

Antepartum fetal surveillance by non stress test and its correlation with perinatal outcome

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ABSTRACT

Objective : The main objective of the study was to assess the role of NST (non stress test) in perinatal outcome in high risk pregnancy.

Materials and methods : Total 402 women with high risk pregnancy were enrolled into the study. NST was performed with cardiotocography. Results of NST were considered as reactive, non reactive and equivocal. All cases were followed up till the delivery and data regarding mode of delivery and perinatal outcome were noted. Data were analyzed by Chi-square test using Open EPI version software.

Results : 41.8% women were primigravidae and 58.2% were multigravidae. Various high risk factors were postdatism, oligohydramnios, hypertension etc. NST was reactive in 71.7% cases and non reactive in 28.3% cases. LSCS was required in 6.3% of women with reactive NST versus 29.5% cases in non reactive group. Sensitivity of NST was 93.33% and specificity was 83.04%. Positive predictive value was 49.12% and negative predictive value was 98.61%.

Conclusion : NST is a simple and non invasive test to detect fetal hypoxia. Reactive test suggests healthy fetus. But non reactive test does not indicate fetal hypoxia. Cases with non reactive NST require further evaluation.

Key words : Birth asphyxia, antepartum fetal surveillance, non stress test

INTRODUCTION

One of the worst outcomes of the pregnancy is the delivery of an asphyxiated newborn which results from abnormality in the fetal gas exchange leading to hypoxia and metabolic acidosis. The majority of asphyxiated newborns recover without apparent deficits but some newborns develop neurological sequelae. Antenatal complications like fetal growth restrictions, placental insufficiency etc. predispose to birth asphyxia. The timely detection of morbid changes in the fetal status and appropriate interventions can prevent perinatal mortality and morbidity. Various biophysical tests like non

stress test (NST), contraction stress test (CST), biophysical profile (BPP), Doppler velocimetry are available to detect fetuses affected by abnormal placental gas exchange.

NST is a graphical recording of fetal heart rate reactivity to fetal movement. It is one of the most widely used primary testing methods for antepartum fetal surveillance^{1,2,3}. In this study, the effectiveness and role of NST has been evaluated for assessing the perinatal outcome in high risk pregnancy.

MATERIALS AND METHODS

This prospective, uncontrolled study was conducted from Jan 2013 to Nov 2014. Total 402 women with high risk pregnancies were enrolled into the study. Inclusion criteria were: pregnant women with 32 or more weeks of gestation with one or more risk factors like decreased fetal movements, postdatism, fetal growth restriction, hypertension, medical disorders with pregnancy etc. Exclusion criteria were: gestational age less than 32 weeks and fetus with gross congenital anomaly.

NST was performed with cardiotocography. Results of NST were considered as reactive, non reactive and equivocal. Result was considered reactive when two or more fetal heart rate (FHR) accelerations were clearly recorded during a 20 minute period, each of 15 or more beats per minute (bpm) and lasting 15 or more seconds occurring simultaneously with fetal movements. If no spontaneous fetal movements occurred during initial 20 minutes of observation, the test was continued for another 20 minutes and during this period fetal movements were provoked by external stimuli. If there was no acceleration with spontaneous or repeated external stimuli during a 40 minute period, the test was considered non reactive. The test was considered equivocal if the fetal heart rate tracing was inadequate for interpretation. NST was repeated weekly or biweekly according to the indication. Cases were followed up till the delivery and data regarding mode of delivery and perinatal outcome were noted. Data were analyzed by Chi-square test using Open EPI version software.

RESULTS

As shown in table 1, majority of women were in age group of 21 to 30 years (81.3%). 41.8% women were primigravidae and 58.2% were multigravidae. Various high risk factors were postdatism, oligohydramnios, hypertension etc. As shown in table 2, NST was reactive in 71.7% cases and non reactive in 28.3% cases. LSCS was required in 6.3% of women with reactive NST versus 29.5% cases in non reactive group. This difference was statistically significant. Table 4 shows numbers of babies born with birth asphyxia in women with reactive and non reactive NST. Table 5 shows predictive value of NST for perinatal outcome. Sensitivity of NST was 93.33% and specificity was 83.04%. Positive predictive value was 49.12% and negative predictive value was 98.61%. The false positivity and negativity rates are affected by the sensitivity and specificity of the test. In our study, the false negative rate was 1.38% for perinatal outcome. This shows that a reactive test is an excellent indicator of a healthy fetus. While non reactive NST is not an indication for immediate delivery but it is rather an indication for close observation and further evaluation.

Table 1: Profile of Study Participants

Profile (a) Age (in years)	Number (n=402)
≤20	55 (13.7%)
21-25	191(47.5%)
26-30	136(33.8%)
31-35	18(4.5%)
>35	2(0.5%)
(b) Gravida	
Primigravida	168 (41.8%)
Multigravida	234 (58.2%)
(c) Risk factor in pregnancy	
Postdatism	140 (34.8%)
Oligohydramnios	86 (21.39%)
Hypertension	80 (19.9%)
PROM	63 (15.7%)
Fever	10 (2.5%)
Decreased fetal movements	12 (2.9%)
Others	11 (2.7%)

Table 2: Result of NST

Result of NST	Number (%)
Reactive	288 (71.7%)
Non reactive	114 (28.3%)

DISCUSSION

Causes of birth asphyxia include antenatal complications, acute complications during labor and delivery and neonatal problems. For the obstetrician, the distinction between antepartum and intrapartum causes of asphyxia is of the largest importance, particularly in medico-legal situations. Advances in perinatal care in last 30 years have resulted in a dramatic decrease in perinatal mortality. Largest advances have been made in the assessment of the fetus at risk of mortality and morbidity secondary to placental insufficiency.

NST is simple, inexpensive, non invasive and easily performed and interpreted. Reactive NST is suggestive of healthy fetus. Abnormal or non reactive NST is due to fetal sleep or fetal hypoxia. So other factors need to be evaluated before intervention after non reactive test.

In our study, NST was non reactive in 28.3% cases, which is similar to study by Nochimson DJ et al⁴. In our study, 29.5% cases required LSCS in non reactive NST group and only 6.3% cases required LSCS in reactive NST group, which is comparable to study by Phelan JP et al⁵. As shown in table 4 and 5, four babies born with birth asphyxia in reactive NST group suggesting false negative rate of 1.38%. Fifty eight babies in non reactive NST group were born normal i.e. non asphyxiated giving false positive rate of 50.87%. So the sensitivity and specificity of the NST were 93.33% and 83.04% respectively. So the test had better negative predictive value than positive predictive value. These results were comparable to studies done by Phelan et al⁵, Brown et al⁶, Flynn et al⁷, Lenstrup et al⁸, Devoe et al⁹, Gelman et al¹⁰ and Leveno et al.¹¹

CONCLUSION

Perinatal morbidity and mortality is high in high risk pregnancy. NST is a simple and non invasive test to detect fetal hypoxia. Reactive test suggests healthy fetus. But non reactive test does not indicate fetal hypoxia. Cases with non reactive NST require further evaluation.

Table 3: Comparison of mode of delivery in relation to result of NST

Mode of delivery	Reactive NST	Non reactive NST
Vaginal delivery	270 (93.7%)	88 (70.5%)
LSCS	18 (6.3%)	26 (29.5%)
Total	288 (100%)	114 (100%)

Chi-square value 22.97, Df 1, p-value <0.001

Table 4 : Predictive accuracy of NST for Perinatal outcome

Result	Asphyxiated baby	Non asphyxiated baby	Total
Reactive test	4	284	288
Non reactive test	56	58	114
Total	60	342	402

Table 5: Predictive value of NST for Perinatal outcome

Predictive value	Percentage
False positive	50.87%
False negative	1.38%
Sensitivity	93.33%
Specificity	83.04%
Positive predictive value	49.12%
Negative predictive value	98.61%

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