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Original Research Article

LABOUR ADMISSION TEST: A SCREENING TOOL TO DETECT AT RISK FETUSES IN LOW RISK PREGNANCIES DURING LABOUR

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Abstract

Background: Aim of the study was to detect at risk fetuses in low risk pregnancies during labour. **Materials and Methods:** Study was done on 200 patients (> 37 wks) admitted to labour room. All patients were categorized into high risk and low risk in early labour and were subjected to Labour Admission Test (AT). Predictive ability of the admission test was evaluated to identify the fetuses at high risk for developing distress during labour. **Results:** Out of 80 high risk group patients, 61(76.25%) had reactive, 5(6.25%) had equivocal and 14(17.5%) had ominous AT while in 120 low risk group patients, 97(80.83%) had reactive, 6(5%) had equivocal and 17(14.16%) had ominous AT. Out of 158 patients with reactive AT, 8(5.06%) had fetal distress, while in equivocal and ominous group, the figures were 2(18.18%) out of 11 and 20 (64.51%) out of 31 respectively. Patients with ominous AT had high incidence of fetal distress. Rate of cesarean due to asphyxia, instrumental delivery rate, admission to NICU and neonatal mortality were also high in patients with ominous AT. **Conclusion:** Admission test is an important screening test to separate high and low risk patients for continuous or intermittent monitoring during active labour.

INTRODUCTION

All fetuses undergo physiological stress during labour. The commonest stress results from the intermittent interruption to maternal-fetal oxygen transfer by uterine contractions. Intrapartum fetal hypoxia has been proposed as one of the potential factors for perinatal deaths and the development of handicaps. The introduction of electronic fetal monitoring in the 1970s raised the hope that if early signs of fetal jeopardy could be detected and treated, there would be decreased neonatal morbidity and mortality. After almost 50 years of worldwide use, although there is considerable reduction in morbidity, there is still no consensus as to precisely what EFM is trying to accomplish, and how well it serves in reducing neonatal handicaps.[1] The policy of universal continuous electronic fetal monitoring has also lead to an increase in cesarean section rates.[2,3] Economic constraints and limited availability of monitors in labour wards also limit its use in low resource settings. Thus selection of patients for continuous monitoring or intermittent auscultation is necessary. Antenatal risk classification system has been used for this purpose, recommending high-risk patients for continuous monitoring. But it has been seen that fetal morbidity and mortality occur with same frequency in low-risk groups also. So an alternative method of fetal monitoring has been suggested which is short recording of FHR and uterine contractions at admission for labour - the labour admission test (AT). This is based on the thought that fetal asphyxia already present at the time of admission can be detected and may have some predictive value in labour.[4]

MATERIALS AND METHODS

Study was done on 200 patients admitted in labour room of a tertiary care institute of north India with gestational age > 37 weeks. Patients were categorized into high and low risk according to Coopland Scoring System[5]. All patients then underwent Labour Admission test- a short recording of fetal heart rate (FHR) in left recumbent position, using Sonicaid Team Fetal Monitor. FHR tracing was classified as Reactive, Equivocal or Ominous in relation to uterine contractions according to Ingemarsson and Arulkumaran's Criteria[4]. All patients were monitored by intermittent auscultation with stethoscope every 30 minutes for 1 minute

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during first and every 15 minutes in second stage of labour till delivery. After delivery, the apgar scores of each neonate were assessed. Post-delivery, the results of labour admission test (AT) were compared with the Apgar score. The data was analyzed with the help of software Epi-Info Version 6.2 for Microsoft Excel for windows. The study population was split into cohorts with different levels of reactivity of AT. Chi-square test (x analysis)/Fisher' exact test were applied to assess variables. Chi-square test for linear trend was also applied to see statistical significance owing to the natural order of the patient's classification into different groups. A p value of <0.05 was considered as statistically significant.

RESULTS

Majority of patients were in the age group of 21-25 years (48%) and mean age of patients was 21.4 years. According to Coopland Classification, 40% of patients belonged to high risk category and 60% of patients belonged to low risk category [Table 1].

According to AT, 79% of patients were in reactive, 5.5% in equivocal and 15.5% in ominous AT category [Table 2].

Fetal distress occurred in 4.34%, 25% and 47.05% in reactive, equivocal and ominous category respectively in vaginal delivery group while it was 10%, 0% and 90.90% in LSCS group in similar categories [Table 3].

Meconium was present in 6.32%, 27.27% & 64.51% in reactive, equivocal & ominous group respectively. Apgar score < 6 at 5 mins was seen in 1.89%, 0% & 16.12% in reactive, equivocal & ominous group respectively. Admissions to NICU occurred in 6.32%, 9.09% & 12.90% in three groups respectively. Neonatal deaths occurred in 0.63%, 0% & 3.2% in reactive, equivocal& ominous groups respectively [Table 4].

Predictive ability of admission test was evaluated to identify the fetuses at high risk for developing intrapartum distress. It was seen that admission test had a sensitivity of 73.3% & specificity of 88.2% with a positive predictive value of 52.3% and negative predictive value of 94.9% [Table 5].

Table 1: Distribution of Patients

VARIABLE		NUMBER	PERCENTAGE
AGE (years)	16-20	8	4
	21-25	96	48
	26-30	80	40
	31-35	16	8
GRAVIDITY	1	120	60
	2	48	24
	3	20	10
	4	8	4
	>5	4	2
SOCIOECONOMIC STATUS (CLASS) MODIFIED KUPPUSWAMY SCALE6	I	16	8
	II	32	16
	III	40	20
	IV	72	36
	V	40	20
RESIDENTIAL AREA	URBAN	84	42
	PERI-URBAN	116	58
RISK SCORING	HIGH RISK	80	40
	LOW RISK	120	60

Table 2: Distribution of Cases According to Admission Test Outcome

		NUMBER (n=200) (%AGE)		
		TOTAL	HIGH RISK (n=80)	LOW RISK (n=120)
ADMISSION TEST RESULT	REACTIVE	158 (79%)	61 (76.25%)	97 (80.83%)
	EQUIVOCAL	11 (5.5%)	5 (6.25%)	6 (5%)
	OMINOUS	31 (15.5%)	14 (17.5%)	17 (14.16%)

X^2.60 p=0.73 Not significant

Table 3: Mode of Delivery, Results of Admission Test and Fetal Distress

ADMISSION TEST RESULT (N=200)	VAGINAL DELIVERY (N=163)(81.5%)			LSCS (N=34)(17%)			INSTRUMENTAL DELIVERY (N=3)(1.5%)		
	TOTAL	FETAL DISTRESS	NO FETAL DISTRESS	TOTAL	FETAL DISTRESS	NO FETAL DISTRESS	TOTAL	FETAL DISTRESS	NO FETAL DISTRESS
REACTIVE (N=158)	138 (87.34%)	6 (4.34%)	132 (95.65%)	20 (12.65%)	2 (10%)	18 (90%)	0	0	0
EQUIVOCAL (N=11)	8 (72.72%)	2 (25%)	6 (75%)	3 (27.27%)	0	3 (100%)	0	0	0

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OMINOUS (N=31)	17 (54.83%)	8 (47.05%	9 (52.94%)	11 (35.48%)	10 (90.90%)	1 (9.09%)	3 (9.67%)	2 (66.66%)	1 (33.33%)

For Vaginal Delivery: X2(2)47.39 p=0.0000 For LSCS: Fisher's Exact test p=1.00

TABLE 3 shows that fetal distress occurred in 4.34%, 25% and 47.05% in reactive, equivocal and ominous category respectively in vaginal delivery group while it was 10%, 0% and 90.90% in LSCS group in similar categories.

Table 4: Perinatal Outcome in Relation to Admission Test

PERINATAL OUTCOME	REACTIVE (n=158) NO. (%)	EQUIVOCAL (n=11) NO. (%)	OMINOUS (n=31) NO. (%)
Presence of Meconium	10(6.32)	3(27.27)	20(64.51)
A/S <6 at 5 min	3(1.89)	0	5(16.12)
Admission to NICU	5(6.32)	1(9.09)	4(12.90)
Neonatal Deaths	1(0.63)	0	1(3.2)

1 .X2 (2) 64.66 p=0.0000 2. X2(2) 14.15 p= 0.0008

3. X2(2) 5.58 p= 0.06 4. X2(2) 1.87 p= 0.39

Table 5: Admission Test's Ability to Identify Fetal Distress (Evaluation by Statistical Methods)

Ominous + Equivocal*	Fetal Distress 22	No Fetal Distress 20	Total 42
Reactive	8	150	158
Total	30	170	200

For analysis purposes, ominous and equivocal have been taken together.

Sensitivity	73.33%	54.11% to 87.72%
Specificity	88.24%	82.42% to 92.66%
Positive Likelihood Ratio	6.23	3.92 to 9.92
Negative Likelihood Ratio	0.30	0.17 to 0.55
Disease Prevalence	15.00%	10.35% to 20.72%
Positive Predictive Value	52.38%	36.42% to 68.00%
Negative Predictive Value	94.94%	90.27% to 97.79%
Accuracy	86.00%	80.41% to 90.49%

DISCUSSION

Low risk pregnancies account for about half of admissions to a neonatal intensive care unit.[5] In 1989, ACOG indicated that fetuses of laboring women could be assessed by intermittent auscultation or by electronic monitoring of FHR.[8] Intermittent auscultation however is subjective and difficult to verify and document. In developing countries like India, with low staff patient ratio in labour wards, sole reliance on auscultation can be a matter of concern and at times dangerous. So electronic FHR monitoring has been developed as a central component of obstetric practice. Despite criticism, continuous fetal monitoring is currently used in Western World.[8] But economic constraints and few monitors in labour wards limits its use in developing countries. So selection of patients for intermittent auscultation or continuous monitoring is important. At present different antenatal risk classifications are being employed to segregate patients into high and low risk categories, and then recommending high risk patients for continuous monitoring. Unfortunately, risk assessment classifications have proven to be insufficient tool as fetal morbidity and mortality are not uncommon in low risk group. In such scenario, an alternative is short recording of FHR on admission for labour ward- labour admission test (AT). This is based on the thought that fetal asphyxia already present at the time of admission can be detected and may have some predictive value in labour.[4]

The mean age of patients in the study was 21.4 years whereas mean age of patients in different studies by Hegde et al.[10] and Kushtagi et al.[11] was 23.8 yrs and 27.8 years respectively. According to Coopland Scoring system 40% patients belonged to high risk group while 60% belonged to low risk group. Kushtagi et al found 33.2% in high risk and 66.8% in low risk categories. On the basis of AT 70% patients had reactive test while 5.5% had equivocal and 15.5% had ominous admission test. The concordant observations have been made by Vanita Das et al.[12] In a study by Ingemarsson et al.[4] and Hegde et al.[10], the percentage of ominous tests in these studies were less probably because these were done in low risk patients only.

In our study, in high risk category 76.25% had reactive AT, 6.25% had equivocal and 17.5% had ominous AT while in low risk group 80.83% had reactive, 5% had equivocal also 14.16% had ominous AT. Similar results were seen in study by Vanita Das et al.[12] and Kushtagi et a1.[11] In a study

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by Hafizur et al.[13], 77% had reactive, 14.4% equivocal and 8.7% ominous AT in high risk group.
Studies have shown that there is progressive rise in fetal distress as the AT moves from reactive to ominous group. In our study, in reactive group 5.06% had fetal distress while in equivocal and ominous group it was 18.18% and 64.51% respectively. Incidence of fetal distress was much higher in high risk group (8.19% in reactive, 20% in equivocal and 85.71% in ominous group respectively) than in low risk group (3.09% in reactive, 16.66% in equivocal and 47.05% in ominous group). Instrumental delivery and LSCS rate was also high in abnormal LAT result group than reactive test group. Fetal distress was more common in ominous group as compared to reactive group who delivered vaginally.
Incidence of presence of meconium, Apgar score <6 at 5 min, admission to NICU and neonatal death were also high in ominous group.
Predictive ability of the AT was evaluated to identify the fetuses at high risk for developing intrapartal distress. Sensitivity of the test is low 73.3% with high specificity (88.23%). Negative Predictive value is very high (94.9%) as compared to positive predictive value of 52.38%. Similar results are seen by Ingemarsson et al (sensitivity 80% & specificity 89.6%) and Kushtagi et al.[11] (sensitivity 53% & specificity 93%).

CONCLUSION

Labour admission test is an important non-invasive method, which can be used both in high and low risk patients, to segregate them for continuous or intermittent monitoring during labour depending upon results of AT.

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