA	1.9
Khan (1995)	236	2.9	-	-
Anand (1998)	155	NIL	120	1
Tripathi (2005)	81	1.2	-	-
Present study (2009)	77	Nil	-	-