

EFFECTIVENESS OF ADMISSION TEST

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ABSTRACT

Objective: To find out the effectiveness of Admission Test (AT) in detecting fetal hypoxia already present at admission to predict hypoxia in labor and to correlate the results of the AT with the perinatal outcome.

Study Design: Descriptive study.

Patients and Method: A total of 100 women in labor both high and low risk groups were selected in the study. All of them were subjected to an admission test (AT) which is a 15-20 minutes recording of fetal heart rate and uterine contractions on cardiotocograph machine at the time of admission in labor. The results of AT were not revealed to the concerned obstetrician in labor room and the test were evaluated after delivery so as not to influence the clinical management.

Results: The results of the AT were 'reactive' in 75 (75%), 'equivocal' in 22 (22%) and 'ominous' in 3 (3%) women. Women with the reactive AT had low risk of intrapartum fetal distress, 1.3% as compared to 4.5 % in the equivocal and 66.6 % in the ominous group. Operative delivery for fetal distress was required in only 1 (1.3 %) woman of the reactive group, in 1 (4.5%) woman of the equivocal group and in 2 (66.6 %) women of the ominous AT group. Resuscitation was required in 2 (2.6 %) babies of the reactive group, in 4 (18.1%) babies of the equivocal group and in 1 (33.3%) baby of the ominous AT group. Nine babies required neonatal unit and NICU admission for neonatal sepsis 5 (6.6%) were from the reactive, 2 (4.5%) were from the equivocal and 2 (66.6%) were from the ominous AT group.

Conclusion: The test was useful to detect fetal distress already present at admission and had the ability to propose fetal well being for the next few hours of labor. It is simple, convenient, non invasive and economical for screening purpose.

KEY WORDS: Cardiotocograph, fetal distress, fetal hypoxia, admission test, perinatal outcome.

INTRODUCTION

The birth of a healthy baby brings happiness to parents, family and to the obstetrician involved in the care. Labor is the most crucial period for the fetus because this is the only time to see whether it can sustain hypoxia due to stress of contraction. Early diagnosis of fetal hypoxia before the permanent damage occurs is a major challenge in the obstetric practice. So concept of intrapartum surveillance is executed. The easiest way of doing is by monitoring the fetal heart rate. The initial description of

the fetal heart rate dates to Marsac a French physician's report as early as 1650'. Intrapartum assessment of fetal well being has evolved over the last 40 years, with the primary focus being fetal heart rate assessment. Fetal heart rate monitoring maintains its role as a common intervention in obstetric unit¹. For this purpose, electronic fetal monitoring has widely been adopted². Although with intermittent auscultation the baseline fetal heart rate can be measured, other features of the fetal heart such as baseline variability, accelerations and decelerations are difficult to quantify³. Due to this fact, the use of antepartum and intrapartum cardiography has increased during the last 15 years as a consequence a considerable decrease was noted in the overall perinatal mortality and still today cardiography is first line of ante and intrapartum fetal assessment⁴.

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Received August 1, 2006; accepted: December 30, 2006.

It is known that fetal heart rate changes and acidosis at birth is not very different between low and high risk pregnancies¹. Ingemarsson et al² described an alternative method of monitoring fetal heart rate during labor, to pick the apparently low risk women whose fetus is compromised on admission or is likely to become compromised in labor is called ADMISSION TEST (AT)¹.

Admission cardiography is most frequently used procedure in more developed countries³. The AT is a short electronic fetal heart rate recording made immediately on admission to the maternity ward⁴. AT should last for 15-30 minutes, however the mother with normal trace in 5 minutes, keen for mobilization and natural labor, should not be monitored unduly¹. Admission cardiography is widely used to identify pregnancies that might benefit from continuous electronic fetal monitoring⁵. It provides information of fetal basic status and predict asphyxia that could develop during labor⁶. Main justification for AT is that the uterine contractions of labor put stress on the placental circulation and help to detect distress in the fetus that are potentially at risk. An abnormal tracing might indicate and identify potential compromise at a stage early enough to allow timely intervention, furthermore a normal AT offers reassurance. Hence low risk labors are electronically monitored for a short period on admission to the delivery ward, and continuous EFM (electronic fetal monitoring) follows only if abnormalities in the FHR are identified⁷.

The objectives of the study were to find out the effectiveness of the AT in detecting fetal hypoxia already present at admission to predict hypoxia in labor and to correlate the results (outcome) of the AT with the perinatal outcome.

PATIENTS AND METHODS

It was a descriptive study carried out in the department of obstetrics and gynaecology at Baqai Medical University from June 2004 to May 2005.

A total number of 100 pregnant women who came in labor were randomly selected for the study. Each subject was informed about the nature of the study and informed consent was taken. Inclusion criteria of the study were singleton pregnancy irrespective of gestational age and risk categorization. Exclusion criteria were intrauterine fetal death, congenital malformation, multiple pregnancy,

abnormal lie and presentation needing immediate lower segment cesarean section (LSCS), acute hypoxia like abruptio placentae, cord prolapse, scar rupture needing immediate delivery, and subjects identified for elective LSCS.

On admission, women's detail history including age, parity, antenatal care, menstrual, obstetric and medical history were documented. General physical examination was done. Per abdominal and bimanual examination were performed to determine the stages of labor, following which mothers were subjected to AT after the informed consent was taken. Pregnant women were monitored with cardiograph machine (model Meridian 800) for 15-20 minutes in a semilateral position in a separate room beside first stage labor room, the numerical display and the recording were concealed. The volume was turned off. The trace was kept in an envelope and the outcome of the test was not revealed during the labor or delivery so as not to influence the clinical management. After 15-20 minutes of monitoring, the parturient were transferred to the first stage room and were monitored intermittently by stethoscope in every 15-30 minutes for a period of one minute after contraction in first stage and after every contraction in the second stage of labor until delivery. The tracing could be as short as 10 minutes when CTG showed reactive trace. For this study a 'reactive trace' was a recording with normal baseline rate and variability, two acceleration of 15 beats above the baseline for 15 sec, and no deceleration. A 'suspicious or equivocal trace' was one with no accelerations in addition to one abnormal feature such as reduced baseline variability, presence of deceleration, baseline bradycardia or tachycardia. An 'ominous trace' was one with more than one abnormal feature or repeated ominous variable or late decelerations¹.

At delivery, perinatal outcome was assessed by the need of operative delivery for fetal distress, Apgar score, color of liquor, admission to neonatal unit, neonatal seizures and the need for intensive care unit admission. All necessary information and clinical data were systematically recorded on a predesigned performa sheet to substantiate the correct information and record. The AT was analyzed at the end of the study by the authors who had no knowledge of fetal outcome.

It was felt important to recognize that interpretation of electronic FHR should be based upon the visual pattern of heart rate as portrayed on chart recorder graph paper. Thus the choice of vertical and horizontal scaling directly effects the appearance of heart rate. The scaling factor employed in the department's machine was 20 beats/ min (ranges 50-210)and the recorder paper was spaced of 1 cm/ min.

Data obtained from the study groups were analyzed and statistically verified by Chi square test (χ^2) with the use of computer software SPSS version 10.

RESULTS

The results obtained were as follows:-

- Majority of women were between 20-29 years (85%), multipara (76.6%) and at term (92%) .

- Majority of women amongst the 100 laboring women showed reactive changes in 75 (75%), equivocal in 22 (22%) and ominous in 3 (3% Fig. 1).

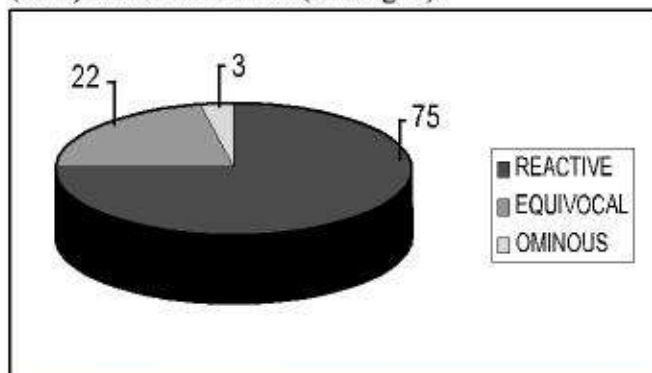


Figure 1: Result of admission test n=100.

In 75 women with reactive AT, 68 (90.7%) had normal vaginal delivery, 2 (2.6 %) had forceps vaginal delivery and 5 (6.6 %) had LSCS delivery .

In 22 women with equivocal AT, 14 (63.6%) had normal vaginal delivery, 3 (13.6%) had vacuum vaginal delivery and 5 (22.7%) had LSCS delivery. In 3 women with ominous AT, 2 (66.6 %) had normal vaginal delivery and 1 (33.3%) had LSCS delivery (Table I).

Table I: AT results and mode of delivery.

TEST	MODE OF DELIVERY			TOTAL
	NORMAL VAGINAL DELIVERY	INSTRUMENTAL DELIVERY	LSCS	
REACTIVE	68 (90.7%)	2 (2.6%)	5 (6.6%)	75
EQUIVOCAL	14 (63.6%)	3 (13.6%)	5 (22.7%)	22
OMINOUS	2 (66.6%)	2 (66.6%)	1 (33.3)	3

Statistically significant difference was observed regarding mode of delivery of three AT groups ($p= 0.006$). Fetal distress was noted in 4 babies of three AT groups: one baby (1.3 %) was from the reactive group, 1 baby (4.5 %) was from the equivocal group and 2 babies (66.6 %) was from the ominous group.

The findings showed statistically significant difference between the reactive and the ominous group in development of fetal distress ($p= 0.004$, Figure 2).

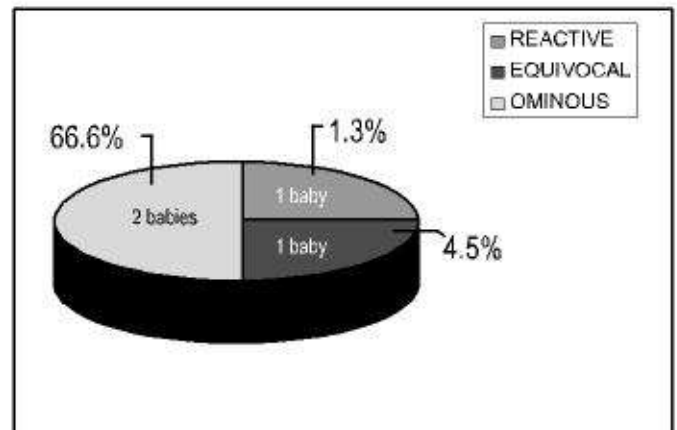


Figure 2: AT Results & fetal distress, n=4.

Interval between AT and detection of fetal distress in 4 fetuses with distress was 6 hours in the reactive group between 6 and 9 hours in the equivocal group and 3 hours in the ominous group (Table II).

Table II: Interval between AT and detection of fetal distress.

TEST	TIME (HOURS)			TOTAL
	3	6	9	
REACTIVE (n=75)	-	1	-	1
EQUIVOCAL (n=22)	-	1	1	2
OMINOUS (n=3)	1	-	-	1

Mode of delivery for distressed babies was low forceps for the reactive group baby, low forceps and LSCS for 2 (9%) babies of the equivocal group and LSCS for 1 (33.3%) distressed baby of the ominous group. Out of the 100 laboring women, 80 (80%) women had clear liquor. Among them 60 (75%) were from the reactive group, 19 (23.7%) were from the equivocal group and 1 (1.25%) was from the ominous group. Thin to moderately

thick meconium stained liquor was observed in 18 (18%) cases when 13 (72.2%) were from the reactive group, 4 (22.2%) were from the equivocal group and 1 (5.5 %) was from the ominous group. Two (2%) cases had thick fresh meconium stained liquor, 1 (50%) from the equivocal group and 1 (50%) from the ominous AT group. Apgar score at 1 minute was ≥ 7 in 69 (92 %) and ≥ 7 at 5 minutes in 75 (100 %) babies of the reactive group. It was ≥ 7 at 1 minute in 18 (81.8 %) babies and ≥ 7 at 5 minutes in 22 (100%) babies of the equivocal group and 4-6 at 1 minute in 2 (66.6%) babies. It was ≥ 7 in 1 (33.3 %) baby and ≥ 7 at 5 minutes in 3 (100%) babies of the ominous group.

Resuscitation at birth was required in 2 (2.6%) babies of the reactive group, 4 (18.18 %) babies of the equivocal group and 1 (33.3%) baby of the ominous group. Statistically significant difference was observed between the reactive and the ominous group ($p=0.008$). Nine babies were admitted in the neonatal and neonatal intensive care unit for neonatal sepsis requiring antibiotics. Five (6.6%) from the reactive group, 2 (9.0 %) from the equivocal group, and 2 (66.6%) were from the ominous group. None of babies developed neonatal seizure. There was no early death.

DISCUSSION

The results suggest that use of admission cardiography, at the start of labor is justified. It has two potential roles. First, it might act as a stress test for a fetus that might become hypoxic in labor and secondly, it might detect prompt delivery of the few fetuses that were already chronically hypoxic¹¹.

Operative delivery for fetal distress was 1 (1.3%) forceps vaginal delivery in the reactive group, 1 (4.5%) LSCS in the equivocal group and 2 (66.6%) LSCS in the ominous group. Similar observation demonstrated by Chitra and Necru¹³ i.e. operative delivery for fetal distress was 1.16 % in the reactive group, 32 % in the equivocal group and 70% in the ominous group. Ingemarsson et al⁶ observed similar results of operative delivery for fetal distress in two different studies i.e. 1.35% in the reactive group, 8.2% in the equivocal group and 50% in the ominous group. Kulkarni and Shroti¹² in their study showed progressive rise of operative delivery for fetal

distress from 5.17% in the reactive group to 28.5 % in the ominous group. Elimian et al¹⁴ is also in favor that women with non reactive AT are more likely to be delivered by LSCS, to have fetal distress resulting in cesarean section and to have longer neonatal hospital stay.

Four babies out of 100 developed fetal distress. Thermaratnam¹⁵ favors that term fetal distress should be replaced by suspected fetal compromise. Steer¹⁶ suggested that fetal distress should not be used. Instead the cause of anxiety should be specified e.g. abnormal fetal heart rate tracing, meconium stained liquor, low pH or high lactic acid level, so that scientific evaluation can be done. Among the four babies who developed fetal distress in labor, 1 (1.3%) was from the reactive group, 1 (4.5%) from the equivocal group and 2 (66.6 %) were from the ominous group. Ingemarsson et al⁶. in their another study observed development of fetal distress in 1.3% of the reactive group, 10% of the equivocal group and in 40% of the ominous group babies. Libiran et al¹⁷ observed distress in 6.5% of the equivocal group babies as measured by umbilical blood pH and apgar score. Incidence of fetal distress was 1.76% in the reactive group, 48% in the equivocal group and 100% in the ominous group in study by Chitra¹³. Hence women with the reactive AT have low risk of developing intrapartum fetal hypoxia and significantly high risk in the ominous group. Fetal AT is useful in predicting the absence of intrapartum fetal distress irrespective of criterion used for evaluation¹⁴.

The interval between AT and development of fetal distress was 6 hours in the reactive group in this study, while this interval was 6 hours and 5 hours respectively after the reactive AT in studies by Ingemarsson et al⁶ and Kulkarni et al¹². Kushtagi and Naragonis¹⁸ have shown this interval to be 6 hours after the reactive AT with no antenatal risk factor and 3 hours in patients with pre existing risk factors. It can be presumed that AT has some predictive value for the first few hours of admission to detect fetal hypoxia unless some acute obstetric accident happen like cord accidents and abruptio placentae¹⁸.

The non-reactive or ominous admission cardiogram also has modest predictive value for soft outcomes such as mild asphyxia, a diagnosis of fetal distress and operative delivery particularly in next few hours^{10,19}. National institute for clinical excellence (NICE) guidelines for

CTG monitoring in labor (NICE 2001) recommends intermittent monitoring for low risk labors and for high-risk labor it recommends continuous CTG monitoring²⁰. Thick fresh meconium in a situation of high risk is of great concern²¹. In this study, 1 (4.5%) in the equivocal and 1 (66.6%) in the ominous group were having thick meconium-stained liquor. So in all cases with FHR not classified as normal, an attempt should be made to release amniotic fluid from above the presenting part by pushing the presenting part gently upwards. If no fluid appears then the possibility of fetal compromise must also be considered²¹.

Apgar score is a poor predictor of hypoxia and acidosis^{22,23}. This is not surprising since the Apgar score is a system to assess the condition of the neonate at birth and it may be effected by several factors than hypoxia and acidosis²⁴. Apgar score at 1 and 5 min were better in the reactive and the equivocal group as compared to the ominous group. Similar difference are shown in other studies^{25,26}. Low risk babies according to AT required less resuscitation at birth. Reason of admission in the neonatal unit was neonatal sepsis. No mortality was recorded within 7 days of birth and none-of these babies suffered from early neonatal seizures.

CONCLUSION

Results of AT with perinatal outcome and mode of delivery as observed showed that AT is good, economical, non invasive, readily available screening test and can predict fetal well being during the next few hours of labor. Transition from screening test to continuous fetal monitoring is simply a continuation of admission cardiography as EFM, which is a permanent recording.

REFERENCES

1. Gibb D, Arulkumaran S. The admission test: Clinical scenarios Fetal monitoring in practice, Oxford; Boston: Butterworth-Heinemann; 1997;67-72.
2. Smith JF Jr., Ousted JH. Assessment of fetus, intermittent auscultation, electronic fetal heart rate tracing, and fetal pulse oximetry. *Obstet Gynaecol Clin North Am* 2005; 32: 245-54.
3. Thacker SB, Stroup DF. Continuous electronic heart rate monitoring for fetal assessment during labor. *Cochran Data base syst rev* 2001; (2); CD000063.
4. Lekis S, Loghis C, Parayoto N et al. Use of antepartum and intrapartum cardiography. *Clin Exp Obstet Gynaecol* 1997; 24: 79-81.
5. Arulkumaram S, Gibb DMF, Ratnam SS. Experience with a selective Intrapartum monitoring policy. *Sing J Obstet Gynaecol* 1983; 14: 47-51.
6. Ingemarsson I, Arulkumaran S, Ingemarsson E et al. Admission test, a screening test for (fetal) distress in labor. *Am J Obstet Gynaecol* 1986; 68: 800-6.
7. Phelan J. Labor admission test. *Clin perinatal* 1994; 21: 879-85.
8. Blix E, Oian P. Interobserver agreement in assessing 549 labor after standerized training programme, Admission test. *Acta Obstet Gynaecol* 2005; 84: 1087-92.
9. Impey L, Reynolds M, Mac Quillan et al. Admission cardiography, a randomised controlled trial. *Lancet* 2003; 361 : 465-70.
10. Yan P. Cardiography admission monitoring and intermittent intrapartum monitoring for fetal distress in labor. *Zhonghua Fu Chan Ke Za Zhi* 1993; 28: 217-9, 253.
11. Pello LC, Dawes G S, Smith J et al. Screening of the fetal heart rate in early labor. *Br J Obstet Gynaecol* 1988; 95 : 1128-36.
12. Chitra R, Neeru T. The role of Admission test in intrapartum surveillance In : Abstract 44th ACOG Conference, Ahmedabad 2000 : 36.
13. Kulkarni AA, Shrotri AN. Admission test, A predictive test for (fetal) distress in high risk labor. *J Obstet Gynaecol Res* 1998; 24: 255-9.

14. Elimian A, Lawlor P, Figueroa R et al. Intrapartum assessment of fetal well-being: any role of fetal admission test? *J Matern fetal Neonatal Med* 2003; 13: 408-13.
15. Thermaratnam S. Fetal distress. *Balliere's Best pract Res clin Obstet Gynaecol* 2000; 14: 155-172.
16. Steer P. Has the expression 'fetal distress' outlived its usefulness? *Br J Obstet Gynaecol* 1982; 89 : 690-3.
17. Libiran MJ, Solis MS, Santos RS et al. Admission test as a predictor of intrauterine asphyxia. *Philipp J Obstet Gynaecol* 1999; 23: 143-9.
18. Kushtagi P, Naragonis S. Labor Admission test; an effective risk screening tool. *J Indian Med Assoc* 2002; 100: 234- 6.
19. Blix E, Oian P. Labor admission test , an assessment of the test's value as screening for fetal distress in labor. *Acta Obstet Gynaecol Scand* 2001; 80: 738-43.
20. Harvey B. Use of CTG monitoring , are recommendations suitable? *RCM Midwives* 2004; 75: 18-20.
21. Gibb D, Arulkumaran S. *Cardiographic interpretation: Clinial scenarios. Fetal monitoring in practice*, Oxford; Boston: Butterworth-Heinemann; 1997; 73-85.
22. Wald F, Cuckle HS, Borcham J et al. Birth weight of infants with spina bifida. *Br J Obstet Gynaecol* 1987; 5: 78-80
23. Nelson KB , Ellenberg J H. Apgar score as predictor of chronic neurological disability. *Paediatrics* 1981; 68: 36.
25. Gauge SM, Handerson C. *CTG made easy*. Churchill Livingstone, Singapore 1997: 9-13.
26. Pearson J, Raees G. *Technique of cesarean section*. In: Charlmers I , Enkin M , Keirs MJNC (edi). *Effective care in pregnancy and child birth: childbirth* Oxford University Press, 1989 : 1234-69.
27. Krebs HB , Petties RE , Dunn LJ et al. Intrapartum heart rate monitoring multifactorial analysis of intrapartum heart rate tracing. *Am J Obstet Gynaecol* 1979 ; 13 : 173.

