

CORRELATION OF INTRAPARTUM CARDIOTOCOGRAPHY AND NEONATAL APGAR SCORES IN HIGH RISK PREGNANCY

by

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SUMMARY

A prospective study of 55 cases of intrapartum electronic fetal heart rate monitoring was conducted for high risk pregnancies, between January 1982 to March 1983, at K.E.M. Hospital, Parel, Bombay. The indications included fetal distress, pregnancy induced hypertension, bad obstetric history, maternal diabetes mellitus, oxytocin infusion, antepartum haemorrhage, intrauterine growth retardation, postdatism and prolonged labour. Obstetric intervention was done as indicated by the fetal heart rate patterns. There was a strong correlation between baseline fetal heart rate patterns, periodic changes in fetal heart rate with uterine contractions and the neonatal Apgar scores at 1 and 5 minutes.

Introduction

Intermittent fetal heart rate auscultation gives an obstetrician little information that can be had from continuous monitoring. Continuous electronic fetal heart rate monitoring gives an early indication of a compromised state of the fetus in labour, allowing timely intervention to deliver the fetus in a healthy state (Hammacker *et al* 1968; Lee and Baggish 1976; Paul and Hon 1971). The present study was conducted with a view of establishing the value of intrapartum cardiotocography in high risk pregnancies.

Material and Methods

A prospective study of 55 cases of high-risk pregnancy was conducted between January 1982 to March 1983 at K.E.M. Hospital, Parel, Bombay. Table 1 shows the indications for intrapartum electronic fetal heart rate monitoring in this study.

Continuous intrapartum electronic fetal heart rate monitoring was done in these patients by an external transducer or internal scalp electrode. Uterine contractions were recorded by external transducer over fundus of the uterus. Obstetric intervention was done as indicated by the results of this monitoring. In patients with late deceleration, persistent tachycardia or bradycardia, prolonged variable deceleration or poor beat to beat variability, cor-

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Accepted for publication on 19-10-85.

TABLE I
Indications

Indication	No. of cases	Per cent
1. Fetal distress	18	32.76
2. Pregnancy induced hypertension	7	12.64
3. Bad obstetric history	8	14.56
4. Maternal diabetes mellitus	2	3.64
5. Oxytocin infusion	3	5.46
6. Antepartum haemorrhage	3	5.46
7. Intrauterine growth retardation	2	3.64
8. Postdatism	8	14.56
9. Prolonged labour	4	7.28
Total	55	100.00

rective measures such as left lateral position, nasal moist O₂, and intravenous infusion of glucose with sodabarbonate were instituted. If these measures failed to improve the FHR pattern, labour was terminated by vacuum, forceps or caesarean section as appropriate. Neonatal Apgar scores were recorded at 1 and 5 minutes after delivery. A correlation was made between the results of cardiotocography and the Apgar scores.

Results

Table II shows a correlation between baseline FHR, the mode of delivery and the neonatal Apgar scores.

Out of 36 patients with normal baseline FHR, 34 had Apgar score of 7-10 at 1 and 5 minutes. Operative deliveries in this group were for indications other than fetal distress. Of 13 patients with baseline tachycardia, 10 required operative delivery, 6 had Apgar scores less than 7 at 1 minute, and 2 had the score less than 7 at 5 minutes. All the 6 patients with baseline bradycardia, required operative delivery, and the Apgar scores were above 6 in only 2 and 3 patients at 1 and 5 minutes respectively.

Table III shows the effect of beat to beat FHR variability on the outcome.

Out of 11 patients with saltatory variability, 10 required operative delivery, 3 had Apgar scores more than 6 at 1 minute and

TABLE II
Correlation With Baseline FHR

Baseline FHR	Mode of delivery				Apgar score					
	Normal	LSCS	Forceps/ vacuum	Total	1 minute			5 minutes		
					0-3	4-6	7-10	0-3	4-6	7-10
Normal (120-160 bpm)	20	4	12	36	1	1	34	0	2	34
Tachycardia (> 160 bpm)	3	6	4	13	1	5	7	0	2	11
Bradycardia (< 120 bpm)	0	4	2	6	2	2	2	1	2	3
Total	23	14	18	55	4	8	43	1	6	48

TABLE III
Correlation With Beat to Beat FHR Variability

Beat to beat variability	Mode of delivery				Apgar score					
	Normal	LSCS	Forceps/ vacuum	Total	1 minute			5 minutes		
					0-3	4-6	7-10	0-3	4-6	7-10
Saltatory	1	5	5	11	2	6	3	0	1	10
Undulatory	22	5	12	39	2	4	33	0	2	37
Narrowed undulatory	1	0	2	3	0	1	2	0	1	2
Silent	0	1	1	2	1	1	0	1	1	0
Total	24	11	20	55	5	12	38	1	5	49

10 at 5 minutes. Out of 39 patients with undulatory variability, 33 had Apgar scores more than 6 at 1 minute and 37 at 5 minutes. Operative intervention was for reasons other than fetal distress. Out of 3 patients with narrowed undulatory variability, 2 had Apgar scores above 6 at 1 and 5 minutes, and 2 required forceps delivery for fetal distress. Both patients with silent pattern required operative delivery, and none had an Apgar score above 6 at 1 or 5 minutes.

Table IV shows a correlation between FHR changes with uterine contractions and the outcome.

Among the 11 patients with no change

in FHR with uterine contractions, only 1 required forceps delivery for prolonged second stage of labour, 8 had Apgar scores above 6 at 1 minute and 10 at 5 minutes. Out of 22 cases with early deceleration pattern, 19 had Apgar scores above 6 at 1 minute and 20 at 5 minutes; operative deliveries were for indications other than fetal distress. Among 9 patients with late deceleration, operative intervention was required for all because of fetal distress, only 2 had Apgar scores above 6 at 1 minute and 5 at 5 minutes after resuscitative measures. Out of 13 patients with variable deceleration, 4 had normal pattern after change in maternal position and delivered normally; 7 had Apgar scores above 6 at 1 minute

TABLE IV
Correlation With FHR Changes With Uterine Contractions

FHR changes with uterine contractions	Mode of delivery				Apgar score					
	Normal	LSCS	Forceps/ vacuum	Total	1 minute			5 minutes		
					0-3	4-6	7-10	0-3	4-6	7-10
No change	10	0	1	11	1	2	8	0	1	10
Early deceleration	14	2	6	22	0	3	19	0	2	20
Late deceleration	0	7	2	9	3	4	2	1	3	5
Variable deceleration	4	3	6	13	3	3	7	1	4	8
Total	28	12	15	55	7	12	36	2	10	43

and 8 at 5 minutes, few requiring resuscitative measures.

Discussion

The rate of operative deliveries was high in the group with ominous fetal heart rate patterns such as baseline tachycardia or bradycardia, silent, narrow undulatory or saltatory variability pattern, and late or prolonged variable deceleration patterns.

There was a strong correlation between baseline FHR, periodic changes in FHR with uterine contractions and the neonatal Apgar scores at 1 and 5 minutes from the time of delivery. Low Apgar scores occurred when the above mentioned ominous FHR patterns were present.

In presence of such FHR patterns, it is essential to terminate labour quickly by operative intervention, to avoid intrauterine fetal death or delivery of a moribund fetus.

Routine intrapartum cardiotocography in high-risk pregnancies improves neonatal survival in 3 ways. It allows early detection of fetal hypoxia and its correction. Loss of beat variability, late decelerations, are early indicators of uteroplacental insufficiency and prompt delivery of such babies prevents fetal damage. Variable deceleration patterns permit diagnosis of cord compression.

Conclusion

Late deceleration, prolonged variable deceleration, poor variability, complicated bradycardia and complicated tachycardia detected by intrapartum cardiotocography are indicators of fetal compromise in utero. In presence of such patterns, it is essential to shorten the labour by operative intervention i.e. vacuum, forceps or caesarean section delivery, to avoid damage to the fetus. This is exemplified by 5 minute Apgar scores below 7 in 50% cases associated with these FHR patterns.

Thus intrapartum monitoring is a very useful means of diagnosing fetal distress at an early stage, before it is clinically evident, so that the obstetrician can intervene at the appropriate moment and deliver a healthy baby.

Acknowledgement

We thank the Dean and Head, Dept. of Obstetrics and Gynaecology, K.E.M. Hospital, and Seth G. S. Medical College, Bombay, for allowing us to publish hospital data.

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