ANTEPARTUM EVALUATION OF FOETUS AT RISK

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SUMMARY

Antepartum evaluation of foetus at risk among 50 high risk pregnancies was carried out by studying the foetal biophysical activities ultrasonically. The foetal condition was evaluated by the correlation of biophysical variables in term of 5 minutes apgar score and foetal distress in labour. It was observed that any single normal test is highly predictive for good foetal outcome whereas absence of variable was more difficult to interpret. The results of combined variables showed good correlation of abnormal tests with foetal outcome.

Introduction

The detection of risk or damage to foetus in utero due to varied causes is a major challenge in modern obstetric practice. Foetal heart rate until recently was the only foetal biophysical variable available with us. The advent of real time ultrasound has opened a hitherto unexplored arena for objective evaluation of multiple foetal activities i.e. foetal movements, foetal breathing movements, tone etc. alongwith the assessment of intrauterine environment such as placental status and amniotic fluid status. The present study entails the assessment of all the variables of foetal biophysical profile in high risk pregnancies.

Material and Methods

Fifty high risk pregnant patients admitted in Department of Obstetrics and Gynaecology, L.N.J.P. Hospital, New Delhi were subjected to the tests at 38 weeks of gestation.

NST was done just before or after the ultrasound examination. A score of 2 or 0 was given if the NST was reactive or non-reactive respectively. On ultrasound examination foetal gross body movements (GBM), foetal breathing movements (FBM), foetal tone (FT) and amniotic fluid volume (AFV) were observed simultaneously for a maximum period of an hour. A score of 2 was assigned to each variable if normal and score 0, if abnormal. Total score of 10 was assigned. The pregnancy outcome was measured by the 5 minute apgar score and by evidence of foetal distress in labour. The foetal condition was evaluated by the correlation of variable score with pregnancy outcome in term of 5 minute Apgar score and distress in labour.

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Observation and Discussion

The common high risk factors observed in the study were pregnancy induced hypertension alone and in combination with other high risk factors; IUGR alone or with other factors and the bad obstetric history. Manning et al (1980, 1981, 1985) have also reported PIH and IUGR as the commonest and most prevalent high risk factors in their studies.

Single foetal variable was correlated to the 5 minute Apgar score and foetal distress in labour (Table I & II).

The observations in Table I show that the incidence of low five minute Apgar score after any single normal test (false negative rate) did not vary significantly. The incidence of normal Apgar score after an abnormal test (false positive rate) was always more than 50% for any abnormal variable except in the case of Gross Body Movements (GBM) where the false positive rate was as low as 33.3%. Maximum false positive rate was observed with NST (60%).

The Table II shows the correlation of single variable with foetal distress in labour. The in-

TABLE I

Correlation of single foetal biophysical variable to 5 minute APGAR score

Variable	False Negative Rate (%)	False Positive Rate (%)
AFV	10	50
FBM	10	50
FT	10.3	54.3
NST	8.6	60
GBM	7.3	33.3

TABLE II

Single Foetal Biophysical Variable and Incidence of Foetal Distress

Variable	No.of Patients	% of total Tests	Foetal Distress No.	Foetal Distress %	P. Value
None	50	-	8	16.0	-
AFV - Normal	40	80	3	7.5	
AFV - Decreased	10	20	5	50.0	< 0.05
FBM - Present	40	80	2	5.0	
FBM - Absent	10	20	6	60.0	< 0.05
FT - Present	39	78	3	7.7	
FT - Absent	11	22	5	45.5	< 0.05
NST - Reactive	35	70	2	5.7	
NST - Non Reactive	15	30	6	40.0	< 0.05
GBM - Present	41	82	3	7.3	
GBM - Absent	9	18	5	55.6	< 0.05

cidence of foetal distress after a single normal test was significantly less than the general incidence of 16% and ranged from 5% with normal. Foetal Breathing Movements (FBM) to 9.7% with normal foetal tone (FT). The incidence of foetal distress observed after single abnormal test was always significantly higher than that observed after single normal test and ranged from 40% with non-reactive NST to 60% with absent FBM.

Thus when compared to studies conducted by Vintzileos et al (1983), the results of this study confirm the high predictive value of normal tests for good foetal outcome as compared to each abnormal test of foetal compromise. The absence of foetal movements was the best predictor of low five minutes Apgar score and absence of FBM was the best predictor of foetal distress in labour (60%). Individually each test showed a high positive rate and comparable false negative rates. Absence of a given variable is more difficult to interpret since it may reflect sleep wake cycles (Natale et al 1978), central nervous system depression by sedatives, narcotics and anaesthetics.

The cyclic variation in the frequency of foetal biophysical activities e.g. FBM and GBM have been observed. Periodicity in heart rate variability has also been observed in normal foetuses.

The results of combined variables were interpreted (Table III) and it showed that as the biophysical profile score decreased the incidence of low five minute Apgar score and foetal distress in labour increased. With different variable combinations it showed a decreasing trend with increasing variable scoring. Thus the observations

TABLE III

CORRELATION OF COMBINED BIOPHYSICAL VARIABLES AND THE INCIDENCE OF LOW FIVE MINUTE APGAR SCORE

Variable Combination	Incidence of low five minute Apgar Score (< >) Variable Score											
	0		2		4		6		8		10	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
NST + GBM	6	83.3	12	16.7	32	6.2						
NST + FBM	6	50.0	13	38.5	31	3.2						
FBM + GBM	5	80.0	9	33.3	36	5.6						
FBM + GBM + NST	4	75.0	5	40.0	12	16.7	29	6.9				
GBM + FBM + FT	4	75.0	5	60.0	8	12.5	33	6.1				
GBM + FBM + FT + NST	4	75.0	4	50.0	3	33.3	11	18.2	28	3.6		
FBM + GBM + FT + AFV	2	100	4	75.0	4	50.0	12	8.3	28	3.6		
FBM+GBM+FT +AFV+NST	2	100	3	66.7	4	50.0	3	33.3	15	6.66	23	4.3

*Variables coded as 2 if normal and 0 if abnormal

*No. of patients with test combination

show an inverse relationship between the biophysical score and incidence of low five minute Apgar score and foetal distress in labour.

On combining the normal results, there was not any change in false negative rate until at least five normal tests were present, when it fell significantly as compared to single normal test or combination of normal tests. The false positive rate fell significantly when two abnormal tests were present and was least when all five variables were abnormal. The incidence of abnormal outcome increased as more abnormal variables were present. This concept is of particular value in antepartum foetal assessment since it allows for estimation of gradation of foetal condition and perhaps a basis for determining the direction and degree of change in foetal status.

Biophysical activities of the foetus are initiated and regulated by integrated complex mechanisms in the foetal central nervous system. Each parameter of the biophysical profile is controlled by a particular portion of central nervous system. The presence of the biophysical activity indirectly indicates that the particular portion of central nervous system that regulates the activity, is intact and functioning. Hypoxia leads to malfunctioning of a particular portion of central nervous system. Thus normal biophysical profile indicates nonhypoxaemic corresponding portion of central nervous system and its assessment indirectly indicates the status of the foetus in utero. When asphyxia abolishes all biophysical activities, the biophysical activity that became active first are last to disappear. For example foetal tone (central cortex subcortical area) is earliest to function in intrauterine life 7.5-8.5 weeks and is last to disappear (Humphery, 1978). The foetal heart rate activity centre (porterior hypothalamus, medulla) which starts operating by end of second trimester or early third trimester is, therefore, most sensitive to hypoxia.

In antepartum foetal evaluation, the presence or absence of acute marker of foetal condition (NST, FBM, GBM and FT), therefore, should, determine the level of foetal compromise at the time of study.

Thus when a score of 10 or 8 is obtained, it is presumed that the foetus is normal and low risk for chronic hypoxia and repeat testing should be done at weekly intervals. In diabetic patients twice weekly testing should be done and when the score of 6 is obtained, chronic asphyxia should be suspected and repeat testing within 24 hours should be done; if persistent score of 6 or less is obtained or oligohydramios is suspected, it is an indication for termination of pregnancy.

With the score at 4, where again chronic asphyxia is suspected and pregnancy is more than 36 weeks, with favourable cervix, the termination should be done. If pregnancy is less than 36 weeks and L:S ratio is less than 2, repeat testing should be done in 24 hours. Indication of delivery in such condition is repeat score of 6 or less, or oligohydramnios.

Score of 2 or 0 indicates strong suspicion of chronic asphyxia. Here the time of testing should be extended to 120 minutes and indication of delivery is persistent score of 4 or less regardless of gestational age.

Thus the assurance of well being of foetus at risk can prevent early intervention and associated risks of failed induction, prematurity and increased operative deliveries. Thus more conservative management can be undertaken.

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