

EFFICACY AND CLINICAL VALUE OF THE NON-STRESS TEST

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SUMMARY

The present study includes 150 high risk antenatal patients. An antepartum electronic foetal heart rate monitoring (non stress test) was carried out in the patients after 32 weeks of gestation. Post datism 45.3% and PIH with IUGR 7.3% or without IUGR 15.3% accounted for two thirds of all high risk patients monitored. The interpretation of NST showed reactive pattern in 58% of patients while 30% of patients showed a non reactive pattern. A good perinatal outcome in the reactive group was seen as suggested by the fact that 90% of patients has a Apgar score greater than 7, whereas in the non reactive group a false positive rate of 35% is seen. Thus reactive NST represents a satisfactory indicator of foetal well being whereas as regards non reactive pattern, NST alone becomes a non specific test.

Introduction

A goal of antepartum obstetric care is antepartum surveillance to identify the foetus at risk of utero placental insufficiency. Depending on the clinical setting, one quarter to one third of all pregnancies will be identified as high risk. This high risk group can be expected to experience the majority of perinatal mortality and morbidity. Thus it is in this group of patients that modern methods of fetal surveillance are likely to find their greatest value.

Non stress test is an important tool in

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modern obstetrics in the high risk group which has come to stay. This is because as more than two thirds of fetal deaths occur before the onset of labour it would be natural to extend the principle of intrapartum fetal heart rate monitoring to the antepartum period in an effort to prevent fetal death. Before the availability of these tests the only method for attacking this problem was to prematurely deliver such fetuses based on empirical risk data. The present study thus is designed to study the efficacy and clinical value of the non stress test in the high risk group of patients.

Material and Methods

The study included 150 high risk

patients. A non stress test was performed on all these patients after 32 weeks of gestation. A corometrics 112 foetal monitor with a paper speed of 1 cm/min was used.

The patients undergoing the NST were monitored for a period of 20 minutes or until four foetal movements associated with FHR acceleration of 15 beats/min are seen. If there are no foetal movements in this 20 min. period, the foetus was stimulated by manual manipulation. Another 20 min. strip was then recorded. It is important to omit any sedatives 24 hours prior to monitoring. The NST was interpreted as reactive when there was a normal baseline variability of 6 beats per minute or greater with a FHR acceleration of 15-20 beats/minute with at least four foetal movements lasting for 20-40 seconds. The pattern was classified as non reactive when there was a decrease in FHR variability to 6 beats/min. and no acceleration with any foetal movement. Any pattern not meeting the above criteria was described as borderline reactive. All reactive NST's, were repeated within 72 hours. Non reactive and borderline NST's were repeated within 24 hours.

In patients with non reactive NST or borderline reactive NST further evaluation was done with ultrasonography, amniocentesis or estriol levels for confir-

mation of maturity prior to termination of pregnancy. To confirm that NST select out foetuses significantly distressed, it was correlated with other signs of distress such as late deceleration in IPM, low Apgar score and perinatal mortality. Specificity, sensitivity, reliability and predictability of NST have also been studied.

Results

TABLE - I
INDICATIONS FOR MONITORING

Indications	Number of Patients	Percentage
Post datism	68	45.34
Pregnancy induced hypertension	23	15.33
Decreased foetal movements	15	10.00
Bad obstetric history	12	8.00
Intrauterine growth retardation	11	7.33
Sterility	7	4.67
Medical disorders	6	4.00
Previous LSCS	5	3.34
Placenta previa	1	0.66
Others	2	1.33

Post datism 45.3% and PIH with IUGR 15.3% or without IUGR 7.3% accounted for two thirds of all high risk patients monitored. NST has a definite role to play in decreasing perinatal mortality in these groups.

TABLE - II
RESULTS OF NST MONITORING

NST Pattern	Number of Patients	Percentage
Reactive (R)	88	58.67
Borderline reactive (BR)	17	11.33
Non-reactive (NR)	45	30.00

TABLE - III
NST AND OTHER INVESTIGATIONS

NST result	Investigations not done		Investigations done					
			USG		Urinary estriol		Amniocentesis	
R (88)	49	55.68%	39	44.32%	5	5.68%	—	—
BR (17)	6	35.29%	11	64.71%	—	—	—	—
NR (45)	13	28.89%	32	71.11%	10	22.22%	6	13.33%

As seen in Table II though 58.6% of high risk patients showed a reactive pattern, 30% of patients did exhibit a non reactive pattern. This group thus requires other additional foetal assessment tests prior to intervention as seen in Table III. USG is preferred over other tests as it is a safe non-invasive test.

As shown in this table, in the reactive group a good correlation was obtained as

seen by the fact that only 14% of cases showed evidence of distress during labour. Incidence of late deceleration is high in the NR group though 38% of cases did exhibit a false positive NST.

The incidence of operative delivery in cases of patients with non reactive NST is increased (46.7%) though factors other than foetal distress may have contributed to some extent.

TABLE - IV
CORELATION BETWEEN NST AND IPM (Intrapartum Monitoring)

NST Pattern	IPM not done		No Deceleration		Early Deceleration		Late Deceleration		Variable Deceleration	
		%		%		%		%		%
R (88)	7	7.9	59	67.0	9	10.2	11	12.5	2	2.3
BR (17)	1	5.9	11	64.7	2	11.8	3	17.7	—	—
NR (45)	4	8.9	14	31.1	3	6.7	23	51.1	1	2.2

TABLE - V
CORELATION BETWEEN NST AND PREGNANCY OUTCOME

NST (Pattern)		Normal delivery	Forceps and vacuum	Elective LSCS		Emergency LSCS	
R	(88)	56 (63.6%)	13 (14.8%)	4 (4.5%)	—	15 (17.1%)	—
BR	(17)	10 (58.8%)	4 (23.5%)	—	—	3 (17.65%)	—
NR	(45)	22 (48.9%)	2 (4.5%)	7 (15.6%)	—	14 (31.12%)	—

TABLE - VI
CORRELATION BETWEEN NST AND FOETAL OUTCOME

NST Pattern	Apgar at one minute						Perinatal mortality					
	≤3	4-6		≥7		MBS	FSB		Neonatal			
		%	%	%	%	%	%	%	deaths %	%		
R (88)	1	1.1	9	10.2	78	88.6	—	—	—	—	1	1.1
BR (17)	1	5.9	4	23.5	12	70.6	—	—	—	—	—	—
NR (45)	3	6.7	26	57.8	16	35.5	1	2.2	—	—	2	4.4

The perinatal morbidity in the reactive group is low as suggested by the fact that almost 90% of the patients had an Apgar score greater than seven. Reactive NST is thus a satisfactory indicator of foetal well being. In the NR group a false positive rate of 35% is seen. Thus NST alone in this group is a non specific test.

as 10-35% (false positive). In our series false positivity was 35%.

The exclusive use of NST as a means to screen large population of high risk patients was proposed by Evertson et al 1979. They concluded that it requires less time than OCT and that properly interpreted, could have comparable predictive

TABLE - VII
DIAGNOSTIC INDICES OF FOETAL MONITORING TESTS

Indices	Formula	Present series	Study in 1981 Trudinger, Book et al, Australia
Specificity	TN/TN+FP	83%	97%
Sensitivity	TP/TP+FN	74%	70%
Predictive value of positive result	TP/TP+FP	64%	69%
Predictive value of negative results	TN/TN+FN	88%	72%

TN	True negative	TP	True positive
FN	False negative	FP	False positive

Discussion

A reactive NST is associated with favourable perinatal outcome in majority of cases. In a review of literature (Freeman, R.K. et al 1981) the number of false negative test or foetal deaths in high risk group was low, 1 in 875 patients in our series it was 1 in 88 patients. Unfortunately as regards a non reactive test, NST becomes non specific because incidence of non reactive NST in well foetus is as high

value. Many reports retrospectively analysing foetal monitoring agree to a beneficial effect which includes reaction of intrapartum still birth rate and perinatal mortality. But a few randomized controlled trials do not show electronic monitoring to be beneficial and indeed suggest that such monitoring may substantially increase LSCS rate.

Conclusion

In conclusion it can be said that the

clinician using the NST must be aware of the limitations of the test. Because of the high incidence of false positive tests, use of additional foetal assessment tests in cases of NRNST to prevent inappropriate intervention will probably go long way in further improving neonatal outcome. Also IPM reassures the obstetrician preventing unwarranted operative interference. Also a word of caution, though NST is a valuable technique, it is only an adjunct to the competent clinician and should not replace good clinical judgement.

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References

1. Evertson, L.R., Gauthier, R.J., Schriffip, B.: *Antepartum FHR testing - evaluation of NST. Am. J. Obstet. Gynec.* 133:29, 1979.
2. Freeman, R.K. and Garite, T.: *Foetal heart rate monitoring, 1981. Publishers Williams and Wilkins, 428 E, Preston Street, Baltimore, U.S.A.*