Role of Partogram in Nulliparas

Rutuja Kolekar¹, Shivanand M Gundalli², Amit Kolekar³, Kaveri Pai⁴

¹Senior resident Department of Obstetrics and Gynecology SNMC Bagalkot Karnataka India
²Assistant Professor, Department of Pathology SNMC Bagalkot Karnataka India
³Assistant Professor, Department of Surgery AVBRH Sawangi Wardha Maharashtra India
⁴Assistant Professor, Department of Anaesthesia AVBRH, Sawangi Wardha Maharashtra India

Abstract: This study was undertaken at K.J.Somaiya Medical College, Hospital and Research Centre, Mumbai between February 2010 to JUNE 2012. The study was an observational study, 250 nulliparous women who had been selected on the basis their low risk factor excluding postdatism, multiple gestation, induced labour and women with any medical or obstetric complications. The mean Age was 23.4years and the mean Gestational age was 38.4 weeks. The mean duration of first stage labour was 3.13 hours and the mean duration of second stage of labour was 37.04 minutes. The mean dilatation rate of the cervix was 1.54 cm/hr and the 10th centile was 1cm/hr. In this series, 38.4% women received augmentation of labour. In the entire study group we had 89.2% normal vaginal deliveries, 6.8% caesarean sections and 4% operative vaginal deliveries. The operative delivery rate was 83.33% in the group of women who crossed the action line, 45 % in the group of women who were between alert and action line and only 1.4 % of the women who were to the left of alert line. The average birth weight was 2.64 kg. The 5 minute APGAR score less than 7 was found in nineteen babies out of which only eleven required NICU admissions. The babies born to women who were to the left of alert line required less (21.2%) NICU admissions compared to the babies born to the women who were between the alert and action line and who had crossed the action line (78.8%). There were only 2 perinatal deaths hence the prenatal mortality rate was 0.8%, the major reason for death being respiratory problems. So simplified partogram is a very good method for monitoring labour progress of women in our local population. It is a very helpful tool to monitor labouring women by both trained and untrained workers and thus must be implemented in all the hospital both rural and urban to avoid mishaps.

Keywords: labour, vaginal deliveries, partogram, babies

1. Introduction

Every day, 1500 women die from pregnancy or childbirth related complications. A woman’s lifetime risk of maternal death is 1 in 7300 in developed countries versus 1 in 75 in developing countries.[1] Every year more than 133 million babies are born. Of these 90% are in low- and middle-income countries and around 3 million babies are stillborn. Almost one quarter of these die during birth. The causes of these deaths are similar to the causes of maternal deaths: obstructed or very long labour, eclampsia, infection and hemorrhage.[1]

Prolonged and obstructed labours are one of the known avoidable causes for maternal and perinatal morbidity and mortality. Information on the incidence of morbidity and mortality from prolonged and obstructed labour is incomplete and patchy. The reported incidence of obstructed labour varies widely: from as low as 1% in some populations to up to 20% in others. About 42,000 deaths or 8% of all maternal deaths in the year 2000 were estimated to be due to obstructed labour. Often, there is paucity of vital registration data in settings where obstructed labour and maternal deaths are common. Moreover, when a woman dies as a result of obstructed labour, the death may not be so classified under the final cause of death. Death may be reported as caused by sepsis, ruptured uterus or hemorrhage rather than owing to the underlying cause, which may be cephalopelvic disproportion or abnormal presentation.[2]

Early detection of abnormal progress of labour and prevention of prolonged labour would significantly reduce the risk of postpartum hemorrhage and sepsis and eliminate obstructed labour, uterine rupture and its sequelae. The partograph (or partogram) is a simple tool that has been used for this purpose.[3]

A partograph is a composite graphical record, of progress of labour and salient condition of mother and foetus. Use of partograph is based on the assumption that it facilitates earlier recognition of dystocia thereby optimizing the timing of appropriate interventions such as amniotomy, oxytocin augmentation or most importantly Caesarean section. The partogram was not created for the convenience of doctors; in fact it was created as a tool for all health professionals including midwives and traditional birth attendants. It serves as an early warning system and assists in early decision on transfer, augmentation and termination of labour.[3]

In under-resourced setting, prolonged labour, and delay in decision-making and late referrals are important causes of adverse obstetric outcome. Owing to resource constraints in such settings, it is usually not possible to monitor each woman continuously throughout the duration of the labour. In such settings, the partograph serves a simple and inexpensive tool to monitor labour in a cost-effective way. The role of obstetric caregiver is to avoid unnecessary intervention in this natural physiological process but at the same time to identify problems when things start going amiss. So the early recognition of any deviation from “normal” progression of labour will help to prevent or reduce undesirable maternal and fetal outcome, which brings in the importance of the partogram. In this study we have tried to prospectively evaluate the use of simplified WHO partogram in progress of labour in our population of nulliparas. [4]
2. Materials and Methods

This study was undertaken at K. J. Somaiya Medical College, Hospital and Research Centre, Mumbai between February 2010 to JUNE 2012. The study was an observational study, including 250 nulliparous women who had been selected on the basis of the below mentioned inclusion and exclusion criteria:

Inclusion Criteria
• Nullipara.
• 37 to 41 weeks of gestation.
• Singleton pregnancy.
• Cephalic presentation.
• Low risk pregnancy.
• Spontaneous labour.

Exclusion Criteria
• Non cephalic presentation
• Major fetal structural anomaly
• Previous uterine surgery
• Any acute obstetric complications such as antepartum hemorrhage, antepartum eclampsia.
• High risk medical conditions such as Moderate to Severe Anemia, Diabetes, Epilepsy, Hypertension, Asthma.
• Induced labour
• The progress of labour was plotted on simplified partogram.
• The following protocols were followed:
  • Plotting was started at cervical dilatation > 4cm
  • Fourth hourly per vaginum examination was recommended, but could be done more frequently if required.
  • Maternal pulse, B.P., temperature and fetal heart rate was monitored and filled in partogram as per the columns.

3. Results

• The mean Age was 23.4 years and the mean Gestational age was 38.4 weeks.
• The mean duration of first stage labour was 3.13 hours and the mean duration of second stage of labour was 37.04 minutes.
• The mean dilatation rate of the cervix was 1.54 cm/hr and the 10th centile was 1.09cm/hr.
• In this series, 38.4% women received augmentation of labour. In the entire study group we had 89.2% normal vaginal deliveries, 6.8% caesarean sections and 4% operative vaginal deliveries.
• The operative delivery rate was 83.33% in the group of women who crossed the action line, 45 % in the group of women who were between alert and action line and only 1.4% of the women who were to the left of alert line. The average birth weight was 2.64 kg.
• The 5 minute APGAR score less than 7 was found in 19 babies out of which only 11 required NICU admissions.
• The babies born to women who were to the left of alert line required less (21.2%) NICU admissions compared to the babies born to the women who were between the alert and action line and who had crossed the action line (78.8%).
• There were only 2 perinatal deaths hence the prenatal mortality rate was 0.8%, the major reason for death being respiratory problems.
• The mean age found in our study was 23.4 years which is a favorable age (21-25yrs) for conception with the least pregnancy related complications. The mean age in our study was more than the mean age found in Philpott and Castle’s study11:- 18 years and was less than the mean age found in the WHO partograph in management of labour study:- 27.23 years. The probable reason for the younger population group could be due to early age of marriages in our country.
• The mean gestational age was 38.4 weeks which is comparable to the gestational age found in WHO partograph in management of labour study 17:- 39 weeks.
The babies who had 5 minute Apgar score < 7 (7.6%), this group of low apgar babies (19) were responsible for 57.9% of NICU admission.

4. Discussion

This study was a prospective study in which 250 women with spontaneous onset of labour were studied with the help of partograph. The mean age found in our study was 23.4 years which is a favorable age (21-25yrs) for conception with the least pregnancy related complications. The mean age in our study was more than the mean age found in Philpott and Castle’s study\(^5\): 18 years and was less than the mean age found in the WHO partograph in management of labour study: 27.23 years.\(^6\) The probable reason for the younger population group could be due to early age of marriages in our country.

The mean gestational age was 38.4 weeks which is comparable to the gestational age found in WHO partograph in management of labour study \(^6\): 39 weeks. All our patients delivered in the duration of 1 to 8 hrs after admission but the mean of the first stage of labour found in our study group was 3.13 hours. The duration of the first stage of labour as studied by various authors is as follows:

<table>
<thead>
<tr>
<th>Author</th>
<th>Duration of first stage of labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friedman (1955) (^7)</td>
<td>4.9 hrs</td>
</tr>
<tr>
<td>Hendricks (1970) (^9)</td>
<td>4.8 hrs</td>
</tr>
<tr>
<td>Studd (1973) (^9)</td>
<td>5.7 hrs</td>
</tr>
<tr>
<td>Pierre Drouin (1979) (^10)</td>
<td>6.1 hrs</td>
</tr>
<tr>
<td>Damania et al (1992) (^10)</td>
<td>7.50 hrs</td>
</tr>
<tr>
<td>Zhang &amp; colleagues (2002) (^11)</td>
<td>5.5 hrs</td>
</tr>
<tr>
<td>Present study (2012)</td>
<td>3.13 hrs</td>
</tr>
</tbody>
</table>

The reason for varying duration is probably due to the difference in the cervical dilatation point at which the cervicograph was started to be plotted by various authors and also because of different rates of cervical dilatation in a given population. The duration of the first stage of labour in our study was shorter compared to other studies probably because almost two fifth of our patients were augmented during labour. In our study, the mean duration of the first stage of labour in the women who were to the left of alert line was 2.8 hours and was 5.1 hours in the women who had crossed the action line.

In our study group, the highest number of women (47.2%) had a dilatation rate in the range of 1 – 1.5 cm/hr and the mean dilatation rate was 1.54 cm/hr. A number of observational studies have reported wide variations in the mean, median, and centile values for the rate of cervical dilatation.\(^7\) This may explain the lack of uniformity in the size and shape of the partogram and the timing of the alert and the action line on a number of partograms that deviate from Philpott’s original version\(^11\). The rate of cervical dilatation was 1.6cm/hr in study by Philpott and Castle (1972)\(^7\). However Friedman reported the rates of cervical dilatation in nulliparous women range from 1.2 cm/hr to 6.8 cm/hr.\(^7\)

The dilatation rate in our study was comparable to the results found in Khara et al, Dafty et al studies but was less than the result reported by Mittal et al and was more than the result found in the study by Baracho et al. In our study population rate of cervical dilatation in the lowest 10\(^{th}\) centile is around 1cm/hr (1.09 cm/hr) compared to the study done by L.J. van Bogaert\(^13\) in South Africa where he found it as 0.86cm/hr. In our study augmentation was done in 38.4% women. Out of these patients 30.2% had oxytocin drip and 27.1% had both ARM + Oxytocin drip while remaining 42.7% progressed only with ARM.

The percentage of women who received augmentation of labour in our study was more compared to other studies. In the present study 89.2% of patients delivered normally, 6.8% had Caesarean sections; Forceps was applied in 1.6% and Vacumm delivery carried out in 2.4%. The studies mentioned below in table no.16 shows comparison between different rates of Caesarean section performed in different studies:

<table>
<thead>
<tr>
<th>Study</th>
<th>CS percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’ Driscoll, 1973 (^7)</td>
<td>3%</td>
</tr>
<tr>
<td>Composite WHO partograph (^10)</td>
<td>4.5%</td>
</tr>
<tr>
<td>Javed et al, 2007 (^20)</td>
<td>6.4%</td>
</tr>
<tr>
<td>Mathews et al 2006 (^11)</td>
<td>3.2%</td>
</tr>
<tr>
<td>Present study</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

The Caesarean section rate was comparable to the study done by Javed et al and was slightly more than the other studies mentioned above. In our study, 17 Caesarean sections were performed for the following indications as shown in table below:

<table>
<thead>
<tr>
<th>Indications</th>
<th>First Stage</th>
<th>Second Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrest of dilatation</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Foetal distress</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>CPD</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Deep transverse arrest</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

In our study this incidence was 3.5% which is slightly lower than the study of Friedman et al\(^7\). In our study, six sections were performed in the second stage of labour. In all these patients, labour dystocia in the form of fetopelvic disproportion was present either in the form of malposition (deep transverse arrest) or inadequacy of maternal pelvis.
Comparing the results found in the WHO partograph in the management of labour study [17] which had 72.8% women between the alert and the action line, we observed that 8% women remained in the alert line and 9.9% crossed the action line. In our study, the maximum number of women (i.e., 84.8%) who crossed the action line had less NICU admissions (21.2%) compared to the women who were between the alert and the action line, and those who crossed the action line (78.8%). Two main causes for low APGAR score related to partograph were Meconium aspiration syndrome and Respiratory distress syndrome. The other common reason found for NICU admission was hyperbilirubinemia, which was not related to the partograph. Hyperbilirubinemia was previously considered to be related to augmentation with oxytocin (Buchan P.C., 1979) [24] but recent data by Oral et al (2003) [8] does not support the above assumption. In our study, we did not find any relation between oxytocin augmentation and hyperbilirubinemia. There were two perinatal deaths (0.8%) in our study. In Philpout’s series, the perinatal mortality was 3.8% and in the study conducted on WHO composite partogram [19], it was found to be 0.3%.

In our study, perinatal mortality was associated with labour dystocia. Babies were shifted to the NICU for low APGAR score. One neonatal death was associated with secondary arrest of the cervical dilatation which did not improve with augmentation and due to appearance of meconium, Cesarean section had to be done. The baby was severely asphyxiated, died after four hours in NICU (cause of death was meconium aspiration with severe birth asphyxia). The other perinatal death was in a patient who had deep transverse arrest and died due to birth asphyxia on day two of life despite LSCS.

Though we did not have any still birth in our study, the WHO partogram in the management of labour study showed significant reduction in the intrapartum still birth and neonatal deaths after introduction of the partograph.

From our results, we found that the women who remained to the left of the alert line required lesser duration of labour, less augmentation of labour and lesser operative deliveries. Babies born to these mothers had better APGAR score and those who crossed the score and required less NICU admissions and less perinatal morbidity and mortality compared to the women who were between the alert and the action line.

From all the above-mentioned maternal and fetal benefits in our study, we strongly recommend the use of partogram which is an aid to referral decisions and is a labour management tool which should be used as a routine tool for monitoring labour in a developing country like India.

5. Summary

Partogram is a graphical record of labour which is an inexpensive, easily available, managerial tool which has been endorsed by WHO for monitoring of labour. Various types and designs of partograms are being used at various centers. Recently, WHO introduced simplified version of partogram, for the use by skilled birth attendants. In our study by Studd et al [1] which found low APGAR score in the babies born to women who crossed the action line. However, the studies of Sizer et al [23] and Lavender et al [11] showed no difference in the APGAR scores in the babies whose mothers were to the left or right of the alert line or the action line.

Among the women who remained to the left of the alert line, there was less NICU admissions (21.2%) compared to the women who were between the alert and the action line and those who crossed the action line (78.8%). Two main causes for low APGAR score related to partograph were Meconium aspiration syndrome and Respiratory distress syndrome. The other common reason found for NICU admission was hyperbilirubinemia, which was not related to the partograph. Hyperbilirubinemia was previously considered to be related to augmentation with oxytocin (Buchan P.C., 1979) [24] but recent data by Oral et al (2003) [8] does not support the above assumption. In our study, we did not find any relation between oxytocin augmentation and hyperbilirubinemia. There were two perinatal deaths (0.8%) in our study. In Philpout’s series, the perinatal mortality was 3.8% and in the study conducted on WHO composite partogram [19], it was found to be 0.3%.

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From the above it is clear that the partogram is an invaluable aid in the management of parturient women across the globe. To small sample size this aspect could not be evaluated in our study. We had a good perinatal outcome and the average birth weight was 2.64 kg. The 5 minute APGAR score less than 7 was found in nineteen babies out of which only eleven required NICU admissions. The babies born to women who were to the left of alert line required less (21.2%) NICU admissions compared to the babies born to the women who were between alert and action line, 45% in the group of women who crossed the action line. Hence the prenatal mortality rate was 0.8%, the major reason for death being respiratory problems. Though we had no still birth in our study, literature has reported that the partograph does improve the still birth rate and neonatal deaths but due to small sample size this aspect could not be evaluated in our study.

From the above it is clear that the partogram is an invaluable aid in the management of parturient women across the globe.

6. Conclusion

The partogram is an inexpensive and accessible tool that can effectively monitor the progress of labour. Other benefits of partogram include:

6.1 Unlike other interventions in maternal health, use of the partogram does not require expensive technology which may malfunction.

6.2 A partogram review (if well recorded) provides rapid, comprehensive information about progress in labor when compared with a review of detailed hand written case notes.

6.3 Midwives find the partogram to have practical benefits in terms of ease of use, time resourcefulness, continuity of care and educational assistance, and these positive aspects may contribute to improving maternal and fetal outcomes.

6.4 Partogram is more user friendly and can be easily taught to skilled birth attendant. From our study, we also realised the importance of the alert line and the action line.

6.5 An alert line on the partogram should be based on the lower 10th centile rate of the cervical dilatation of the local population. We found this rate as 1.09 cm/hr, which approximately corresponds to the slope of the alert line on a standard partogram.

6.6 The action line should be placed 4 hours from the alert line with the rate of the cervical dilatation 1cm/hr. Placing this line early can have a biased opinion regarding the progress of labour and can lead to more operative delivery. Because of the frequent observations of the patients with the help of partogram we managed to:

6.7 Treat dysfunctional labour early and effectively.
6.8 Reduce the incidence of Caesarean sections.
6.9 Obtain a better outcome in neonates.

Based on this we conclude, simplified partogram is a very good method for monitoring labour progress of women in our local population. It is a very helpful tool to monitor labouring women by both trained and untrained workers and thus must be implemented in all the hospital both rural and urban to avoid mishaps.

References


Author Profile

Dr. Amit Kolekar MBBS MS MCH URO presently passed from Nair Hospital Mumbai, working as Assistant Professor in Department of Surgery AVBRH Sawangi Wardha Maharashtra India.

Dr Kaveri Pai MBBS MD ANAESTHESIA passed from BJMC Pune. Presently working as Assistant Professor in Department of Anaesthesiology AVBRH Sawangi Wardha Maharashtra India.

Dr. Shivanand Gundalli. M B B S. MD (PATH) Passed MBBS from KIMS Hubli and M D Pathology from Drvnmnc Solapur India. Total Experience of 2 and Half Year Post M D Qualification Registrar in Pathology in MGM Medical College Parel Mumbai for 2 Months. Medical Officer in YCM Hospital Pimpri, Pune for Three and Half Months. Work Experience as Assistant Professor in Department Of Pathology Govt Med College Solapur for 9 Months. Worked as Consultant Pathologist in SRL Ranbaxy Laboratories Mumbai for 11 Months. Worked as Part Time Consultant Pathologist in Lifecare Laboratory, CAP Accredited Laboratory Mumbai and Shruti Clinical Laboratory Mumbai, an ISO Certified Laboratory. Presently Working as Assistant Professor in Department of Pathology SNMC Medical College and HSK Hospital Bagalkot , Karnataka Since 2 Months.

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