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Original research article

Predictive accuracy of non-reactive NST for caesarean section for fetal distress

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Abstract

NST is a test that records graphically the fetal heart activity and uterine activity continuously through uterine quiescence and contraction with foetal movement. It is not only simple and inexpensive; it is also noninvasive and is easily performed and interpreted. Women with high risk pregnancy, non-reactive NST/CTG and women with low risk pregnancy, non-reactive NST/CTG enrolled into the study from 34 weeks of gestation admitted in labour room. Positive predictive value of non-reactive NST test is 85%/non-reactive CTG 48% for caesarean sections done for fetal distress. With non-reactive NST/CTG trace false positive rate to predict perinatal outcome was 73% and 79% respectively; this could probably be the result of an early intervention and hence improving the perinatal outcome.

Keywords: Non-reactive NST, caesarean section, fetal distress

Introduction

The non-stress test or the NST has a major role to play in such a situation because of the practical advantages it offers in terms of simplicity and cost-effectiveness. NST is a test that records graphically the fetal heart activity and uterine activity continuously through uterine quiescence and contraction with foetal movement. It is not only simple and inexpensive; it is also noninvasive and is easily performed and interpreted. It also consumes less time and has no contraindications for testing and more importantly it can be used to screen a large population quickly in an outpatient setting and can be performed by trained paramedical staff [1, 2].

There is a considerable body of clinical literature that supports the use of the NST in the management of high-risk pregnancies. The present study examines the role of non-reactive NST/non-reactive CTG in the antepartum surveillance of high risk pregnancies and its effectiveness in predicting the different variables of perinatal outcome.

Methodology

Women with high risk pregnancy, non-reactive NST/CTG and women with low risk pregnancy, non-reactive NST/CTG enrolled into the study from 34 weeks of gestation admitted in labour room.

Method of collection of data

The high risk groups and low risk group population were selected by history, clinical examination and relevant investigation. The study population consists of 229 women. Out of which 130 high risk patients and 99 low risk patients of Booked & unbooked cases from OBG OPD, wards, prelabour & labour room.

The inclusion criteria

- Patients of all age group who gave consent.
- Singleton non-anomalous pregnancies of 34 weeks or more weeks gestation.
- Only the NST or CTG performed within 7 days prior to delivery and at the admission for labour respectively were considered for fetal outcome.
- Patients with clinically suspected IUGR, pre-eclampsia, gestational diabetes mellitus, PIH (gestational hypertension), chronic hypertension, previous fetal demise, decreased or absent fetal movement,3rd trimester bleeding, prolonged pregnancy, cardiovascular disease, rhesusiso-immunization, previous caesarean section, altered liver function test, adolescent pregnancy and oligohydramnios.
- Preterm labour more than 34 weeks.

Exclusion criteria

- Sedative usage 24hrs before testing.

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- Major congenital anomaly of the fetus detected by routine ultrasound screening.

Procedure of study

The patients were divided into 2 study groups one containing high risk pregnancies and control group of low risk pregnancies. Non-reactive NST/CTG were used for surveillance from 34 weeks of gestation.
Patients were first given a description of the procedure they had to undergo after a preliminary history taking, thorough general examination & obstetric examination. Informed consent was taken.
Later patients were subjected to the test using Sonicaid fetal monitor at speed of 3cm/min for 20 minutes after ensuring maternal hydration and food intake.
NST was recorded weekly, biweekly and on alternate days or even daily basis depending on the high risk factor and was followed up.
CTG recording of fetal heart rate and uterine contraction in labor for a period of 20 minutes was performed.

Results:

Table 1: Predictive Accuracy of Non-Reactive NST for Caesarean Section for Fetal Distress

	Statistics	High Risk	Low Risk
NST Results	Sensitivity	27%	14%
	False Positives	73%	86%
	PPV	85%	15%
CTG Results	Sensitivity	21%	16%
	False Positives	79%	84%
	PPV	48%	52%

Above table shows predictive value of non-reactive NST test/CTG for caesarean sections done for fetal distress.
Positive predictive value of non-reactive NST test is 85%/non-reactive CTG 48% for caesarean sections done for fetal distress.
With non-reactive NST/CTG trace false positive rate to predict perinatal outcome was 73% and 79% respectively; this could probably be the result of an early intervention and hence improving the perinatal outcome.

Table 2: Showing Mean and SD of Birth weight at Delivery in High Risk Groups

Subgroups	Test type	N	Mean birth weight
LSCS	NST	29	3.096
	CTG	10	3.025
GDM	NST	12	3.175
	CTG	5	3.64
PIH	NST	18	3.011
	CTG	8	2.95
HYPOTHYROID	NST	7	3.36
	CTG	6	3.008
Rh –ve	NST	13	3.007
	CTG	3	3.033
Prolonged Preg	NST	5	3.31
	CTG	4	2.875
Adol Preg	NST	1	2.7
	CTG	4	2.85
Others	NST	33	2.698
	CTG	22	3.036

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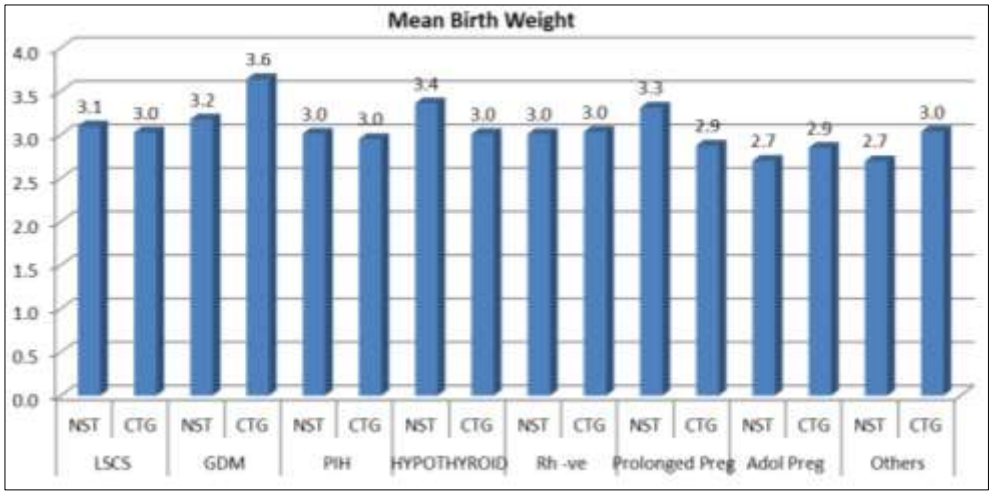

Fig 1: Average (mean) Birth Weight (in Kgs) of Subgroups in High Risk Pregnancy

The mean birth weight and gestational age of patients in high risk and low risk groups are shown in the above figure and table. The mean birth weight in high risk pregnancy patients was 2.6kg.

Discussion

In the present study, also we see that the incidence of fetal distress is increasing from low risk to high risk pregnancy. Thus, non-reactive NST/CTG test can detect fetal distress already present at admission and unnecessary delay in intervention can be avoided in such a case.

Table 3: Series of Studies Outcome for Non-reactive NST/CTG Test

Study	Sensitivity	False positive	Positive predictive value
Kamal Buckshee [2]	21.43%		74.21%
Ingemarsson [3]	23.5%		98.7%
Kushtagi P [4]	53%		61%
Blix E [5]	15		16
Salamalekis *et al* [6]	40.9%		28.1%
Arias *et al* [7]	36%	88%	
Brettchneider *et al* [8]	19%	44%	
Phelan JP *et al* [9]	41%	91%	
Bhattachary MS [10]	65.64%	76.87%	65.64%
Present study	24%	76%	66.5%

Non-stress test is an accepted method of monitoring high risk pregnancies.

The mean sensitivity was 24%, positive predictive value was 66.5%, and mean false positive rate was 76% for the non-reactive test results.

Our study sensitivity is coinciding with Kamal Buckshee study, Ingemarsson study and Brettchneider *et al* that is 21.43%, 23.5%, 19% respectively.

One of the objections to the test is that it has a high false positive rate; in other words, it cannot predict adverse foetal outcome for example the false positive is as high as 91.5% in Phelan JP study and 88% in Arias *et al* study as mentioned in above table.

In our study the false positive is 76% which is correlating with Bhattachary MS study that is an Indian study.

The positive predictive value is as high as 98.7% in Ingemarsson study and as low 16% in Blix E study.

In our study, the positive predictive value is 66.5% which is correlating with Bhattachary MS study.

Conclusion

Positive predictive value of non-reactive NST test is 85%/non-reactive CTG 48% for caesarean sections done for fetal distress.

With non-reactive NST/CTG trace false positive rate to predict perinatal outcome was 73% and 79% respectively; this could probably be the result of an early intervention and hence improving the perinatal outcome.

References

1. Siristatidis C, Salamalekis E, Kassanos D, Loghis C, Creatsas G. Evaluation of fetal intrapartum hypoxia by middle cerebral and umbilical artery Doppler velocimetry with simultaneous

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cardiotocography and pulse oximetry. Arch Gynecol Obstet. 2004 Dec;27(4):265-70.
2. Peebles DM, Edwards AD, Wyatti S, *et al*. Effects of frequency of uterine contractions on human fetal cerebral oxyhaemoglobin concentration measured by near infrared spectroscopy. Br J Obstet Gynaecol. 1992;99:700.
3. Doyle PM, O'Brien PMS, Wickramasinghe YABD, Houston R, Rolfe R. Transcerebral near infrared spectroscopy used to observe changes in fetal cerebral haemodynamics during labour. J Perinat Med.1994;22(3):265-268.
4. Jobsis FF. Non-invasive infrared monitoring of cerebral and myocardial oxygen sufficiency and circulatory parameters. Science. 1977;198:1264-6.
5. Miller FC, Skiba H, Klaphopz H. The effects of maternal blood sugar on fetal activity. Obstet Gynaecol. 1979;52:662.
6. Salamalekis E, Vitoratos N, Loghis C, *et al*. The predictive value non-stress test taken 24 hours before delivery in high-risk pregnancies. Int J Gynaecol Obstet. 1994 May;45(2):105-107.
7. Arias JW, Saldana LR, *et al*. Fetal heart rate acceleration; fetal movement ratio in the management of high risk pregnancy. Obstet Gynecol. 1982;60:4272.
8. Schifrin BS. The CTG and the timing and mechanism of fetal neurological injuries. Best Practice and Research. 2004 Jun;18(3):437-56.
9. Phelan JP. The non-stress test: A review of 3000 tests. Am J Obstet Gynaecol. 1981;139:7.
10. Bhide A, Bhattacharya MS. Predictive value of non-reactive stress test in neonatal outcome. J Postgrad. 1990;36(2):104-105.