INTRAPARTUM ELECTRONIC FOETAL HEART RATE MONITORING†

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Until recently, intermittent auscultation of the foetal heart rate and observation of meconium in the amniotic fluid were the only parameters for detecting and evaluating foetal distress. The usual technique is to count foetal heart beats for 1 minute every 15 minutes in-between the contractions which is not very accurate. Continuous beat-by-beat surveillance of the foetal heart rate and uterine contractions provides reliable, reproducible, and predictive information about the condition of the foetus during labour. This also provides an attentive supervision of labour which forms a major contribution of monitoring to foetal health.

Deceleration refers to the periodic decrease in foetal heart rate associated with uterine contractions. Three types of decelerations are defined based on the shape of the wave and the timing relative to the uterine contraction.

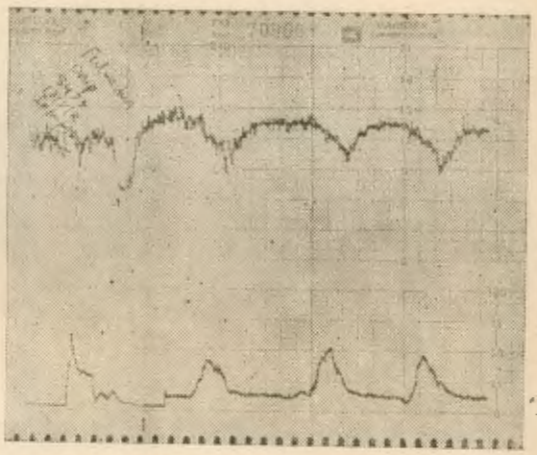

Fig.

Early deceleration is slowing of the cardiac rate coincident with a uterine contraction and return to normal as the intrauterine pressure abates. It is relatively innocuous pattern due to pressure on the foetal head.

Variable deceleration bears no constant relation to the time of contraction and is variable in onset, duration and depth. It is attributed to compression of the umbilical cord and is less ominous than late deceleration. A change in posture should show an improvement in this graph.

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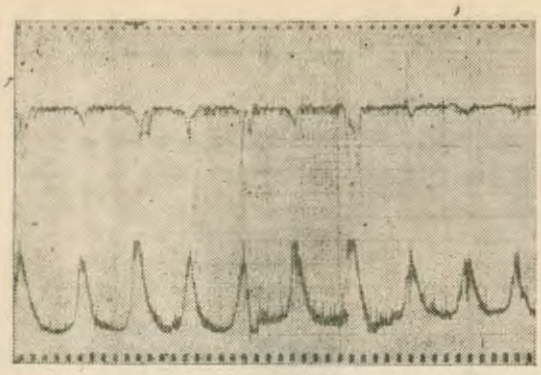

Fig. 2

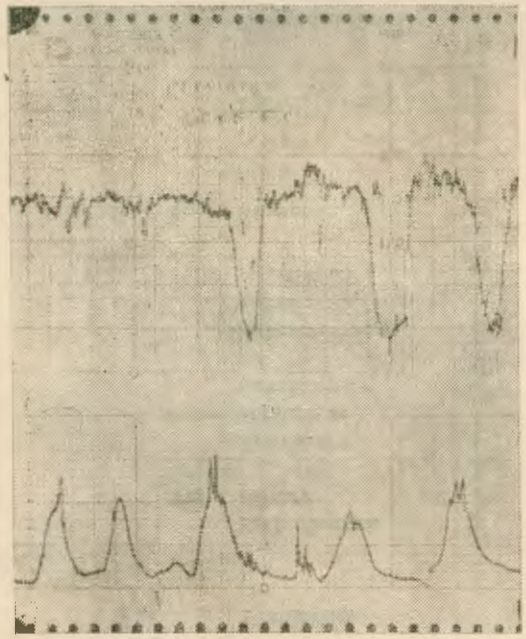

Fig. 3

Late deceleration has a delayed onset relative to onset of uterine contractions has a lag period of over 20-25 seconds between the peak of the contraction and the nadir of the deceleration. It is due to utero-placental insufficiency and hypoxia. In these cases supine position is avoided and oxygen is administered. An artificial rupture of membranes to relieve high intrauterine pressure and intravenous fluids together with correction of maternal hypotension may help. If no improvement is seen, delivery should be effected immediately.

Intrapartum monitoring has been applied to selected cases to judge the degree of foetal distress, with each uterine contraction, by assessment of the graphic record.

Material and Method

A total of 137 high-risk cases were monitored at the Mowrosjee Wadia Maternity Hospital, Bombay from July 1979 to April 1981. Observations as regards the baseline, variability, accelerations and decelerations were made and these changes were correlated with the presence of uterine contractions. None of these patients were subjected to internal monitoring. Foetal heart rate was recorded externally by an ultrasound array transducer and uterine contractions by the external tocotransducer.

Results

TABLE I

Indications of Intrapartum Foetal Heart Rate Monitoring and Number of Cases Monitored

Indications	No. of cases	Per cent
Foetal distress	71	51.83
Postdatism	20	14.60
Bad obstetric history	11	8.03
Premature rupture of membranes	8	5.84
Intrauterine growth retardation	7	5.11
Toxaemia	5	3.65
Elderly primigravida	5	3.65
Decreased foetal movements	3	2.19
Diabetes mellitus	3	2.19
Previous caesarean section	2	1.46
Renal hypertension	1	0.73
Anaemia	1	0.73

This depicts the various indications and the number of cases monitored.

TABLE II

Distribution of Cases According to the Type of Deceleration

	No. of cases	Per cent
Early deceleration	6	4.6
Variable deceleration	40	29.1
Late deceleration	19	13.8
No foetal cardiac deceleration	72	52.3

This enumerates the distribution of cases according to the type of decelerations.

Seventy-two (52.5%) of these patients had no deceleration of the foetal heart rate, whilst 65 had deceleration, 19 had late deceleration, 40 had variable deceleration and 6 had early deceleration.

This table depicts the distribution of the indications and the type of decelerations.

This depicts the mode of delivery according to the indications.

Of the 19 that had late deceleration, 17 underwent operative interference and 2 delivered normally. They were both cases of I.U.G.R. who progressed well. Apgar score was 5 and 7 at 1 minute, and 8 and 9 at 5 minutes. Of the 17 that required lower segment caesarean section, 15 showed an Apgar of more than 8 at 1 minute, two babies showed an Apgar of 6 and 5 at 1 minute.

Of the 40 patients with variable deceleration, change in posture to left lateral

TABLE III

Types of Deceleration in the Various Indications

		Foetal distress	Postdatism	Bad obstetric history	Premature rupture of membranes	Intra-uterine growth retardation	Toxaemia	Elderly primi	Decreased foetal movements	Diabetes mellitus	Previous caesarean section	Renal hypertension	Anaemia
Early deceleration	6	0	0	0	0	0	0	0	0	0	0	0	0
Variable deceleration	31	1	3	3	1	1	0	1	1	0	1	0	0
Late deceleration	7	3	1	1	1	2	2	1	1	0	1	0	0
No deceleration	27	16	7	7	6	4	3	3	1	3	0	1	1
Total	71	20	11	8	7	5	3	5	3	3	2	1	1

TABLE IV
Mode of Delivery According to the Indications

Indications	Normal vaginal	Forceps	Caesarean section	Total
Foetal distress	29	14	28	71
Postdatism	12	1	7	20
Bad obstetric history	7	0	4	11
Premature rupture of membranes	4	2	2	8
Intrauterine growth retardation	4	0	3	7
Toxaemia	3	0	2	5
Elderly primi	3	1	1	5
Diminished foetal movements	1	1	0	3
Diabetes mellitus	3	0	0	3
Previous caesarean	0	1	1	2
Renal hypertension	1	0	0	1
Anaemia	1	0	0	1
Total	68	20	48	137
Per cent	51.4	14.6	35	

position and oxygen administration helped in 20 patients and they delivered normally or assisted by forceps. In 20 patients the line of treatment did not work. As they were primigravidae in early labour with persistent variable deceleration, lower segment caesarean section was done. Thirty-four had Apgar score more than 8 at 1 minute and 6 had Apgar score less than 8 at 1 minute, out of which 2 were stillborn. One had severe variable deceleration and a stillborn child was removed at caesarean section. Another was a case of threatened rupture of the uterus and the uterus ruptured before the operation was performed. Both these stillbirths could have been avoided if monitoring had been done at an earlier stage.

It is thus seen that there was a higher incidence of caesarean section in patients who showed late and variable decelerations and a higher percentage of patients who showed no deceleration had a normal vaginal delivery.

Conclusion

In conclusion, it is seen that employment of continuous cardiotocometry obtains information from the foetal cardiac response to the uterine contractions and from the foetal cardiac behaviour in-between the contractions. The bedside attention of doctors and nurses to the patients is also found to be increased. Electronic foetal monitoring thus helps us to predict hypoxia before it has a significant effect on the foetus.