Role of Admission Test in Low Risk Pregnancy

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Abstract

Introduction: Admission test is a non-invasive, easily performed, interpreted and readily accepted by the patients. It can be used as screening procedure to detect pre-existing fetal hypoxia and plan early intervention to prevent adverse perinatal outcome.The present study was thus conducted to evaluate the efficacy of admission test in predicting fetal outcomes at birth in term low risk pregnant women. *Materials & Methods:* A prospective observational study was conducted from August 2015 to July 2017. 100 low risk (normal) pregnant mothers fulfilling the inclusion criteria, attending the labour room were included.The admission test was conducted and interpreted for all patients. On the basis of admission test results, type of delivery and neonatal outcome at birth was assessed. Data was analyzed using SPSS ver 21.0. *Results:* Non-Reassuring Admission Test was observed in 12% subjects. Caesarean delivery was conducted in 41.7% of females with non-reassuring NST as compared to 11.4% females with reassuring NST. Meconium stained liquor was observed in 50% of babies with non-reassuring NST as compared to 3.4% babies with reassuring NST (p<0.01). APGAR score at 1 and 5 minutes were significantly lower in babies with non-reassuring NST (p<0.01). Fetal distress and NICU admission rate was observed in 50%

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and 66.7% of babies with non-reassuring NST as compared to 2.3% and 2.3% babies with reassuring NST (p<0.01). The sensitivity and specificity of NST in predicting fetal distress was 50% and 97.7% respectively. *Conclusion:* The result of admission test can be used to identify patients likely to develop adverse fetal outcomes and help in optimal utilization of labour room with limited resources. Thus, admission test can be used as an important non-invasive method to diagnose fetal compromise present at the time of admission in low risk patients in early labour.

Keywords: Admission Test; Low Risk Pregnancy; Neonatal Outcome; Cardiotocography.

Introduction

The most crucial time for the fetus during the whole pregnancy period is the labour. In labour, fetal distress is quite common and is the main cause of concern for the obstetrician. This gave birth to the concept of intrapartum fetal monitoring, which is the easiest way to listen to fetal heart rate [1].

In the 1970s, with the invention of cardiotocograph, continuous fetal monitoring was introduced and it became the standard practice in all pregnant women. In the western countries, continuous fetal monitoring is being used extensively but due to economic constraints, it is not feasible in most of the developing countries like ours for practicing it.

Ingemarsson et al. [2] has described an alternative, in the form of ADMISSION TEST (AT) or Non stress test (NST) which is a short recording of FHR and uterine contractions

of 15-20 minutes, at the time of admission in labour ward. Admission test has been categorized as reassuring or normal, suspicious or equivocal and ominous or Non-Reassuring [3].

Reassuring or normal NST is characterized by a normal baseline FHR of 110-160bpm and 2 or more fetal heart rate accelerations of about 15 bpm and lasting at least 15 seconds from the baseline within a 20 minute period [3]. Equivocal /suspicious tracings are those with normal baseline rate with no accelerations in 20 minutes and reduced baseline variability (5-10 beats/min)or tracings showing abnormal baseline rate with no accelerations and variable decelerations without ominous signs [3]. Non-reassuring or Ominous NST is characterized by lack of acceleration for a period of 40 minutes [4].

Admission test is a non-invasive, easily performed, interpretated and readily accepted by the patients. The test looks for presence of temporary acceleration of the FHR associated with fetal movements that involves the cerebral cortex and is affected by physiological and pathological influences on foetal brain. It was found that admission test could be used as screening procedure to detect pre-existing fetal hypoxia and plan early intervention to prevent adverse perinatal outcome. The present study was thus conducted to evaluate the efficacy of admission test in predicting fetal outcomes at birth in term low risk pregnant women.

Materials and Methods

After approval by the college ethical committee, a prospective observational study was conducted from August 2015 to July 2017, where 100 low risk (normal) pregnant mothers fulfilling the inclusion criteria, attending the labour room were included.

Inclusion criteria included term low risk motherswith cephalic presentation admitted in labour room with gestational age between 37 to 42weeks. High risk pregnancies like multiple gestation, pre-eclampsia, eclampsia, diabetes mellitus, renal diseases, heart disease, severe anaemia, oligohydroamnios, history of recurrent pregnancy losses, previous history of still birth, post-datism, thrombophilias, diminished fetal movements, antepartum hemorrhage, abnormal presentation, instrumental delivery, etc. were excluded. Patients in second stage of labour and those posted for elective LSCS were also excluded.

Methodology

After admitting the patient in labour room, detailed history was taken and thorough examination was carried out. All essential investigations were checked to rule out any risk factor and necessary investigations were done. After excluding the cases as per exclusion criteria, informed written consent was taken from pregnant mothers willing to take part in the study. The admission test was conducted and interpreted for all patients.Bionet fetal monitoring machine FC700, which is available at our hospital was used to perform admission test on patients. Then on basis of the admission test, number of patients who had vaginal delivery or taken for LSCS were assessed and correlated with the neonatal outcome at birth. The labour Admission Test of 20 min duration graphically records the fetal heart activity and contractions, simultaneously and continuously in the same time scale [2].

Points Considered in Reading a Graph

a. Baseline foetal heart rate.

b. Beat to beat variability

c. Fetal movements

d. Uterine contractions

e. Qualifying acceleration

f. Any deceleration if present.

Table 1: Association between Admission Test results and mode of delivery

Mode of Delivery	Admission Test		Total
	Non Reassuring	Reassuring	
LSCS	5	10	15
	41.7%	11.4%	15.0%
Vaginal	7	78	85
	58.3%	88.6%	85.0%
Total	12	88	100
	100.0%	100.0%	100.0%
	p- value < 0.01		

Table 2: Association between Admission test with neonatal outcome

Variables	NST		Total	p- value
	Non Reassuring (n-12)	Reassuring (n-88)		
MSL	6	3	9	<0.01
	50.0%	3.4%	9.0%	
<7 (at 1 min)	7	4	11	<0.01
	58.3%	4.5%	11.0%	
<7 (at 5 min)	5	3	8	<0.01
	41.7%	3.4%	8.0%	
Neonatal Resuscitation	6	2	8	<0.01
	50.0%	2.3%	8.0%	
NICU Admission	8	2	10	<0.01
	66.7%	2.3%	10.0%	
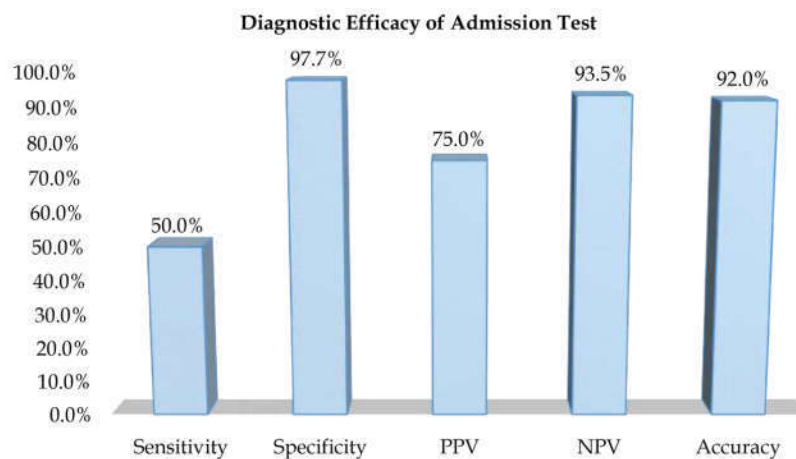
Fig. 1: Overall Diagnostic Efficacy of Admission Test

Definition of a Reassuring NST [3]

- Two or more accelerations that peak at 15 bpm or more, each lasting for 15 seconds or more, and all occurring within 20 minutes of beginning the test.

- It was also recommended that acceleration with or without foetal movement can be accepted, and that a 40 minute or longer tracing (to account for foetal sleep) should be performed before concluding that there was insufficient reactivity.

Definition of a Non-reassuring NST [3]

At the end of 40 minutes if there are:

- No qualifying accelerations.

- Baseline variability less than 5 bpm.

- Late decelerations with spontaneous uterine contractions.

- Variable decelerations, repetitive and lasting for more than 30 seconds.

Statistical Analysis

Data were statistically described in terms of mean (±SD), frequencies (number of cases) and percentages when appropriate. All statistical analysis were done using computer programs SPSS version 21 using appropriate tests.

Results

Most of the study subjects were between 20-30 years of age (77%) while only 6% were above 30 years of age. A total of 42% females were primi-gravida while 58% were multi-gravida. Non-Reassuring Admission Test was observed in 12% subjects. Caesarean delivery was conducted in 41.7% of females with non-reassuring NST as compared to 11.4% females with reassuring NST. The association of abnormal pattern in NST and caesarean section was found to be statistically significant (p<0.01) (Table 1). In present study meconium stained liquor was observed in 50% of babies with non-reassuring NST as compared to 3.4% babies with reassuring NST (p<0.01). APGAR

score at 1 and 5 minutes were significantly lower in babies with non-reassuring NST (p<0.01) while the mean birth weight was comparable (2.82 vs 2.93; p-0.82). Neonatal resuscitation and NICU admission rate was observed in 50% and 66.7% of babies with non-reassuring NST as compared to 2.3% babies each with reassuring NST (p<0.01) (Table 2). The sensitivity and specificity of NST in predicting fetal distress was 50% and 97.7% respectively, while the positive and negative predictive values were 75% and 93.5% respectively. The overall diagnostic accuracy was 92% (Figure 1).

Discussion

Among the various antenatal surveillance modalities used for high risk pregnancies, NST is one of the easiest test to perform and cost effective. There are considerable number of clinical literatures that support the use of NST as an admission screening test [5-10]. In present study Non-reassuring NST was observed in 12% subjects. In a similar study by Shrestha et al. [7] among the 125 pregnant mothers who were included in the study, 10% had non-reassuring NST. In a study by Pada et al. [6], out of 100 cases, 86% had normal NST and 14% had abnormal NST.

Caesarean delivery was conducted in 41.7% of females with non-reassuring NST as compared to 11.4% females with reassuring NST (p<0.01). Phelan J et al [10] studied NST of 1452 high risk patients and observed that 14% tests were abnormal and in these women, they also observed a significant increase in LSCS rate in females with non-reassuring NST. In a similar study to assess the value of antenatal NST, Brown V et al. observed significantly increased incidence of caesarean deliveries in females with abnormal NST pattern [11]. Amena K et al. [12] reports 82% caesarean rate from abnormal NST group which was statistically significant from normal NST group. Rahman H et al. [13] in a similar study found LSCS rate of 35.8% from reacting group and 78.6% from non-reacting group (p<0.001). A slightly lower cesarean section rate in present study can be attributed to inclusion of only low risk pregnancies while in most of the above mentioned studies, both low risk and high risk pregnancies were included. But all the studies unanimously observed a significant association of increased rate of cesarean section in non-reassuring groups.

In present study meconium stained liquor was observed in 50% of babies with non-reassuring NST as compared to 3.4% babies with reassuring NST

(p<0.01). APGAR score at 1 and 5 minutes were significantly lower in babies with non-reassuring NST (p<0.01). Neonatal resuscitationand NICU admission rate was observed in 50% and 66.7% of babies with non-reassuring NST as compared to 2.3% each with reassuring NST (p<0.01). Visser G et al. evaluated in CTG of 428 patients observed that all patients with non-reassuring NST showed signs of fetal distress during labour and patients with a normal NST rarely showed signs of fetal distress during labour [14]. Rahimi et al. observed that thick meconium staining, fetal distress and NICU admission was significantly more frequent in abnormal NST subjects (*P*<0.001) [15]. Khandelwal et al. found that patients with non-reassuring traces had higher incidence of meconium staining, clinically detected fetal distress, operative delivery or cesarean section and NICU admission [16]. Chua et al. reported that operative delivery (P <0.001), 5-min Apgar score <7 (P<0.005), assisted ventilation (P<0.001) and admission to NICU (P< 0.001) were significantly associated with non-reassuring NST at admission [17]. Sudip Dutta et al. [13] found the incidence of meconium staining as 71.4%, NICU admission as 57.1%, APGAR <7 at 5 minutes 64.3% in non-reassuring group (p<0.01). In a study by Panda et al. [6], Meconium Staining is 85.71%, NICU admission 21.42% and APGAR <7 at 5 minutes is 28.57% from abnormal NST group [1]. In a study conducted by Bano et al. [18], the APGAR score <7 at 5 minutes was 3.4% in the reassuring NST group whereas it was 42.8% in the non-reassuring group.

The sensitivity and specificity of NST in predicting fetal distress was 50% and 97.7% respectively, while the positive and negative predictive values were 75% and 93.5% respectively. The overall diagnostic accuracy was 92%. Sultana J et al. observed that sensitivity of CTG was 87%, specificity was 66%, positive predictive value was 54% and negative predictive value was 92% in the prediction of abnormal outcomes [18]. Brown et al. observed the sensitivity and specificity of admission test as 50% and 99% [11]. Dwarakanath L et al. [19] studied the efficacy of admission NST to predict obstetrics outcome. They got sensitivity of 75.8%, specificity of 76.9% PPV of 95.6%, NPV of 32.25%. Panda et al. [6] found sensitivity of 57.89%, specificity of 96.30% PPV of 78.57%, NPV of 90.70%.

Conclusion

Our study supports the idea that admission test plays an important role in prediction of adverse fetal outcomes. The result of admission test can be used to

identify patients likely to develop adverse fetal outcomes and help in optimal utilization of limited labour room resources available. Thus, admission test can be used as an important non-invasive method to diagnose fetal compromise present at the time of admission in low risk patients in early labour.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Acknowledgments

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