

Segregation of Patients for Intrapartum Monitoring, using Robson's Classification

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ABSTRACT

Introduction: Monitoring labour by intermittent or continuous foetal heart rate monitoring has been discussed widely in literature. Robson's classification has categorized pregnant women in ten groups. The study proposes to examine in which patients one must recommend continuous or intermittent foetal heart rate monitoring.

Aim: To study the effect of Continuous Electronic Foetal Monitoring (CEFM) on the overall rate of operative deliveries as well as the rate using Robson's classification and the neonatal outcome.

Materials and Methods: After Institutional Review Board approval, low risk parturients with a reactive foetal heart rate at arrival in labour were prospectively analysed. Women with a previous caesarean section, those requiring elective caesarean section and having high risk factors were excluded. Patient details, history, examination findings and the method of monitoring, whether continuous or intermittent was noted. 1803 women were monitored by CEFM and 2107 by intermittent auscultation. In both the groups of intrapartum monitoring,

suspected foetal distress was followed by immediate intervention in the form of caesarean section or operative vaginal delivery without resorting to any other monitoring methods such as foetal scalp blood sampling, as per the institutional policy.

Comparison was based on the need for operative deliveries in view of presumed foetal distress and the neonatal outcome between the two groups of monitoring and further in each Robson's class. Results were assessed using IBM® SPSS Version 22.0, Chi-square test, considering $p < 0.05$ as significant.

Results: Operative deliveries in view of suspected foetal distress increased and the neonatal outcome was better with CEFM. Assessing in each Robson's class, only class 4A, 7A and 10A results were consistent with the overall outcome. In others (class 2A), women experienced reduced rate of operative deliveries and better neonatal outcome with CEFM. In yet others, there was no benefit with CEFM as there were increased operative deliveries without any difference in the neonatal outcome.

Conclusion: Segregation of patients for intrapartum monitoring using Robson's classification would result in decreased operative deliveries and a better neonatal outcome.

Keywords: Continuous electronic heart rate monitoring, Foetal distress, Intermittent auscultation, Prospective studies

INTRODUCTION

It is indispensable to monitor foetal heart rate during labour, as a foetus is not just a potential life but a life with a potential. But how to monitor foetal heart rate during labour? There is no firm consensus as to whether CEFM is better as compared to intermittent auscultation in terms of improved perinatal outcome [1]. Although recent Cochrane review states that CEFM does not provide added advantage over intermittent auscultation but it certainly provides increased opportunities for detection of foetal distress than intermittent auscultation [2]. There is still scope in this discipline for a classification system to segregate patients for labour monitoring which would reduce the perinatal mortality rate without increasing surgical intervention. The study aimed to compare the rate of operative deliveries and the neonatal outcome in different classes of Robson's classification [3-6].

It would thus highlight the groups of patients which would benefit with continuous electronic foetal heart rate monitoring in terms of better perinatal outcome without increasing unnecessary operative interference.

Robson's classification provides a classification of patients in 10 mutually exclusive groups according to the characteristics of pregnancy. This classification system proposed by Robson et al., [3], is based on four areas: the woman's previous obstetric record (primigravida or previous vaginal delivery or previous caesarean section), gestation of the pregnancy (<37 or >37 weeks), presentation (cephalic or non-cephalic) and the type of labour (spontaneous or

induced) which leads to the outcome—the mode of delivery (vaginal delivery or operative vaginal or cesarean section). This classification system has been used to make comparisons of caesarean section rate in single institutional studies, jurisdictional and national registries and recently with international comparisons [3-6].

To correlate operative obstetric intervention, neonatal outcome in patients undergoing continuous foetal monitoring or intermittent monitoring according to the Robson's classification and to suggest which patients according to Robson's classification would benefit by continuous electronic foetal heart rate monitoring.

MATERIALS AND METHODS

After Institutional Review Board approval, this prospective observational study was conducted over a period of seven months from March, 2015 to September, 2015 at a government regulated tertiary care hospital.

The study was conducted in the labour room of the hospital during pre-decided eight hour sessions thrice a week. Parturients at low risk for obstetric complications with a reactive foetal heart rate during admission at arrival in labour were prospectively analysed.

Primigravid patients, multigravid with previous vaginal delivery with gestational age from 32 weeks or more were included in the study. Patients with high risk factors such as pregnancy induced hypertension, gestational diabetes mellitus, oligohydramnios and intrauterine growth restriction diagnosed during antenatal visits or at admission during labour, multigravid women with a previous

caesarean section and women requiring elective caesarean section were excluded.

During the study period, 4,396 women were admitted in the labour room for termination of pregnancy. Out of these, 486 patients were excluded due to high risk factors diagnosed antenatally or at admission for labour, including women undergoing elective caesarean section. Out of 3,910 patients included in the study, 1,803 patients were monitored by CEFM and 2,107 by intermittent auscultation method.

Each patient included in the study was assigned a Robson's number according to the Robson's group (herewith referred to as 'class') to which they belonged [3-6].

Patients belonging to classes 2(B), 4(B), 6, 7(B), 8(B), 9 were thus excluded from the study as they warranted caesarean section before labour [3] as well as patients belonging to classes 5 and 10(B) as they were monitored only using continuous electronic foetal heart rate monitoring.

Patient details, history, examination findings and investigations were noted from the hospital records. The mode of intrapartum monitoring by which each patient was monitored; whether CEFM or intermittent auscultation was also noted.

Intermittent monitoring was done by auscultation (using stethoscope or a hand held Doppler machine) of foetal heart rate every 15 to 30 minutes in the first stage of labour and every 5 to 10 minutes in the second stage of labour.

Continuous monitoring was done by connecting electrodes on the patient's abdomen connected to the wireless monitoring devices developed by Monica healthcare™, for Wipro GE Healthcare Pvt. Ltd.

Only few patients included in the study in each class could be monitored using continuous electronic foetal heart rate monitoring due to limited resources. The division of patients in two groups of intrapartum monitoring by hospital authorities was based on the availability of electronic monitoring devices and not influenced by any of the patient characteristics. This eliminates selection bias from the study and results in equal distribution of confounding variables among the two groups.

Foetal distress which warranted operative interference in deliveries was defined by the presence of following parameters:

- Baseline oscillations or beat-to-beat variability of less than 5 bpm;
- Absent accelerations;
- Late decelerations with spontaneous uterine contractions;
- Repetitive variable decelerations – atleast 3 in 20 minutes;
- Any observation of foetal heart rate more than 160 bpm or less than 90 bpm at any instance.

In both the groups of intrapartum monitoring, suspected foetal distress was followed by immediate intervention in the form of caesarean section or operative vaginal delivery without resorting to any other monitoring methods such as foetal scalp blood sampling as per the institutional policy.

The number of patients facing operative interference in deliveries such as forceps or vacuum application or caesarean section in view of foetal distress was noted and compared between the groups and further in each class.

The neonatal outcome in terms of umbilical artery pH at birth, foetal acidosis at birth (cord artery pH at or below 7.13), Apgar scores, need for resuscitation and admission to neonatal care unit and perinatal deaths was noted and compared between the two groups and further in each class.

Comparison was done on the basis of need for operative interference in deliveries in both the groups and the neonatal outcome in the two groups of patients and further in each class of patients according to Robson's classification.

STATISTICAL ANALYSIS

Results were analysed using Chi square test with the help of Statistical Package for Social Sciences (SPSS) software Version 22.0, considering $p < 0.05$ as significant.

RESULTS

The number of patients facing operative interference in deliveries was significantly greater in the continuous monitoring group compared to patients being monitored intermittently (27.01% versus 14.3%; $p < 0.001$) [Table/Fig-1].

The number of neonates having complications at birth such as respiratory depression (5-minutes Apgar score less than 7), acidosis (umbilical artery pH values at or below 7.13), requiring use of assisted ventilation, admission to neonatal care unit was 23 in the intermittent auscultation group as against five in the CEFM group. Five neonatal deaths occurred in the CEFM group and two perinatal deaths occurred in the intermittent monitoring group (one intrapartum and one neonatal death). Three neonatal deaths in the CEFM group were associated with major congenital anomalies of the foetus and thus were excluded from the analysis as they could not have been prevented by any form of intrapartum monitoring. These congenital anomalies were not diagnosed on any antenatal ultrasonography scans. The neonatal complications related to foetal hypoxia were thus significantly greater in the intermittent auscultation group compared to CEFM group (25 of 2107 versus 7 of 1803; $p = 0.004$) [Table/Fig-2].

Analysing the rates of operative interference in deliveries, using Robson's classification [Table/Fig-3]:

The rate of operative interference in deliveries significantly increased with CEFM, in all the Robson's classes, except for class 2(A). Women belonging to class 2(A), which includes nullipara women with singleton pregnancy of more than 37 weeks gestation with cephalic presentation in induced labour, experience significantly decreased rate of operative deliveries with CEFM ($p = 0.003$) as compared to intermittent auscultation. All other groups of patients experience increased rate of operative interference in deliveries with CEFM than that with intermittent auscultation.

Analysing the neonatal outcome in different classes of patients using Robson's classification [Table/Fig-4]:

There was no difference in neonatal outcome with continuous or intermittent monitoring in Robson's classes 1, 3 and 8(A), that is patients in spontaneous labour and multiple pregnancies respectively. This means that in these classes of patients there is an increased rate of operative deliveries with CEFM without any beneficial effect on the neonatal outcome. Thus, in these classes of patients, intermittent monitoring would prove beneficial for the patient as it would lead to decreased operative interference in deliveries without any difference in the neonatal outcome.

The neonatal outcome was significantly better with CEFM in Robson's groups 2(A), 4(A), 7(A) and 10(A), that is patients with induced labour, multipara with a singleton breech pregnancy and preterm gestation less than 36 weeks respectively [Table/Fig-4]. Thus, in these classes of patients, CEFM is better as compared to intermittent auscultation as it gives a better neonatal outcome.

Patients belonging to Robson's group 2(A) benefit the most out of CEFM, with decreased operative interference in deliveries and also better neonatal outcome with CEFM as compared to intermittent auscultation. Thus, patients belonging to class 2(A) should be monitored using CEFM.

However, in classes 4(A) and 7(A) and 10(A), CEFM was associated with increased operative deliveries but it was also associated with a better perinatal outcome. The use of CEFM is justified in these classes as the increased rate of operative interference in deliveries is accompanied by a significantly better neonatal outcome.

Mode of delivery	Monitoring Groups		Total	p-value
	Intermittent Monitoring	Continuous monitoring		
Number of patients facing operative interference in delivery	302 (14.33%)	487 (27.01%)	789	<0.001*
Number of patients delivering without any operative interference	1805 (85.67%)	1316 (72.99%)	3121	
Total	2107	1803	3910	

[Table/Fig-1]: Number of patients facing operative interference in view of foetal distress among the patients in two groups of labour monitoring.
*p-value < 0.05 is considered significant.
Using Chi-square test.

Neonatal Outcome	Monitoring Groups		Total	p-value
	Intermittent Monitoring	Continuous monitoring		
Number of neonates with adverse neonatal outcome*	25(2 [†])	7(2 [†])	32	0.004 ^{††}
Number of neonates with good neonatal outcome	2082	1796	3878	
Total	2107	1803	3910	

[Table/Fig-2]: Comparison of neonatal outcome in two groups.
* Adverse neonatal outcome includes neonates having complications at birth such as respiratory depression, acidosis, requiring assisted ventilation, admission to neonatal care unit and neonatal deaths.
[†] Excludes neonatal deaths associated with major congenital anomalies of the foetus which could not have been prevented by any form of intrapartum monitoring.
² + means 2 neonatal deaths among the number of neonates with adverse neonatal outcomes. ([†] means the number of neonatal deaths)
^{††} Using Chi-square test: p-value < 0.05 as significant.

Robson's Group	Number of Patients facing operative interference in view of foetal distress		p-value*
	Intermittent auscultation	Continuous monitoring	
1.	99	148	0.002
2(A).	81	47	0.003
3.	45	115	0.000
4(A).	12	32	0.003
7(A).	19	46	0.001
8(A).	32	61	0.003
10(A).	14	38	0.001
TOTAL	302	487	0.04

[Table/Fig-3]: Analysis of the rate of operative deliveries, using Robson's ten group classification system.
* Using Chi-square test: p<0.05.

Robson's Group	Number of Neonates requiring resuscitation, NICU admission or Fresh Still Births		p-value*
	Intermittent auscultation	CEFM	
1.	1	3	0.564
2(A).	8	1	0.035
3.	0	2	0.586
4(A).	4	1	0.000
7(A).	7	1	0.000
8(A).	1	2	1.000
10(A).	3	2	0.002
TOTAL	25 [†]	7 [†]	0.020

[Table/Fig-4]: Analysis of number of neonates requiring resuscitation, NICU admission or perinatal mortality, using Robson's classification.
* Using Chi-square test: p<0.05 – significant.
[†] Absolute value of the number of neonates with adverse neonatal outcomes, including perinatal deaths.

DISCUSSION

CEFM has been compared with intermittent auscultation for intrapartum foetal monitoring and the results have been equivocal [7,8]. Recent Cochrane reviews state that there is no benefit of CEFM over intermittent auscultation especially as far as the neonatal outcome is concerned; infact, Alfirevic Z et al., state that non-reassuring patterns of foetal heart rate during intrapartum monitoring does not necessarily correlate with foetal hypoxia or acidosis at birth [8].

However, recently Bretelle F et al., have reported that the continuous foetal monitoring is more suited to pick up foetal acidosis [9] and even Sholapurkar SL stated that the current methodology of intermittent auscultation may be flawed in that it poses a risk of missing many or most late (pathological) Foetal heart rate decelerations [10]. Herrera CA et al., also were of the opinion that CEFM may predict foetal academia [11]. The infant Collaborative group also are analysing the role of CEFM in parturient women [12].

In the present study, CEFM group was associated with better neonatal outcome as compared to intermittent auscultation and the findings corroborate with Bretelle F et al., [9], while there was an increase in operative interference as also shown by Paterno NT et al., Alfirevic Z et al., and Maso G et al., [8,13,14].

Robson's Classification takes care of the confounding factors that affect pregnancy and parturition [3–5] and has yet not been used to compare neonatal outcome measures with foetal heart rate monitoring. The present study uses Robson's classification of pregnant women for comparison between the two methods of intrapartum monitoring and observes the caesarean section rate and the neonatal outcome in each group of Robson's classification.

The current study has shown that continuous electronic foetal monitoring benefits patients with induced labour while reducing the need of operative interference {Robson's 2(A)}, while in Multipara with induced labour {Robson's 4(A)}, multigravida patients in spontaneous labour with breech presentation {Robson's 7(A)} and preterm gestation less than 36 weeks {Robson's 10(A)} neonatal outcome showed significant improvement along with increase in operative interference and there is no benefit of CEFM in patients with spontaneous labour {Robson's 1 and 3} and multifoetal pregnancies in spontaneous labour {Robson's 8(A)}.

Thus, in view of the global need for providing quality, equitable and evidence based – care for all, segregation of patients for intrapartum monitoring using Robson's classification provides a balance between the extremes on the continuum of health care: too little, too late and too much, too soon [15].

LIMITATION

The protocol of the study was not rigidly designed in terms of the mode of operative delivery, whether forceps or vacuum application or caesarean section, in order to safeguard patient's ethical interest and in view of the importance of clinical judgment of the consultant in each individual case.

CONCLUSION

Neonatal outcome is seen to improve in groups 2A, 4A, 7A, 10A of Robson's classification, whereas operative obstetric intervention is decreased in Group 2A but with the same neonatal outcome as intermittent foetal heart rate monitoring. CEFM will benefit patients in groups 2A, 4A, 7A and 10A of Robson's classification in labour.

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