

Correlation of Mode of Delivery in Low Risk Pregnancy with Labor Admission Test

Dr. Lata Rajoria¹, Dr. Lila Vyas², Dr. Ram Bharat Meena³,
Dr. Neelam Meena⁴, Dr. Suman Chaudhary⁵, Dr. Amita Chaudhary⁶
^{1,2}Sr. Professor, ⁵Assist. Professor, ³Research Scholar, ⁴Sr. Medical Officer, ⁵Sr. Resident.
Department of obstetrics & gynaecology, SMS medical College, Jaipur (Rajasthan). -
302001.

Abstract : *The objective of the study is to predict the assessment of the maternal well being and mode of delivery & fetal wellbeing. Assessment of the fetal well being by electronic fetal monitoring of the fetal heart rate in the pregnant women who admitted in the labor room of the Department of obstetrics & gynaecology in the SMS Medical College during the year of 2015 to 2017 with a period of gestation of >36 weeks, in first stage of labor with fetus in the cephalic presentation. Only low risk cases were subjected to an admission Test, which included a 20 minute recording of FHR are compared with low risk cases in an aspect of fetal distress and mode of delivery. 130 patients were included in the study. Out of 130,105 had reactive trace and 25 had non-reactive traces. The Admission Test can serve as an evidenced based tool to detect fetal distress already present or likely to develop and to predict the mode of delivery and fetal outcome.*

INTRODUCTION

Care given to a mother during her pregnancy and childbirth is an index of civilisation. There is a sea change in the antenatal and intranatal care since the inception of the concept of antenatal care by Bellantyne in 1901.¹ While nutritional supplements, vaccinations and investigations as part of antenatal care have increased and improved for better maternal and fetal wellbeing, the ten centimetre journey from brim to the outlet of pelvis has remained the most dangerous journey in one's life since the evolution of the species.

Hence the necessity of monitoring of mother in the antenatal and the intranatal period and hence an insight and research into the modern biomedical engineering and its application to fetal activity.

ADMISSION CARDIOTOCOGRAPHY: A short recording of fetal heart rate over 20-30 minutes is done immediately after admission in the labour room. In this application of electronic fetal monitoring, women with low risk pregnancies are

monitored for a short time on admission for labour, and continuous monitoring is used only if abnormalities of the fetal heart rate patterns are subsequently identified.

This test identifies a fetus with risk for hypoxia in the next 5-6 hours of labour. Ingermarsson I et al (1986)² observed that a reactive or normal Admission Test tracing guaranteed a progress of labour without fetal distress, provided delivery occurred in about next 6 hours.

A normal admission fetal cardiocograph reassures and thus allows patient to be mobile by eliminating continuous monitoring. It reduces the burden on Admission Test machine, which is an important necessity for majority of the nations including ours.

Thus: -

- The labor Admission Test is a screening test in early labor to detect compromised fetus on admission.
- It is used to select the woman in need of continuous fetal electronic monitoring during labor.
- It is a dynamic screening test to study fetal oxygenation at the time of admission of mother in labor room.

AIMS & OBJECTIVES

Correlate the result of the Admission Test with the maternal outcome in low risk obstetric population.

MATERIAL & METHODS

The present study is a hospital based descriptive observational study was conducted in Department of Obstetrics & Gynaecology, S.M.S. Medical College & attached group of Hospitals, Jaipur from February 2015 to 2017.

STUDY POPULATION

Sample size is calculated at 95% confidence level assuming 73.7% sensitivity of Admission Test as per study of Dr. Hafizur Rahman, Dr. Renjhen Prachi, Dr. Dutta Sudip, Reliability of admission cardiocography in predicting adverse perinatal outcome in low risk obstetric population, [J. of Indian Obstetrics & Gynaecology; Ed. Oct.-Dec. 2012; page 6-10]⁹ at the relative allowable error of 10% of sensitivity, minimum 130 patients are required.

After obtaining the institutional ethical committee approval, 130 pregnant women were admitted in the labor room in first stage of labor after applying inclusion (gestational age of ≥ 36 week, Singleton pregnancy, Cephalic presentation, Primi or multi-gravida) & exclusion (Bad obstetric history, Multifetal pregnancy, Congenital fetal anomalies, Mal-presentation, False labor pain, Elective LSCS or previous LSCS, Use of sedative drug, Admission interval > 24 hrs, IUGR, Medical disorders: Hypertension, anaemia, asthma, thyroid disorder etc.) criteria.

A detailed history was taken with emphasis on last menstrual period, menstrual history, obstetric history. The period of gestation and the gestational age was calculated from last menstrual period by (Naegle's formula)³ and ultrasonographic records.

Detailed medical history in terms of asthma, drug allergy, cardiovascular disease, hypertension, coagulopathy, chronic use of steroid was taken. A detailed dietary history and immunisation history was also taken. All patients were subjected to a detailed general physical and systemic examination.

Cardiocography Machine

The machine used was EDANUSA - Fetal Monitor VERSION 1.5. It gives a real time graph on the LCD and has a printer attached to the machine. The monitor is designed to comply with the international safety requirements IEC/EN 60601-1 for medical electrical equipment. It is class I equipment.

The monitor operates within specifications at ambient temperatures between +5°C (+41°F) and +40°C (+104°F).

It gives a bright black and white display of the fetal heart rate and the uterine contractions by tocometric transducer. An elastic belt is placed around the mother abdomen. It has two plates or transducers which make contact with the skin after application of specific ultrasound conductor jelly. One of these plate uses ultrasound to measure fetal heart rate.

OBSERVATIONS & DISCUSSION

In the present study - 130 subjects were studied using electronic fetal monitor. An admission Test was used as an indicator for antepartum and intrapartum surveillance. Results were analysed in terms of mode of delivery.

The continuum of search for a correct, immediate yielding result, essentially non-invasive method for antepartum evaluation of fetal wellbeing, has resulted in various inventions and innovations, of which cardiocography is an important product. Obstetricians have long searched for methods of antepartum evaluation of fetus that would be non-invasive accurate and yield results that were immediately available.

Dr. Orvan Hess¹³ first started preliminary research into the development of cardiocography as early as the 1930's. In the late '40s, he joined hands with Dr. Edward Hon⁴ to further his attempts to develop a form of technology that could record fetal heart signals.

The ideal test should be easy to perform, less expensive, repeatable without causing inconvenience to the patient. It should be specific and sensitive. It should not have any side effect and should not cause any harm to the mother or the fetus. Admission Test is one such test which fulfills most of these criteria and thus it is now generally accepted as a clinically useful method in assessing fetal hypoxia, uteroplacental insufficiency and fetal risk during antepartum period.

In this study 130 cases were evaluated. High risk factors were not taken into account which are proved to be affecting uteroplacental circulation reducing placental oxygen reserve, causing hypoxia and thus risking the life of the fetus. Many similar studies have been carried out over years in various countries.

Table-1
Age Wise Distribution of Study Subjects

Age Group (in yrs)	Number	%
≤ 20	12	9.23
21- 25	49	37.69
26- 30	55	42.31
>30	14	10.77

Total	130	100.00
--------------	------------	---------------

This table reveals that most of the study subjects belonged to 21-30 years age (this is most fertile period) group 104 (80%). Only 10.77% of subjects were above 30 years of age & adolescent pregnancy contribute only 12 (9.2%) subjects.

Table-2
Gravidity Wise Distribution of Study Subjects

Gravidity	Number	%
Primi	58	44.61
Second	56	43.08
Third	14	10.77
Fourth	2	1.54
Total	130	100.00

Above table reveals that most of the study subjects were primi gravida (44.61%) and 43.08% were 2nd gravida. Only 16 (12.31%) of women had gravida 3 or more.

Table-3
Period of Gestation By 1st Trimester USG

Gestational Age (in weeks)	Number	%
36	15	11.54
37	26	20.00
38	40	30.77
39	25	19.23
40	22	16.92
41	2	1.54
Total	130	100.00

Present table shows that most of the study subjects delivered at 38 week of gestation (30.77%) followed by 20% delivered at 37 weeks of gestation as assessed by 1st trimester USG. Only 15 subjects (11.54%) delivered before ≥ 36 week (late pre-term) of gestation.

Table-4
Result of Labour Admission Test

	Reactive	Non- Reactive	Total
Result of ADMISSION TEST	105 (80.77%)	25 (19.23%)	130 (100.00%)

Our study shows that labour Admission Test (LAT) applied on 130 study subject (all belonged to low risk obstetric population) after assessing inclusion & exclusion criteria. Out of 130, Admission Test was reactive in 105 (80.77%) cases and non-reactive in 25 (19.23%) cases.

Similarly Rahman H et al (2012)⁹ conducted a study on 192 pregnant woman and showed that Admission Test was Reactive in 88.40% and Non reactive in 12.0% woman.

Dwarakanath L et al (2013)¹⁰ conducted a study on 200 pregnant women, and showed that Incidence of reactive trace was 69% & Non-Reactive 31%.

While in a study conducted by Chuang J et al (2004)⁵ on 169 patients, only 11 (6.5%) showed fetal heart-rate deceleration.

Talaulikar VS et al (2011)⁸ showed, the test was reactive in 94.3% out of 1041 patients.

Table-5
Mode of Delivery

Mode of Delivery	Reactive		Non-reactive	
	Number	%	Number	%
Vaginal	97	92.38	3	12.00
Ventouse	1	0.95	0	0.00

(Instrumental Vaginal)				
Caesarean Section	7	6.67	22	88.00
Total	105	100.00	25	100.00

$\chi^2 = 77.077$

d.f. = 2

p < 0.001

Sig

Present table shows that in subjects with reactive Admission Test, 97 (92.38%) delivered by normal vaginal delivery, 1 (0.95%) had delivered by ventouse application and C section was required in only 7 (6.67%) cases, where as in subjects with non reactive Admission Test, 88% required C section and normal vaginal delivery was possible only in 12% subjects.

Application of Chi-square test showed that this difference was statistically significant at *p*<0.00 and non reactive Admission Test is significantly associated with requirement of C section.

Similarly Khatun A et al (2009)⁶ conducted a study on Hundred consecutive normal and hundred consecutive abnormal Admission Test tracings, There was significantly higher rate of caesarean delivery.

Blessy D et al (2014)¹¹ conducted a study on 400 patients. On comparing Admission Test tracings with the mode of delivery, 80 out of 267 women of the reactive group had caesarean delivery (29.96%), and 124 (93.25%) had caesarean delivery in Non-Reactive group.

While in a study conducted by Khurshed F et al (2009)⁷ on 210 women, 62.57% delivered vaginally & 37.43% had LSCS in reactive group Admission Test. While in Non-Reactive Admission Test group 27.27% delivered vaginally & 72.73% required LSCS.

Hafizur Rahman et al (2012)⁹ conducted a study on 192 patients, Operative delivery for fetal distress was required in only 2.3% (4 of 169) women of the reactive group, in 36.3% (4 of 11) women of the equivocal group and in 83.3% (10 of 12) women of the ominous group.

Most women aim for spontaneous vaginal delivery, when complications arise in the second stage of labor there is a choice between instrumental vaginal delivery and caesarean section. Obstetricians are increasingly choosing caesarean section when complications arise in the second stage of labor. Thus instrumental vaginal delivery becoming rare in current era.

Table-6
Diagnostic Parameters of Admission Test

Diagnostic Parameters	% (95% CI)
Sensitivity	70% (45.72 – 88.11%)
Specificity	90% (82.81 – 94.90%)
Positive Predictive Value	56% (40.40 – 70.49%)

Negative Predictive Value	94.29% (89.39 – 97%)
False Negative	5.70%
False Positive	44.00%

Above table shows that Admission Test at admission has high sensitivity and specificity for predicting fetal distress (70 % and 90% respectively). Proportion of false negative results is very low. A high NPV (94.29%) allows a clinician to accurately exclude fetal distress in individual patient.

Hafizur Rahman et al (2012)⁹ conducted a study on 192 patients, has a sensitivity of 73.7%, specificity of 94.8%, positive predictive value of 60.9%, and negative predictive value of 97.0%.

Dwarakanath L et al (2013)¹⁰ was conducted a study on 200 pregnant women, this study has a sensitivity of 76% and positive predictive value (PPV) of 96%, specificity of 77% and negative predictive value (NPV) of 33% for a reactive test.

Blessy David et al (2014)¹¹ was conducted a study on 400 patients. The study concluded that admission Admission Test has 92.85% sensitivity and 94.16% specificity. The positive predictive value was 87.96% and negative predictive value was 96.62% with a diagnostic accuracy of 93.75% indicating that reactive admission Test correlates well with the fetal wellbeing.

SUMMARY

This observational study was conducted in department of Obstetrics and Gynaecology during the period from 2015 to 2017.

130 cases, admitted in labor ward with 36 weeks onward of gestation in labor, on clinical examination with 3-5 centimeter of cervical dilatation. These cases were from primigravida to multiparous without high risk pregnancies like Bad obstetric history, Multifetal pregnancy, Congenital fetal anomalies, Mal-presentation, False labor pain, Elective LSCS or previous LSCS, Admission interval >24 hrs, IUGR, Use of sedative drug, Medical disorders like Hypertension, anaemia, asthma, thyroid disorder etc.

In the present study the observations for an admission Admission Test were done on following lines - According to NICE guideline [2014], Intrapartum care for healthy women and babies (CG190).¹²

1. Baseline fetal heart rate

2. Baseline variability
3. Decelerations
4. Accelerations

All these patients were subjected to Admission Test or admission Admission Test. Out of 130 tests performed, 105 (80.77%) were reactive and 25 (19.23%) were non-reactive. In certain non-reactive tests, the test was repeated for another 30 minutes to confirm the previous abnormal finding. If again the test was non-reactive, a decision of termination of pregnancy was taken accordingly.

Present study shows that in subjects with reactive Admission Test, 97 (92.38%) delivered by normal vaginal delivery, 1 (0.95%) had ventouse application (due to prolonged 2nd stage of labor) and C section was required (for NPOL in 3 subjects, MSL in 3 subjects & 1 was due to CPD) in only 7 (6.67%) cases, whereas in subjects with non reactive Admission Test, 88% required C section (indication of LSCS in the non reactive group out of 25 subjects was mainly meconium stained liquor in 17 subject and severe oligo & cord around neck in 5 subjects) and normal vaginal delivery was seen only in 12% subjects. (p<0.001).

This study shows that Admission Test at admission has high sensitivity and specificity for predicting fetal distress (70% and 90% respectively). Proportion of false negative results is very low. A high NPV (94.29%) allows a clinician to accurately exclude fetal distress in individual patient and deciding best way in term of mode of delivery.

CONCLUSION

The cardiotocography test is a simple, non-invasive, inexpensive test for antepartum fetal surveillance. It is easy to perform and causing no inconvenience or complications to the patient. Admission Test should be performed for diagnostic performance in light of clinical circumstances.

Our study has shown that Non-Reactive Admission Test is an alarming sign for active intervention as early as at the time of admission because those who have Non-Reactive Admission Test (approximately 20% [25 cases] in our study) majority of them landed in caesarean delivery for fetal distress. Hence early intervention decreased the neonatal morbidity.

The study suggest that Admission Test should be performed in every labor patient (low as well as high risk group) to decrease neonatal morbidity & mortality.

Study showing high Negative predictive value (94.29%) so this Admission Test very useful in detecting compromised fetus, in very early in first stage labor.

Finally conclude that Admission Test is a very useful prognostic tool in early labour for triaging of fetus and helpful in predicting the fetal outcome and mother's wellbeing.

BIBLIOGRAPHY

1. Reiss HE. Historical insights: John William Ballantyne 1861-1923. *Hum Reprod Update*, 1999 Jul-Aug; 5(4) : 386-9.
2. Ingemarsson I, Arulkumaran S, Ingemarsson E, Tambyraja RL, Ratnam SS. Admission Test: a screening test for fetal distress in labor. *Obstet Gynecol*, 1986 Dec; 68(6) : 800-6.
3. Nguyen T, Larsen T, Engholm G, Møller H. Evaluation of ultrasound-estimated date of delivery. *Ultrasound Obstet Gynecol*, 1999 Jul; 14(1) : 23-8.
4. Hon EH and Hess OW. Instrumentation of fetal electrocardiography. *Science*, 1957; 125 : 553-4.
5. Chuang J, Chou CT, Cheng WC, Huang LW, Hwang JL, Tsai YL. Spontaneous FHR deceleration : an ominous sign for fetal outcome. *Arch Gynecol Obstet*, 2004 May; 269(9) : 254-8.
6. Khatun A, Khanam NN, Nazir F. Role of Elaborate Cardiotocography (ADMISSION TEST) in Pregnancy Management. *BSMMU J*, 2009; 2(1) : 18-24.
7. Khursheed F, Chandra MD, Jatoti N. Cardiotocography : Obstetric and Neonatal outcome. *Journal of Rawalpindi Medical College (JRMC)*, 2009; 13(2) : 86-88.
8. Talaulikar VS, Arulkumaran S. Labor Admission Test. *International Journal of Infertility and Fetal Medicine*, September 2011; Vol. 2, No. 3 : 89-95.
9. Dr. Hafizur Rahman, Dr. Renjhen Prachi, Dr. Dutta Sudip, Reliability of admission cardiotocography in predicting adverse perinatal outcome in low risk obstetric population, *Indian Obstetrics & Gynaecology*, Oct.-dec. 2012 : page 6-10.
10. Dwarakanath L, Lakshmikantha G, Chaitra SK. Efficacy of admission cardiotocography (Admission Test) to predict obstetric outcome. *Journal of Evolution of Medical and Dental Sciences*, February 2013; 2(5) : 66.
11. Blessy D and K Saraswathi. A study on role of admission ADMISSION TEST as a screening test to predict fetal outcome. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*

Department of Obstetrics and Gynaecology, November - December 2014, 5(6) : Page No. 295.

12. NICE guideline [2014], Intrapartum care for healthy women and babies (CG190), Published: 3 December 2014, nice.org.uk/guidance/cg190.
13. Dr. Orvan W. Hess, 96, Dies; Developed Fetal Heart Monitor". New York Times. "Obituary Corrections". New York Times. October 6, 2002.