

INTRAPARTUM FETAL HEART RATE MONITORING IN LOW RISK PREGNANCY

by

REETA ABBOTT*

Introduction

After introduction of intrapartum fetal heart rate monitoring, reduced perinatal mortality and improved neonatal outcome have been reported by Paul (1972) and Quilligan and Collea (1976). The role of intrapartum fetal heart monitoring (IFHRM) and its importance has revealed interest in recent years, but reduced perinatal mortality is due to monitoring only is controversial, as there are lot of other contributory factors which help to reduce perinatal mortality as example antenatal care, maternal age and parity, diet etc. There are lot of studies on importance on IFHRM in high-risk pregnancies but yet very little work has been done on its importance in low-risk pregnancies. The present study was done to evaluate its importance in low-risk cases and their benefits and side effects. The major problem arises in classification of low-risk pregnancies, although Hobel *et al* (1973) indicated that some of the low-risk patients were actually at high-risk and 20% of low-risk patients developed complications during labour inspite of careful selection and came under the category of high-risk pregnancies.

Material and Method

Two hundred women of low-risk pregnancy including 62 primiparas participat-

ed in this analysis. The criteria of low-risk was given to the patients who had no complications in present and past deliveries, no history of stillbirth and had all previous deliveries after 38 weeks of pregnancy. All patients had antenatal fetal heart rate monitoring during their visit to antenatal clinic. Internal monitoring was done in delivery room when the patients were admitted in labour, Corometric FM III and FM II2 was used and paper speed was 3 cm/min. (Fig. 1). Except local anaesthesia used for episiotomy, no other anaesthetic drug was used. In 50% of cases induction of labour was done by inserting laminaria tent in the cervical canal and followed by prostaglandin vaginal tablets and intravenous preparations. The average duration of recording was minimum 15 min to maximum 24 hours. After admission of the patients to the labour room monitoring was started at 4-5 cms dilatation of cervical canal by performing an artificial amniotomy. A tocodynamometer was applied to the fundus to gauge the uterine and fetal activity. Fetal scalp electrode was placed against the presenting part by turning the cork screw attached to the wires twice in clock wise direction and after its fixation both green and red wires were attached to the leg plate placed on the mothers thigh as shown in Figure 2. This leg plate was attached to the monitor at proper place.

The monitoring was discontinued after the delivery of head. Only singleton preg-

*Dept. of Obstetrics and Gynaecology, Hiro-saki Medical School, Japan.

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nancies of more than 38 weeks of gestation were included in this study. Fetal heart rate changes were interpreted according to the criteria of Hammacher *et al* (1968) and Hon (1974). Apgar score at 1 and 5 min of birth were noted and pH analysis was done in umbilical artery and vein by ABL-2 Radiometer. All fetal heart rate monitoring was analysed by author and confirmed by experienced teacher and in cases of abnormal heart rate pattern decision of mode of delivery was taken by experienced teacher of the same institution.

Results

Two hundred cases of singleton normal pregnancy delivered after 38 weeks of gestation were included in this study. On interpretation of data's they were classified under following headings.

Base line fetal heart rate

TABLE I
Intrapartum Fetal Heart Rate Monitoring Findings

Fetal heart rate pattern	No. of cases	Percentage
1. Acceleration	40	20%
2. Tachycardia	2	1%
3. Persistent bradycardia	30	15%
4. Early deceleration	34	17%
5. Variable deceleration	80	40%
6. Late deceleration	10	5%
7. Unsatisfactory	4	2%

The number of beats per minute (BPM) maintained over a 10 minutes interval and is the rate return to the base line between contractions. According to Hon (1974) (a) Normocardia- 120-160 bpm, (b) tachycardia- 160-180 bpm. In this series, 2 patients had tachycardia at the time of delivery and both delivered spontaneously and 1 case had 5 and 7

apgar score at 1 and 5 min. Baby birth weight was 3208 gms and arterial blood pH was less than 7.20. (c) Bradycardia- 100 bpm is moderate and less than 100 bpm is severe degree of bradycardia. Thirty cases of this series (15%) showed bradycardia at the time of delivery and 20 cases required vaccum extraction delivery.

Acceleration

The increase of fetal heart rate of atleast 15 bpm for atleast 15 seconds above the base line fetal heart rate (FHR) is interpreted as acceleration. The accelerations are uniform or variable according to there shape, and sporadic and periodic according to their relationship with uterine contractions. Forty cases had only acceleration pattern at the time of delivery and all delivered normaly except in 1 case cesarean was done due to previous cesarean section and in that case arterial pH was less than 7.20 but apgar score and birth weight was normal.

Decelerations

The decelerations were classified according to their shape and temporal relationship with uterine contractions.

Early Deceleration

They are uniform in shape and considered to be as a benign fetal heart rate alteration and prognosis worsen only when if it is associated with other type of decelerations. It begins early in uterine contractions and have their nider at the peak of contraction and return to the base line after the end of contraction. It is due to fetal head compression. Thirty-four cases had early deceleration out of which only 2 required vaccum extraction delivery. One case progressed to late deceleration and had pH less than 7.20 but birth weight and apgar score were within normal limits. Another case had PH less

than 7.20 and apgar score of 5 and 5 at 1 and 5 min, with birth weight of 2916 gms.

Variable Decelerations

The most frequent deceleration seen was variable deceleration and it is due to cord compression. It is variable in duration and intensity related to uterine contractions. The prognosis is ominous when it is associated with loss of beat to beat variability or tachycardia. Eighty cases (40%) showed this type of deceleration out of which 2 required cesarean section, 7 vacuum extraction, 1 forceps delivery and rest had spontaneous delivery. Both cases of cesarean section had pH less than 7.20 but apgar score and birth weight were normal. One case of normal vaginal delivery had pH less than 7.20 and apgar score 5 and 7 at 1 and 5 min with normal birth weight.

Late Deceleration

The shape of deceleration is almost same as early deceleration but onset is usually seen after 30 seconds or more after completion of contractions. It is caused by fetal hypoxia provoked by inadequate exchange within placenta. Ten cases (5%) showed late deceleration in which only 1 case had vacuum extraction and another case had cesarean section. Both cases had pH less than 7.20 and apgar score 5 and 8 at 1 and 5 min and their birth weight was within normal limits.

Unsatisfactory

Due to new machinery and skilled interpreter all monitoring records were interpreted correctly except 4 cases in which monitoring time was not sufficient for interpretation of the record.

Delivery Data

One hundred and sixty cases had spontaneous vaginal delivery, vacuum extrac-

tion was done in 28 cases and 1 case required forceps delivery. Cesarean section was done in 11 cases in which 4 had late deceleration, 2 had previous cesarean, 1 was frank breech 1 case was pregnancy with myoma and 3 had cord prolapse.

Gas Analysis

On analysing the total patients gas analysis, 18 cases (9%) of arterial blood and 6 (3%) of venous blood had pH less than 7.20. Twelve cases (6%) of arterial blood and 9 (4.5%) of venous blood had pH between 7.20-7.25. One hundred and seventy (85%) cases of arterial blood and 185 (92.5%) had pH more than 7.25.

Discussion

The routine use of intrapartum fetal heart rate monitoring is a subject of controversy. Kelso *et al* (1978) compared monitored low-risk patients with the patients followed by only auscultation and observed no difference. On the other hand, they observed increased rate of cesarean section but increased cesarean section rate can not be only due to monitoring as it depends on lot of other factors.

Westergran *et al* (1980) studied large number of low-risk patients monitored during labour with excellent fetal outcome and absence of any negative implication of the method. While Hobbins *et al* (1979) felt negative attitude of FHRM because of its few advantages and more disadvantages. The most difficult problem arises in the classification of low-risk pregnancies, as 20% of them frequently converted into high-risk groups during labour.

It is well evident that late deceleration alone or in combination with other type of deceleration is the most ominous sign for fetus. In present series, 5 cases (50%) of late deceleration had operative delivery, 2 vacuum extraction and 3 cesarean section

TABLE II
Relationship of Low Apgar and Low pH With Fetal Heart Rate

FHR Pattern	Mode of Delivery	PH Artery	Vein	Apgar	
				1 min	5 min
1. V.D.	V.E.	7.10	7.20	9	10
2. L.D.	V.E.	7.14	7.14	8	10
3. E.D.	V.E.	7.19	—	7	10
4. V.D.	V.E.	7.07	7.07	8	9
5. V.D.	V.E.	—	—	5	9
6. P.B.	V.E.	7.195	—	8	9
7. V.D.	V.E.	7.09	6.97	8	9
8. P.B.	V.E.	7.19	—	8	9
9. V.D.	V.E.	7.13	—	8	9
10. E.D.-L.D.	V.E.	7.20	7.20-7.25	7	10
11. V.D.	Forceps	7.19	—	8	9
12. Tachycardia	Spont	7.11	—	7	9
13. V.D.	"	7.16	—	5	7
14. E.D.	"	7.18	—	5	5
15. L.D.	Caesarean	7.13	—	5	8
16. L.D.-V.D.	"	7.18	—	5	8
17. L.D.	"	7.18	—	5	8
18. V.D.	"	7.07	7.19	8	9
19. Acceleration	"	7.14	—	7	8
20. Acceleration	"	7.16	—	7	9

V.D. = Variable deceleration. L.D. = Late deceleration.

E.D. = Early deceleration. V.E. = Vacuum extraction.

Spont = Spontaneous delivery. P.B. = Persistent bradycardia.

Dash indicates normal pH values.

due to fetal distress. Four cases had pH less than 7.20 and 3 had apgar score 5 and 8 at 1 and 5 min. In Goddlin series (1971) also 52% of late deceleration cases required operative interference and had pH less than 7.20. Due to proper care and timely interference no perinatal mortality was observed in present series. The absence of late deceleration or the appearance of early or variable decelerations correlates well with a healthy fetus. In Kubli *et al* (1969) series, 9 late deceleration cases out of 22 (40%) had PH less than 7.20 (Table II).

It is an evident fact that if the base line FHR remains within the normal range and there are no periodic changes then there is less than 10% chance of fetus

having pH less than 7.25. The periodic changes in the form of early and variable deceleration is not ominous until it is associated with some other subsidiary factors. In present series, 7 cases (3.5%) had variable deceleration with low apgar score and low pH. Five cases were delivered by vacuum extraction while 1 was forceps delivery and cesarean was done in 1 case. All cases had pH less than 7.20 except 1 in which pH was normal but apgar score low at 1 and 5 min. Kubli *et al* (1969) observed 31 cases of variable deceleration with pH less than 7.20. During present observation only 2 cases of early deceleration had low pH (2.9%). All cases of variable deceleration were not associated with the low pH in present

series, although there was a good correlation of deceleration with pH findings and it was thought to be due to the time interval period between the occurrence of variable deceleration and examination of pH in umbilical cord blood.

This series pH analysis shows pH less than 7.20 in 18 cases (9%) of arterial and 6 (3%) of venous blood. In Saling series (1962) there were 20% of cases with pH less than 7.20. Tejani (1975) observed only 17% of cases of pH less than 7.20. In present observation due to careful monitoring the cases of fetal distress were managed timely and this may be the case of less percentage of low pH. There was no mortality in this series but Kelso *et al* (1978) observed perinatal mortality 1 in 504 and Wood *et al* (1980) observed 1 in 890 live births.

The routine use of IFHRM is already established in all developed country hospitals. It is evident that absence of late deceleration or the appearance of early and most variable decelerations correlates well with the healthy fetus and IFHRM saves all compromised fetuses as by warning timely the signals of distressed fetus. On reviewing its disadvantages Borgstedt *et al* (1975) found .3% cases of fetal scalp abscess, Cordero and Hon (1971) noticed 4.5% maternal infection, Haverkamp and Bowls (1971) found uterine perforation, Scalco (1972) noticed arterial scalp bleeding and Chan (1973) quoted scalp haematoma but all these can be avoided by careful observations and experience hands. Total operative intervention in present series was 20% while Westergren *et al* (1980) observed only 10% operative intervention for fetal distress.

The routine use of IFHRM in underdeveloped countries depends on the status of hospital, equipment cost, trained persons and skill interpreters.

Summary

Role of intrapartum fetal heart rate monitoring was observed in 200 cases of low-risk pregnancies at the time of delivery by Corometric fetal heart rate monitor. All cases of single pregnancy delivered after 38 weeks were included in this study. Monitoring was started at 4-5 cm of cervical dilation by performing artificial amniotomy. On interpretation late deceleration was found in 10 cases (5%), and 50% of these cases required operative interference. Variable deceleration was observed in 80 (40%) cases out of which 7 had low pH. No perinatal mortality was observed. The occurrence of variable and early deceleration is not an ominous sign until they are associated with other factors. The occurrence of late deceleration alone or in combination is most harmful for fetus and needs prompt delivery. The routine use of IFHRM is advised as it gives warning signals of distressed fetus and proper timely management of the fetus reduces perinatal mortality.

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See Figs. on Art Paper V