

## THE ROLE OF ANTEPARTUM FETAL HEART RATE MONITORING IN CASES OF INTRAUTERINE GROWTH RETARDATION

by

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### *Introduction*

The recognition that the fetus can be in jeopardy long before the onset of labour has had a major influence in obstetric practice over the last 10 years. A new science of perinatal medicine has evolved, accompanied by a large number of biochemical and biophysical techniques to study placental function and assess fetal well being.

Widespread interest in the syndrome of fetal growth retardation was stimulated by the work of Lubchenco and colleagues in 1963 who described babies born with weights well below the norm for the gestational age. Gruenwald (1963) introduced the concept of chronic fetal distress and placental insufficiency.

In the management of high risk patients, Simmons (1974) has recently shown

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that cardiotocography carried out in antenatal patients can be invaluable in deciding the precise timing of delivery. In the present study, antepartum fetal heart rate monitoring was used to assess the risk of death for the growth retarded fetus.

### *Material and Method*

A non-stress test (NST) was performed on 118 patients who showed clinical evidence of intra-uterine growth retardation. Only those patients who were sure of their last menstrual period and previous menstrual pattern were chosen for this study. The total number of NSTs performed were 211, out of which 133 were repeat NSTs performed on 43 patients. The remaining 75 patients had only a single NST performed on them.

A Corometrics Model 112 Fetal Monitor was used with a paper speed of 1 cm/min. Fetal heart rate was recorded using the Doppler Array Transducer. The patient was given a special event marker and was asked to mark fetal movements. Fetal cardiac acceleration of at least 15 beats per minute lasting for at least 15 seconds with fetal movements was taken to denote a reactive pattern.

Acceleration of less than 15 beats per minute or no accelerations with fetal movements denotes a non-reactive pattern.

Accelerations of 10 to 15 beats per minute lasting for 10 to 15 seconds with fetal movements were grouped as borderline patterns.

Variability of less than 3 beats per minute in the baseline fetal heart rate was reported as a silent pattern.

Unreadable fetal heart rate data or no fetal movements, even on fetal stimulation, was taken as an unsatisfactory pattern.

### Results

The degree of growth retardation was determined clinically by noting the disparity in uterine size as compared with the average expected uterine size for that period of gestation.

Table I shows the distribution of the

TABLE I

Disparity in weeks of gestation	Percentage of total
3-4 weeks	21.0
4-6 weeks	54.0
>6 weeks	25.0

patients according to disparity in weeks of gestation.

Table II depicts associated conditions in 55 patients.

TABLE II

Associated conditions	No. of patients
Pre-eclamptic toxæmia	27
Postdatism	12
Bad Obstetric History	9
Diabetes mellitus	2
Heart disease	1
Bronchial asthma	1
Bad obstetric history + Postdatism	2
Bad obstetric history + toxæmia	1

### Previous Obstetric History

There was 1 patient who gave a history of congenital malformation in a previous child.

There were 2 patients who gave a history of IUGR in a previous child. One was a case of full term still birth with IUGR. The other was a full term normal delivery. The baby died in neonatal period due to respiratory distress. The patterns obtained by monitoring 118 patients were classified as shown in Table III.

TABLE III

Pattern	Tests	Patients
Reactive	140	84
Non-reactive	60	23
Borderline	3	3
Unsatisfactory	5	5
Silent	3	3
Total	211	118

### Mode of Management

(A) Reactive Group: There were 84 patients who revealed a Reactive NST. In these, the NST was repeated every week. One patient underwent an elective LSCS for an associated obstetric indication. The remaining 83 patients were monitored intrapartum when they went into spontaneous labour. Eighty-one of these had no fetal cardiac deceleration. Of these, 79 delivered normally, 2 required assistance by vacuum extraction. Of the remaining 2, one revealed a persistent variable deceleration and was delivered by an outlet forceps procedure, whilst the other had a late deceleration pattern and an emergency caesarean section was performed.

(B) Non-Reactive Group: There were 23 patients who showed a non-reactive pattern. The NST was repeated within 48 hours and remaining non-

reactive in all of them. These patients were divided into two groups, viz. (i) Those who were close to term—7 patients, and (ii) Those who were not close to term—16 patients.

(i) Of the 7 patients who were close to term, 3 underwent an elective LSCS for associated obstetric indications. In the remaining 4 patients, an oxytocin challenge test (OCT) was performed. One patient showed a positive OCT and underwent an elective LSCS. The other 3 patients showed a negative, suspicious and unsatisfactory OCT each. All of them went into spontaneous labour. Intrapartum monitoring in these patients revealed no fetal cardiac deceleration and all delivered vaginally.

(ii) In the 16 patients who were not close to term, the treatment of IUGR was continued. Of these, 6 patients became reactive under treatment. Intrapartum monitoring was done in these patients, when they went into spontaneous labour at term. Three of them showed no fetal cardiac deceleration and delivered normally. The remaining 3 showed a late fetal cardiac deceleration and an emergency LSCS was performed on them.

Ten patients remained persistently non-reactive in spite of vigorous treatment. All of them were induced at term and intrapartum monitoring was done. Of these, 2 revealed no fetal cardiac deceleration and delivered normally. The other 8 showed a late fetal cardiac deceleration and underwent emergency caesarean section for fetal distress.

Three patients showed borderline pattern. Repeat NST in these patients showed a reactive pattern and all delivered vaginally.

There were 5 patients who showed an

unsatisfactory pattern. Repeat NST performed on these patients showed a reactive pattern in 4 cases who delivered normally and non-reactive pattern in 1 case who underwent a LSCS.

In 3 patients a silent pattern was obtained. One of these delivered a still born female 2 kg with anencephaly. The second patient showed a late deceleration with Braxton Hick's contraction and underwent an emergency LSCS for fetal distress. The third patient delivered normally.

Management of these cases was based on the following principles:

(1) Judicious timing of delivery based on the results of the NST and indicators of fetal maturity.

(2) Attempting to correct the condition responsible for fetal compromise e.g. appropriate treatment of pre-eclampsia and diabetes.

(3) Endeavouring to enhance blood flow to the uterus. This was mainly done by asking the patient to lie in left lateral position as often as possible. Since the transfer of nutrients is flow dependent, it is logical that in a compromised situation, the fetus would benefit from enhanced placental perfusion. Uterine relaxants like Isoxsuprine and Nylidrin were also used routinely.

(4) Increasing the oxygenation of the maternal blood by giving oxygen by mask to the patient for half hour periods at least six times a day.

By using this regime, definite improvement was noticed in the fundal height in most patients.

Table IV shows the baby weights as recorded at birth.

TABLE IV

Birth weight of baby	Patients	Per cent	Values in normal patients (Control group)
<2 kg	28	23.7	8
2-2.5 kg	58	49.1	34
>2.5 kg	32	27.2	58
Total	118	100.0	100

The results of the Reactive and Non-reactive group were compared as shown in Table V.

TABLE V

	Reactive	Non-reactive
Interference during delivery	2.4%	65%
Fetal distress	2.4%	50%

The perinatal mortality in our series was 2.5% and all were in the non-reactive group.

The mode of delivery in the 118 patients is shown in Table VI.

TABLE VI

Mode of delivery	Patients	Percentage of total
Normal vaginal delivery	96	81.36
LSCS	19	16.10
Vacuum	2	1.69
Forceps	1	0.85

3

The Apgar scores recorded 5 minutes after birth are shown in Table VII.

TABLE VII

Apgar score	Incidence
7 or <7	19%
>7	81%

#### Conclusion

In order to salvage the growth retarded fetus and to provide it with the best chance for a productive life, it is essential to identify the patient at risk and clinically recognize early suboptimal fetal growth.

With recent advances in perinatal medicine, one can assess the well being of the fetus and serially monitor its growth. In many cases, therapeutic measures can be utilised to enhance growth in a compromised situation.

By using the non-stress test, intra-uterine hypoxia is diagnosed early and steps taken to remedy it. Those cases who showed an improvement with treatment correlated with good outcome.

Thus a decision was made regarding the optimal time of delivery by seeing the changes in the NST pattern. In this way,

it was possible to salvage even severely affected babies to some extent, by timely interference.

Hence serial NSTs are undoubtedly of value in predicting fetal outcome. It is to be hoped that with increased use of this technique, we shall be able in the future, to reduce the perinatal mortality and morbidity in these cases to a minimum.

References

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3. Simmons, S. C.: *In Clinics in Obstet. Gynaec.*, Ed. Beard, R. W., 1: 217, 1974.

The above series recorded 3 babies who had not been shown in Table VII.

TABLE VI

Group	Number	Survived	Deceased
Group I	10	7	3
Group II	10	8	2

Conclusion

In order to salvage the growth retarded fetus and to provide it with the best chance for a productive life it is essential to identify the patient at risk and ultimately to salvage early substantial fetal growth.

With recent advances in perinatal medicine one can assess the fetal status of the fetus and certain monitor the growth. In many cases, however, the fetus can be difficult to salvage, hence a comprehensive approach.

By using the non-stress test, certain aspects of the fetal status can be taken to monitor it. These cases who showed an improvement with treatment correlated with good outcome.

This decision was made regarding the optimal time of delivery by using the changes in the NST pattern. In this way

The results of the present and non-stress group were compared as shown in Table V.

TABLE V

Group	Number	Survived	Deceased
Group I	10	7	3
Group II	10	8	2

The perinatal mortality in our series was 20% and 20% in the non-stress group.

The mode of delivery in the 18 post-natal cases is shown in Table VI.

TABLE VII

Mode of delivery	Number	Survived	Deceased
Vaginal	10	7	3
Caesarean	10	8	2