INTRAPARTUM FOETAL MONITORING IN HIGH RISK PREGNANCY

by

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Every uterine contraction during labour is an asphyxial stress to the foetus, which is well tolerated by a normal healthy foetus with good placental reserve, but a compromised foetus with limited placental reserve may suffer cerebral anoxia resulting in death or later neurological deficits. Therefore, to prevent prolonged intrauterine asphyxia and its sequelae, it is extremely important to detect the early subtle signs of foetal distress which are the changes in the foetal heart rate pattern during and immediately after the uterine contractions. The cardiotocograph with which a simultaneous record of the foetal heart rate and uterine contractions is made, provides an accurate objective evidence that fetal condition is good and that the tolerance for labour is normal; whereas intermittent auscultation with the traditional fetoscope and stethoscope detects the foetal heart rate changes only in between uterine contractions, a sign of foetal distress which is rather late. A normal tracing during labour will ensure the obstetrician that a normal labour will occur and unnecessary caesarean section for intolerance to labour will be avoided. Ideally all patients should be monitored in labour, but due to lack of resources it has been possible to monitor only selected high risk patients.

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Material and Methods

One hundred and sixty-five high risk pregnancy patients delivered at the All-India Institute of Medical Sciences Hospital were monitored during labour. The indications for monitoring the patients are shown in Table 1. The monitor used was a Hewlett Packard cardiotocograph

TABLE I
Indications

Indications	No. of patients
Meconium discharge	41
Foetal tachycardia	7
Foetal bradycardia	4
Irregular foetal heart sounds	4
Syntocinon drip	5
Pre-eclamptic toxaemia	38
Postdated pregnancy	22
Intrauterine growth retardation	13
Diabetes mellitus	7
Bad obstetric history	9
Hypertension	5
Antepartum haemorrhage	4
Diminished foetal movements	2
Less liquor	2
Elderly primigravida	2
Total	165

Model 8021B, which recorded a continuous simultaneous tracing of the foetal heart rate and the uterine pressures on a moving strip of paper. The speed of the paper strip was 1 cm/minute. Both for the foetal heart rate and uterine pressure external abdominal transducers were used, the one for the former was positioned at the site where the foetal heart sound was best heard and the one for the latter over the fundus of the uterus. The foetal monitoring was discontinued when the patient was transferred to the delivery room.

Interpretation of the foetal heart rate patterns (FHR) was done according to the criteria of Hon (1963) as described earlier (Sinha *et al* 1978). The base line foetal heart rate, beat to beat variability and its periodic changes were studied. Foetal well being was judged by the Apgar score at 1 minute and 5 minutes.

Results

Tables II and III show the different fetal heart rate patterns obtained in the present study.

The mode of delivery in patients with different fetal heart rate patterns is seen in Table IV. In patients where prolonged variable decelerations, late decelerations of any magnitude, or zero variability pattern were seen, corrective measures like postural change, oxygen and hypertonic glucose were instituted. If these failed to alleviate the pattern in 15 to 20 minutes, labour was terminated by caesarean section or forceps application depending upon the stage of labour at which the patient was. It is apparent that the caesarean section rate in patients with the above mentioned patterns is very high as compared to others. Isolated tachycardia and bradycardia, if not associated with changes in baseline variability, were not taken as indications for immediate intervention.

TABLE II

Baseline Foetal Heart Rate Patterns

Baseline foetal heart rate pattern	No. of patients
Rate	
Normal rate	152
Tachycardia	9
Bradycardia	4
Beat to Beat Variability	
0 variability	1
+1 variability	6
+2 variability	71
+3 variability	62
+4 variability	25

TABLE III

Periodic Foetal Heart Rate Pattern

Periodic fetal heart rate pattern	No. of patients
No change	106
Early deceleration	13
Late deceleration	13
Transient variable deceleration	26
Prolonged variable deceleration	7

The correlation of meconium and foetal heart rate pattern to the Apgar score is seen in Table V. The foetal outcome was the best in the group showing a normal foetal heart rate pattern and no meconium discharge, and worst in the group having an abnormal foetal heart rate pattern with meconium discharge. There was no statistical significance in the difference between groups I and II and groups III and IV.

The relationship of the baseline foetal heart rate patterns and their periodic changes to the Apgar score is outlined in Table VI. It is apparent that prolonged variable deceleration, late deceleration and zero variability are ominous signs of foetal compromise.

TABLE IV

Mode of Delivery

Fetal heart pattern	No. of patients	Normal delivery	Forcepts of vacuum extraction	LSCS
Normal	65	46	13	6
Tachycardia	9	7	0	2
Bradycardia	4	3	0	1
Early deceleration	13	12	0	1
Transient variable deceleration	26	24	0	2
Prolonged variable deceleration	7	0	2	5
Late deceleration	13	3	0	10
0 variability	1	0	0	1*
+1 variability	6	5	0	1**
+4 variability	25	23	0	2***

* Patient had zero variability and late deceleration.
** Patient had +1 variability and bradycardia.
*** Patient had +4 variability and transient variable deceleration.

TABLE V

Correlation of Fetal Heart Rate (FHR) Pattern and Meconium to Apgar Score

	No. of patients	Apgar Score					
		1 Minute			5 Minutes		
		0-3	4-6	7-10	0-3	4-6	7-10
I. Normal FHR +No Meconium	96	0	0	96 (100%)	0	0	96 (100%)
II. Normal FHR +Meconium	49	2	4	43 (87.8%)	1	1	47 (95.9%)
III. Abnormal FHR +No Meconium	14	5	8	1 (7.1%)	1	1	12 (85.7%)
IV. Abnormal FHR +Meconium	6	4	2	0 (0%)	4	0	2 (33.3%)

Statistical difference between Apgar score at 5 minutes.
Group I & II—Not significant.
Group I & III—Significant P 0.01.
Group I & IV—Highly significant P 0.001.
Group II & IV—Highly significant P 0.001.
Group III & IV—Not significant.

TABLE VI

Relationship of Fetal Heart Rate Pattern to Apgar Score

Fetal Heart Rate Pattern	No. of patients	Apgar Score					
		1 Minute			5 Minutes		
		0-3	4-6	7-10	0-3	4-6	7-10
Normal	65	0	2	63	0	0	65
Tachycardia	9	0	1	8	0	0	9
Bradycardia	4	0	1	3	0	0	4
Early deceleration	13	0	0	13	0	0	13
Transient variable deceleration	26	2	0	24	1	1	24
Prolonged variable deceleration	7	2	4	1	1	0	6
Late deceleration	13	7	6	0	4	1	8
0 Variability*	1	1	0	0	1	0	0
+1 Variability**	6	0	1	5	0	0	6
+4 Variability***	25	0	0	25	0	0	25

* 1 Patient had late deceleration.

** 1 Patient had bradycardia.

*** 2 Patients had transient variable deceleration.

Discussion

Late deceleration, prolonged variable deceleration and zero variability have been accepted as evidence of foetal distress (Shenker *et al* 1973; Paul and Hon 1974; Cibils 1976, 1976). All these ominous patterns have been included under abnormal foetal heart rate patterns. The high rate of abnormal foetal heart rate patterns (12%) in the present study is due to the selection of only high risk pregnancy patients for foetal monitoring and does not reflect the incidence in a normal obstetric population.

Zero variability is the most serious sign of foetal distress (Shenker *et al* 1973; Cibils 1975 and 1976). In the present study only 1 patient had zero variability and that baby was very depressed at birth, the Apgar score at 5 minutes being below 4. In patients having late deceleration pattern with or without meconium discharge, 38.4% of the babies were born depressed, their Apgar score at 5 minutes being below 7. Shenker *et al* 1973, found 32% of the babies depressed in mothers showing late deceleration pattern alone and 40% depressed in mothers having late deceleration pattern with meconium discharge. Cibils (1975 and 1976) in his series found 33 and 35% of the infants depressed at 5 minutes when late deceleration pattern was present. Prolonged variable deceleration is the least serious of the signs for foetal distress, only 14.1% of the babies being depressed at 5 minutes.

In the present series, 55 of the patients monitored had meconium discharge. Only 6 of these showed abnormal foetal heart rate pattern (11% app.). This compares with the findings of Miller *et al* (1975). All these 6 patients were delivered by caesarean section. Four babies (66% app.) had Apgar score below 7 at

5 mins. This is a slightly high figure as compared to that of Shenker *et al* (1973) who found 40% of the babies depressed when meconium discharge was associated with abnormal FHR. Forty-nine patients with meconium stained liquor but with normal foetal heart pattern were allowed vaginal delivery. Forty-seven (95.9%) new born babies were in excellent health, only 2 babies had Apgar score below 7 at 5 minutes. This difference is statistically highly significant (P .001). One of the 2 infants born depressed had congenital heart disease and the other had aspirated meconium. The generally good outcome of babies with meconium stained amniotic fluid and a normal foetal heart pattern, puts the old concept of the significance of meconium discharge as a definite sign of foetal distress, in doubt. According to Miller *et al* (1975) and Steer and Fenton (1975) the presence of meconium in the amniotic fluid without signs of foetal asphyxia (i.e. abnormal foetal heart rate pattern and foetal acidosis) is not a sign of foetal distress and need not be an indication for active intervention. However, the occurrence of foetal distress in patients having meconium discharge enhances the potential for meconium aspiration and a poor neonatal outcome as compared to the neonatal outcome in patients with abnormal foetal heart rate pattern alone. The presence of meconium should serve to alert the physician to a high risk foetal condition, and it should be a definite indication for continuous foetal monitoring during labour.

More work and long term studies are, however, necessary to confirm the beneficial effects of continuous foetal monitoring in improving long term foetal health and survival.

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