FETAL HEART RATE TRACINGS BEFORE CAESAREAN SECTION CORRELATED WITH NEONATAL OUTCOME

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SUMMARY

Thirty patients, prior to caesarean section, had cardiotocographic monitoring. The FHR tracings were analysed and correlated with the newborn's condition after caesarean section. An attempt has been made to determine the value of FHR tracings prior to delivery in predicting the neonatal outcome.

Introduction

Bioelectronic monitoring of the fetal heart rate (FHR) during labor is an improvement on auscultatory monitoring. However, uncertainity still exists with regard to the relative value of this technique.

Uterine contractions decrease uteroplacental perfusion and oxygenation of fetal blood (Galdeyro Barcia *et al*, 1973). Alterations of fetal PO_2 correlate with FHR changes. A compromised fetus will reflect his status by some abnormality in the FHR pattern. Early identification of the fetus at risk is possible by analysis of FHR tracings. Timely intervention can improve the perinatal outcome.

Material

This study was carried out on 30 patients in labour on whom a decision for caesarean section was taken. Patients were monitored by a Hewlett Packard Cardiotocograph Monitor within the hour prior to caesarean section. FHR changes were analysed on the basis of the classification used by Krebs *et al* (1979) based on that proposed by Hon (1963). The purpose was to analyse in a systematic manner all meaningful FHR patterns.

The neonatal outcome was assessed by recording 1 and 5 minute Apgar Scores and neonatal morbidity and mortality.

Observations

The indications for caesarean section in the study were fetal distress, antepartum haemorrhage, previous caesarean, obstructed labour, failed induction and breech. The commonest indication for caesarean was fetal distress seen in 16 (53.33%) cases. This is shown in Table I.

Baseline FHR was studied from the tracings. Normocardia (120-160 b.p.m.) was present in 20 cases, bradycardia (<119 b.p.m.) was present in 4 cases and tachycardia (>160 b.p.m.) in 6 cases.

Variability or irregularity of FHR is shown in Table II. Undulatory pattern

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TABLE I
Indications

S. No.	Indication	No. of cases	%
1.	Fetal distress	16	53.33
2.	Antepartum haemorrhage	3	10.00
3.	Previous caesarean with recurring indication	4	13.33
4.	Obstructed labour	2	6.67
5.	Failed induction	4	13.33
6.	Breech	1	3.33

was present in 15 (50%) cases. The amplitude of FHR was decreased in 16 cases. The frequency of oscillations was decreased in 20 cases.

TABLE II A
Amplitude

Amplitude	No. of cases	%
Silent(s)	1	3.33
Narrowed Undulatory (NU)	15	50.00
Undulatory (U)	13	43.33
Saltatory (Sa)	1	3.33

TABLE II B
Frequency

Frequency	No. of cases	%
Low	5	16.66
Moderate	15	50.00
High	10	33.33

Accelerations and decelerations in FHR may be present. These FHR patterns are described as periodic changes when observed during uterine contractions.

Decelerations i.e. transient decreases of the rate lasting at least for 20 seconds were present in 19 cases (63.33%). The shape of the tracing and its time relationship with uterine contractions have been the basis for their classification (Cibils, 1976). The type of decelerations in this series are shown in Table III. Early decelerations were seen in 3 (10%) cases, late in 4 (13.33%) cases and combined form of deceleration observed in 6 (20%) cases. A variable pattern was noted in 4 (13.33%) cases and prolonged decelerations were recorded in 1 (3.33%) case.

TABLE III
Decelerations

Type	No. of cases	%
Sporadic	1	3.33
Periodic		
Early	3	10.00
Late	4	13.33
Combined	6	20.00
Variable	4	13.33
Prolonged	1	3.33

The neonatal outcome was assessed by the 1 and 5 minute Apgar Scores as shown in Table IV. The 1 minute score was <7 in 12 (40%) cases and 5 minute score <7 was noted in 5 (16.67%) cases.

The newborns were kept in the nursery for 48 hours routinely and then transferred to the mother. They had a prolonged nursery stay in case of neonatal complications of birth asphyxia, birth trauma, meconium aspiration, pneumonia, jaundice or septicaemia. A nursery stay of more than 3 days was taken as an indicator of neonatal morbidity found in 7 (23.33%) cases. There were 3 (10%) neonatal deaths.

TABLE IV
One and Five Minute Apgar Scores

	Apgar Score below 7		Apgar Score above 7	
	No. of cases	%	No. of cases	%
One minute score	12	40	18	60
Five minute score	5	16.67	25	83.33

Discussion

Twenty cases (66.67%) of a total of 30 showed baseline FHR to be normocardiac. Uncomplicated normocardia was present in 6 (20%) cases with good neonatal outcome. However, a complicated normocardia was found in 14 cases (46.67%). Low Apgar Scores were found in 7 of these 14 cases, where prolonged nursery stay was necessary for 2 babies and death occurred in 1.

Mild bradycardia with good variability and no decelerations is generally not due to asphyxia and is not a cause for alarm (Gross *et al*, 1979). However, bradycardia complicated with decreased variability would indicate a severely asphyxiated newborn as was seen in 2 babies out of 4 in this group and 1 of these 2 babies died.

Tachycardia alongwith other changes in FHR was found in 6 (20%) cases. The Apgar Scores at 1 and 5 minutes were lowered in 3 (50%) cases. In 4 (66.67%) neonates the nursery stay was prolonged and 1 (16.67%) neonates the nursery stay was prolonged and 1 (16.67%) neonatal death occurred. Fetal tachycardia was a warning sign and along with other FHR changes could alert the clinician to a state of fetal distress.

Variability in terms of amplitude and frequency was analysed. A silent amplitude pattern was present in 1 case where the neonate had poor Apgar Score and expired 8 hours after birth. This pattern was accompanied by bradycardia and periodic prolonged deceleration. Like Krebs *et al* (1979) we also found that silent amplitude was associated with other abnormalities and was the most ominous of the FHR patterns.

A narrowed undulatory (NU) pattern was present in 15 (50%) cases with no other FHR changes a NU pattern alone was associated with low Apgar Scores at 1 minute in 3 (60%) neonates. However, when the NU pattern was associated with other complications, as was seen in 10 (33.33%) cases, the Apgar Score were low at 1 minute and 5 minute in 5 (50%) cases. Longer nursery stay was necessary for 1 neonate and another neonate expired. When the baseline variability of FHR is decreased the neonatal outcome is adversely affected and the outcome is further worsened when there are other changes in the FHR pattern.

An uncomplicated undulatory baseline amplitude (10-25 b.p.m.) present in 6 (20%) cases was associated with a good neonatal outcome. However, when accompanied by decelerations present in 7 (23.33%) cases the undulatory pattern affected the neonatal outcome adversely.

A saltatory amplitude (>25 b.p.m.) was present in 1 case with accompanying variable decelerations. This infant had a nuchal cord which was noticed at caesarean section. A saltatory amplitude has been reported to precede variable decelerations giving a warning of fetal distress

due to cord complications (Hammacher *et al*, 1968).

Frequency of FHR pattern was decreased in 20 (66.67%) cases. It was accompanied by a decreased amplitude in 10 (33.33%) patients. A decrease in frequency alone is not so significant as it is when associated with a decrease in amplitude. In the latter group there were low Apgar Scores at 1 and 5 minutes.

Sporadic accelerations during labour probably reflect fetal well-being. They were present in 8 (26.67%) cases and did not much influence the neonatal outcome. Periodic accelerations were recorded in 10 (33.33%) cases. The Apgar Score was lowered at 1 minute in 4 (40%) cases and there were 2 (20%) neonatal deaths. Periodic accelerations have been interpreted as indications of hypoxaemia and foretell neonatal complications.

Decelerations were recorded in 10 (63.33%) cases. Sporadic decelerations suggestive of an asphyxiated infant were found to be the case with 1 neonate who had low Apgar Scores and a prolonged nursery stay.

Early decelerations are benign FHR alterations. They are due to a vagal reflex stimulated by pressure from within the maternal pelvis against the fetal head and do not influence the neonatal outcome significantly.

Late decelerations are indicators of fetal compromise. Found in 4 (13.33%) cases they did influence neonatal outcome by decreased Apgar Score in 1 case and 1 neonatal death.

Variable decelerations suggestive of cord complications were seen in 4 (13.33%) cases. There was not a significant influence on neonatal outcome. However, severe variable decelerations associated with other FHR changes may be indicative of progressive fetal hypoxia.

Combined decelerations, a mixture of late and variable decelerations, were recorded in 6 (20%) cases. Here the Apgar Scores and neonatal outcome were worse as compared with each type of deceleration alone. This was evidence by low Apgar Scores at 1 minute and 5 minutes in 2 (33.33%) cases and prolonged Nursery stay in 3 (50%) cases.

Prolonged deceleration pattern was present in 1 (3.33%) case. The accompanying bradycardia and silent amplitude pattern individually are indicators of poor prognosis. In this case, all these changes in FHR pattern prove to be the preterminal events.

From the above data, we found that no single criterion should be considered alone as an indicator of fetal prognosis. Uncomplicated normocardia was associated with a good neonatal outcome. However, complicated normocardia, bradycardia and tachycardia do adversely affect the neonatal outcome. A decrease in variability was associate with low Apgar Scores and increased neonatal morbidity and mortality, specially when associated with changes in other variablels. Decelerations of late and variable type influenced neonatal outcome and when they were combined a further worsening of the prognosis was noted. Prolonged decelerations suggested a severely asphyxiated fetus.

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