Evaluation for Role of Nonstress Test in High Risk Pregnancy.

N. Shantha • N. Shyamala • Shameem Sultana
Govt. Maternity Hospital, Afzalgung, Hyderabad.

Summary : **Antepartum fetal heart rate testing with nonstress test (NST) is an effective method of surveillance in high risk pregnancy. The sensitivity 80% and specificity 95.5% are high. A reactive NST is an excellent predictor of healthy fetus as indicated by negative predictive value of 97.72%. It is very good at predicting the fetus which does not require premature intervention. An unsatisfactory NST with abscence of fetal movement for a prolonged period 40 mts with the presence of spontaneous deceleration is an indication for poor fetal outcome with need for immediate intervention.**

Nonreactive NST signifies ominous fate for the fetus as indicated by positive predictive value of 66.6%. The study of baseline variability & spontaneous deceleration have improved the positive predictive value. Of the 9 nonreactive NST's active intervention had saved 5 babies giving a fetal salvage ratio of 55.55%. Both nonreactive & unsatisfactory NST's have to be further evaluated by repeat NST or biophysical profile.

Introduction

The development of an effective test for assessing antepartum fetus could allow intervention before fetal death or asphyxic damage & prevent delivery of premature fetuses. Antepartum fetal heart rate testing has been the primary mode of evaluating fetal status of which nonstress test is most commonly used. The choice undoubtedly stems from the numerous advantages offered by NST. It is non-invasive, less costly and less time consuming, has no contraindications, easier to interpret & can be employed in outpatient setting. Hence higher volume of patients can be screened more efficiently.

Our study was conducted to evaluate the role of NST in high risk pregnancy, to predict fetal well being and formulate a plan of action depending on the results and to study the outcome of pregnancy & to evaluate the reliability of NST in high risk pregnancy.

Material and methods

Hundred antenatal cases of high risk pregnancy of the Institute of obstetrics and gynecology, Hyderabad from September '92 to December '93 were selected for the study. The patients were evaluated by NST as early as from 33 weeks of gestation or whenever a risk factor was identified.

The instrument used was cardiotocodynamometer FM260. The test was performed for 20mts or if the patient perceived two fetal movements with acceleration of 15 beats lasting for 15 seconds the test was stopped. If no movement was recorded it was continued for another 20 mts period.

FHR tracing during NST were classified according to criteria of Evertson et al. (1979) as :

1. Reactive Pattern : Two or more accelerations in 20 mts period with movement
2. Nonreactive Pattern: With each movement none of the criteria for reactive NST were met or no acceleration and poor variability were noted.
3. Unsatisfactory :
    a. Acceleration with movement <15 beats for <15 seconds.
    b. Acceleration not associated with movement.
    c. No movement/tracing inadequate to draw definite conclusion.

Along with this, features like baseline FHR, variability and decelerations were noted down.

Reactive NST's were followed up weekly until delivery. Unsatisfactory or nonreactive NST were repeated within 24 hours for another 20 mts period or biophysical profile done depending on the circumstances. If repeat NST was reactive in this above category it was carried out weekly until delivery. If biophysical profile was >8 with good amniotic fluid volume NST was repeated weekly. If <8 or 8 with less amniotic fluid then depending on the gestational age measures were undertaken for immediate delivery. Patients were followed through delivery and postpartum period and perinatal outcome correlated with test results.

Results

The hundred antenatal patients in the study group were classified by their risk factors as shown in Table 1. The commonest indication was HDP (59%) and the next commonest was for postdates accounting for 15%. This was in contrast to Phelan's (1981) series in which 42% were postdates and 10% were diabetic patients. In the study of Rajaram et al (1992) commonest indication for testing was BOH (27%), in contrast to our study where only 5% were for BOH. The reason for HDP being commonest indication could have been due to large group of 41% constituted by primigravida in whom 26% were suffering from HDP.

Total number of 188 NST's were done with an average of 1.8 NST's per patient. Maximum no. of NST's were done at 34-35 weeks gestation of which 94.6% were reactive. The reactivity increased from 34 weeks gestation as shown in graph. 1.

Weekly NST's helped us to prolong pregnancy & prevent preterm delivery by early intervention as shown in Table II. The 36 patients in whom 105 NST's were performed unnecessary intervention could be avoided. In 3 patients by weekly NST the duration of pregnancy was prolonged by a month.

Out of 188 tracings as shown in Table III 169 tests were reactive i.e. 89.89% in comparison with Weingold's (1980) series which showed reactivity of 87.3%. The high number of unsatisfactory NST in both our series and Rajaram et al's (1992) could be due to the non use of fetal stimulation. Maximum no. of NST's viz 114 (60.63%) were done in patients with HDP in whom non reactive NSTs were 4.3%.

Fetal outcome in relation to the last NST before delivery is shown in Table IV. Of 88 reactive tests 86 babies had Apgar at 1" & 5" > 6/10 & one baby had Apgar at 1" & 5" <6/10 & one was still birth due to cord prolapse. Of

GRAPH 1

NO.OF NST'S IN RELATION TO GESTATIONAL AGE

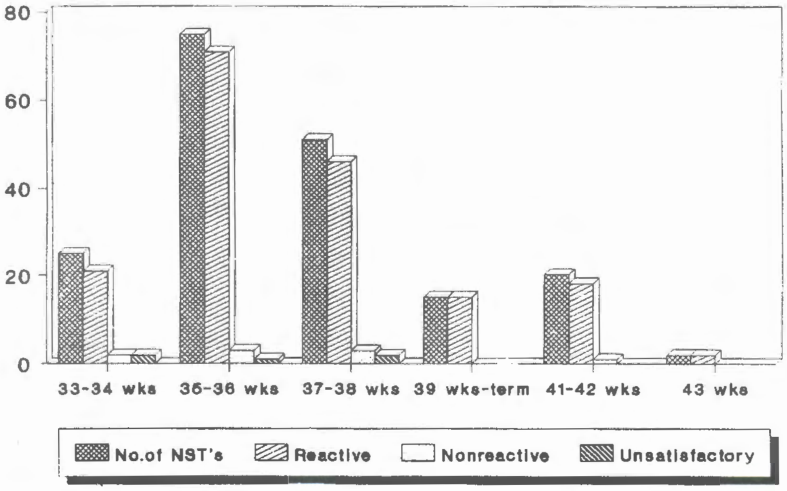

Table I:
Classification of Patients by Major Risk

Risk Category		Number	%
HDP	Mild	21	59%
	Severe (2 patients had imminent eclampsia	38	
Postdatism		15	15%
Gestational diabetes (Class 4)		9	9%
BOH		5	5%
IUGR		5	5%
Decreased fetal movements		4	4%
Elderly primi		1	1%
Rh -ve factor		2	2%

Table II:
Duration of Non Intervention based on NST.

Duration of Pregnancy	No. of Patients	No. of NST's	NST before delivery		
			R	NR	UN
8-13 days (1 wk.)	25	47	45	2	-
14-20 days (2 wks)	12	26	12	-	-
21-27 days (3 wks)	6	20	6	-	-
> 28 days	3	12	3	-	-
Total	36	105	-	-	-

Table III:
Result of NST'S

Test result	Number of patients	%
Reactive	169	89.89%
Non reactive	9	4.78%
Unsatisfactory	10	5.31%

Table IV:
Fetal outcome in relation to last NST before delivery

Test Result	No. of tests		Apgar at 1" & 5">6/10	Apgar at 1" & 5"<6/10	Still birth
	No.	%			
Reactive	88	88%	86	1	1 cord prolapse
Nonreactive	9	9%	2	5	2
Unsatisfactory	3	3%	2	-	1

Table V:
Reliability of NST

Sensitivity	80.00%
Specificity	95.60%
Positive predictive value	66.66%
Negative predictive value	98.00%
False negativity rate	2.27%
False positivity rate	33.33%
Prevalence	10.00%

the nonreactive NST (9%), 2 had still births & 5 had babies with Apgar at 1" & 5" < 6/10 & 2 had Apgar at 1" & 5" > 6/10.

The false negativity rate is 2.27%. This is in comparison with Evertson et al's (1979) 1% & Weingold et al (1980) 0.7%. In total of twelve nonreactive and unsatisfactory NST's 4 babies were not compromised giving a false positive rate of 33.33%. This is less when compared with that of Thacker & Berkelman (1986) viz 50 to 75% and of Rajaram et al (1992) viz 60%. This is because criteria used for reactivity in these were >3 accelerations in 15 mts period. The 80% sensitivity and 95.6% specificity as shown in Table V are high and comparable with those reported by Keegan et al (1979) & Rajaram et al (1992). The Negative predictive value of 97.72% is also high and comparable to Keegan et al's (1979) 98% and Devo & Wareb 95%. The Positive predictive value 66.6% in our study is comparable to Rajaram et al's (1992) 40%. This is because both baseline FHR, variability and decelerations were taken into account & study period extended to 40 mts.

Reviewing other parameters, three patients, had decreased baseline variability out of which one patient had intrauterine death & two other patients had babies with low Apgar scores. The incidence of decelerations is 3% which is similar to that observed by Bourgeois et al (1984) viz. 1.7%. Two of the three NST's that showed decelerations had abnormal outcomes 66.6% indicating that term fetuses with abnormal NST with decelerations had poor fetal outcomes and immediate intervention is needed.