

Interpretations and Implications of Non-Reassuring Fetal Heart Rate Patterns



Medical Science

KEYWORDS : NON STRESS TEST (NST), NON-REASSURING FHR PATTERNS, MODE OF DELIVERY, PERINATAL OUT-COME

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ABSTRACT

The Non Stress Test (NST) has become a useful tool in antenatal surveillance because of its wide applicability, ease of performance and relatively low cost.

In a country like India with large population and limited resources, the antepartum surveillance modalities have to be cost effective. Thus NST has a major role to play in such a situation because of practical advantage that it offers in terms of simplicity and cost effectiveness. This study was done to analyse the interpretations of non-reassuring fetal heart rate patterns seen on NST and their implications in evaluating mode of delivery and perinatal outcome.

The study was carried out in 172 pregnant females attending the antenatal clinic at Prakash Institute of Medical Sciences, Urun-Islampur and Holy Family Hospital, Bandra, Mumbai. All pregnant women above 37 weeks of gestation attending the Obstetrics Outpatient Department were included in the study and they were subjected to a weekly NST tracing till delivery. Antenatal NST results were used to compare the mode of delivery and perinatal outcome.

Following outcomes were observed:

1. Operative interference in form of LSCS was more common in cases with a non-reactive NST as compared to reactive NST (61.1% vs. 33.8%).

2. Meconium stained liquor was more common amongst non-reactive NST cases (83.3% vs. 36.8%)

3. NICU admission rate was high among cases with non-reactive NST (63.9% vs. 7.4%)

To conclude, non-reactive NST displayed significant association with operative interference in form of LSCS and also with poor perinatal outcome.

INTRODUCTION

The wellbeing of the fetus is one of the main concerns of obstetric care. Increasingly sophisticated non-invasive techniques have made the intrauterine environment more accessible to the obstetrician.

The primary aim of antepartum fetal monitoring is to avoid fetal deaths. An ideal secondary objective is to avoid neonatal complications related to intrauterine asphyxia.

The aim of antenatal fetal monitoring is to assess the fetal status in utero and to detect at the earliest any evidence of fetal jeopardy so that prompt measures can be taken before adverse effects of anoxia occur.

The antepartum assessment of fetal wellbeing has become an integral part of management of both high risk and low risk pregnancies. To achieve this evaluation, various genetic, biochemical and biophysical techniques have been devised. These techniques aim to identify fetuses that are at risk of preventable morbidity or mortality from utero-placental insufficiency due to maternal risk factors, placental disorders or fetal disease. Though there are many antepartum biophysical monitoring methods like CST, NST, foetal BPP, vibroacoustic fetal stimulation, amniotic fluid volume assessment, Doppler velocimetry for high risk pregnancies, there is no single test which is ideal for all high risk fetuses.

The assessment of fetal well-being is widely practiced by measuring the fetal heart rate and monitoring its patterns. Electronic fetal monitoring provides graphic and numeric information on fetal heart rate, fetal movement and uterine activity and helps clinical personnel to assess fetal well-being.

With the advent of electronic fetal monitoring, a relationship between foetal movement and foetal heart rate was observed and that relationship formed the basis for the Non Stress Test (NST). Most antepartum testing protocols use the NST as their principal test for foetal wellbeing.^{1,2} The Non Stress Test (NST) has become a useful tool in antenatal surveillance because of its wide applicability, ease of performance and relatively low cost³.

In a country like India with large population and limited resources, the antepartum surveillance modalities have to be cost effective. Thus NST has a major role to play in such a situation because of practical advantage that it offers in terms of simplicity and cost effectiveness⁴.

NST can identify the fetus in jeopardy in the compromised intrauterine environment and also fetus that may not be able to tolerate the stress of labor⁵. This is indicated by non-reassuring fetal heart rate (FHR) patterns. This enables an appropriate timely intervention to achieve the most favourable perinatal outcomes.

This study was done to analyse the interpretations of non-reassuring fetal heart rate patterns seen on NST and their implications in evaluating mode of delivery and perinatal outcome.

METHODS

The study was carried out in 172 pregnant females attending the antenatal clinic at Prakash Institute of Medical Sciences, Urun-Islampur and Holy Family Hospital, Bandra, Mumbai. All pregnant women above 37 weeks of gestation attending the Obstetrics Outpatient Department were included in the study.

These pregnant women were subjected to weekly NST tracing till delivery. These women were followed up till time of delivery.

The outcomes observed were:

1. Mode of delivery: LSCS vs. Normal delivery
2. Meconium staining of liquor during labor and delivery⁶
3. NICU admission rates.

NICU admission was independently decided by Paediatricians depending on APGAR score at birth.

Outcomes were compared with respect to antenatal NST results whether Reactive or Non-reactive.

Informed written consent of the patient was obtained before enrolment into the study.

It was a prospective comparative study conducted at Department of Obstetrics and Gynaecology, Prakash Institute of Medical Sciences, Urun-Islampur and Holy Family Hospital, Bandra, Mumbai All pregnant women above 37 weeks of gestation with cephalic presentation attending the Obstetrics Outpatient Department of Prakash Institute of Medical Sciences, Urun-Islampur were included in the study.

The exclusion criteria were those factors which predispose a patient for caesarean section like multiple gestation, antepartum eclampsia, antepartum haemorrhage, previous LSCS, all non-cephalic presentations and cephalopelvic disproportion. Pregnant women with one or more major congenital anomalies of the fetus and intrauterine fetal death were also excluded from the study.

Statistical Methods and Data Analysis

In this project all statistical analysis were performed by using 10.0 version of statistical software SPSS.

Descriptive Analysis:

Continuous variables were summarized by using summary statistics (number of observations, mean, standard deviation or median with range of minimum and maximum). Categorical values were summarised by using frequencies and percentages.

Tests of Significance:

In this study, all efficacy variables like association between NST results with all other parameters like mode of delivery, meconium stained liquor and NICU admission status were analysed by estimating chi Square test.

RESULTS

A total of 172 cases were included in the study. All cases had at least one antenatal NST tracing available to compare with the outcome. Out of 172 cases, 136 cases had a reactive NST while 36 cases had a non-reactive NST. A comparison was done between these two groups with respect to following outcomes:

1. Mode of Delivery
2. Meconium Staining of the Liquor
3. NICU Admission

Table 1. Association between NST Result and Mode of Delivery

NST Result	Vaginal Delivery No. %	L.S.C.S No. %
Reactive (N = 136)	90 66.2	46 33.8

Non-reactive (N = 036)	14 38.9	*22 61.1
Total	104	68
P value	-	0.0029

By Chi-Square test P < 0.05, *Significant

A total of 46 cases with reactive NST required operative intervention in the form of LSCS while the number was 22 among those with a non-reactive NST.

This reveals that **61.1%** of the cases with Non-reactive NST had undergone LSCS which was significantly more as compared to **33.8%** of the cases with reactive NST who had undergone LSCS.

Table 2. Association between NST Result and Meconium Stained Liquor

NST Result	Clear No. %	Thin MSL No. %	Thick MSL No. %
Reactive (N = 136)	86 63.2	34 25.0	16 11.8
Non-reactive (N = 36)	06 16.7	*20 55.6	*10 27.7
Total	92	54	26
P value	-	0.000003	0.00003

By Chi-Square test P < 0.001, *Significant

Out of 136 cases with reactive NST, a total of 50 cases had either thin or thick meconium staining of liquor.

While out of 36 cases with non-reactive NST, 30 cases had either thin or thick meconium staining of liquor.

This reveals that **83.3%** of the cases among non-reactive group had meconium stained liquor which was significantly more as compared to **36.8%** of the cases among reactive group.

Table 3. Association between NST Result and NICU Admission

NST Result	No NICU No. %	NICU No. %
Reactive (N = 136)	126 92.6	10 7.4
Non-reactive (N = 36)	13 36.1	*23 63.9
Total	139	33
P value	-	<0.001

By Chi-Square test P < 0.001, *Significant

A total of 10 new-borns born to mothers with a reactive NST required NICU admission while the number was 23 in the non-reactive group.

This reveals that **63.9%** of the cases from non-reactive group required NICU admission which was significantly more as compared to **7.4%** of the cases amongst reactive group.

conclusions

Electronic fetal monitoring (EFM) has been a subject of controversy for the last two decades. Several authors have criticized the policy of EFM stating that it will lead to an increase in intervention rates with no evidence of fetal benefits.^{7,8,9}

The ultimate aim of antenatal fetal surveillance is to identify the fetuses at risk so that timely intervention can be done. In this aspect, a reactive NST is a reliable indicator of fetal wellbeing.

NST is a non-invasive, simple, bedside method of antenatal fetal surveillance.¹⁰

The major objective of this study was to study the interpretations of non-reassuring foetal heart rate patterns seen on NST and to evaluate their implications to improve perinatal outcome.

In this study, we measured maternal outcome in terms of mode of delivery while perinatal outcome in terms of meconium stained liquor and NICU admission.

Major conclusions of the study were:

Non-reactive NST had a significant association with operative interference in the form of LSCS. Thus it affected the mode of delivery in a significant number of cases.

Non-reactive NST had a significant association with poor perinatal outcome as evidenced by meconium stained liquor and NICU admission.

This shows that antenatal NST can reliably predict the mode of delivery and perinatal outcome. But it needs further evaluation to include it as a routine protocol for deciding the mode of delivery.

Thus NST can be used as a simple, safe, widely available, non-invasive, cost effective and reliable means of antenatal fetal surveillance which would help in improving maternal as well as perinatal outcome.

REFERENCES:

1. Freeman RK. The evolution of antepartum fetal testing methods. *Am J Obstet Gynecol.*2003;Jul;189(1):310.
2. Preboth M. ACOG guidelines on antepartum fetal surveillance. *Am Fam Physician.*2000.Sep;62(5):1184-1188.
3. Druzin ML. Fetal surveillance – update. *Bull N Y Acad Med.*1990 May-Jun; 66(3): 246-254.
4. Liston R, Sawchuck D, Young D. Fetal health surveillance: antepartum and intrapartum consensus guideline. *Journal of Obstetrics and Gynaecology Canada.* 2007 September; 29(9) Suppl 4:36.
5. Lohana RU, Khatri M, Hariharan C. Correlation of non-stress test with fetal outcome in term pregnancy. *Int J Reprod Contracept Obstet Gynecol.*2013 Dec; 2(4): 639-45.
6. Desai D, Chauhan K, Chaudhary S. A study of meconium stained amniotic fluid, its significance and early maternal and neonatal outcome. *Int J Reprod Contracept Obstet Gynecol.*2013; 2(2):190-93.
7. Geidam AD, Audu BM, Kawuwa BM, Obed JY. Rising trend and indications of caesarean section at the University of Maiduguri teaching hospital, Nigeria. *Annals of African Medicine.* 2009; 8:127-32.
8. Naymi RS, Rehan N. Prevalence and determinants of caesarean section in a teaching hospital of Pakistan. *Journal of Obstetrics & Gynaecology.*2000;20:479-83
9. Ibekwe PC. Rising trends in caesarean section rates: an issue of major concern in Nigeria. *Niger J Med.*2004; 13(2):180-81.
10. Keegan KA Jr, Paul RH, Broussard PM, McCart D, Smith MA. Antepartum fetal heart rate testing. Vs. The nonstress test--an outpatient approach. *Am J Obstet Gynecol.*1980 Jan; 136(1):81-3.