Efficacy of Admission Test in Predicting the Fetal Outcome

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Abstract: *Routine electronic fetal monitoring of fetal heart rate in labour has become an established obstetric practice in world.But with few monitors available there is a need to find a method without compromising fetal outcome.Admission test may serve to address this problem.Objective was to access admission test during labour as a predictor of fetal outcome.In this test admission test was conducted in 100 cases for a period of 1 year among which 50 cases were of high risk group and 50 cases were of low risk group.Out of 50 high risk cases 31 were reactive ,10were suspicious and 9 were ominous on trace.Among 50 low risk cases 42 were reactive,6 were suspicious and 2 were ominous pattern.In high risk cases,among reactive group,6 cases developed fetal distress later on while in suspicious group,4 cases developed fetal distress and in ominous group 7 cases developed fetal distress.Among 50 low risk group,in reactive group 4 cases developed fetal distress,while in suspicious group 1 case developed fetal distress and in ominous group no case developed fetal distress.By going for admission test ,there will be decrease in the load of continous monitoring and can identify patients likely to develop adverse fetal outcome.Ominous and suspicious pattern require vigilant monitoring.Admission test can detect fetal distress already present on admission and unnecessary delay in intervention can be avoided.*

I. Introduction

The ultimate goal of having a healthy mother and healthy baby has been a prime concern of health care providers-the obstetricians.The main issue that confounds the Obstetricians is still birth and that of neonatologist is perinatal loss.According to American College of Obstetricians and Gynecologists(1999),the goal of antepartum fetal surveillance is to prevent fetal death.Fetal heart rate monitoring maintains its role as a common intervention in obstetric unit.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 quantify.For this purpose ,electronic fetal monitoring has widely adopted.Admission test is the non stress test done at the time of admission to labour ward.Non stress test describes fetal heart rate acceleration in response to fetal movement as a sign of fetal health.

II. Aims And Objectives

The aim and objective of the present study is to evaluate the efficacy of admission test for detecting the patient at risk of developing intrapartum fetal hypoxia,to detect the fetus with intrauterine hypoxia present already at the time of admission,to compare the role of admission test in low risk and high risk groups and the mode of delivery in relation to admission test.

III. Materials And Methods

This study was conducted for one year in the department of obstetrics and gynaecology Guntur medical college Guntur in the year 2014.This study group consisted of 100 antenatal women attending the labour ward in government general hospital Guntur.Among which 50 cases were low risk and 50 cases were high risk group.All the pregnant women underwent admission test in first stage of labour for aperiod of 20 min and then categorized as reactive ,suspicious and ominous based on FIGO recommendations.[1]**Reactive**: Normal acceleration(>15beats),for >15 seconds in 20 minutes,traces with no accelerations but normal baseline variability(10-25 bpm),normal baseline rate with early deceleration but with accelerations.

Suspicious: Normal baseline with no rate accelerations in 20 min and reduced baseline variability (5-10 bpm),abnormal baseline rate($\geq$160bpm)with no accelerations ,variable decelerations without ominous signs.

Ominous: Baseline variability of <5bpm and abnormal baseline rate,repeated late decelerations ,repeated variable decelarations with any of the following ominous signs –durations>60 s and deceleration >60 beats from the baseline FHR ,rebound tachycardia ,slow recovery,reduced variability between decelerations. **Inclusion**

criteria: Any age group, gestational age>34 wks , singleton pregnancy with cephalic presentation,any socioeconomic status and patients who are likely to deliver within 24 hrs of admission test. **Exclusion**

Criteria: Polyhydramnios,multiplepregnancy,malpresentations, antepartum hemorrhage and congenital anomalies. The outcome was analyzed by associations of various FHR tracings with respect to incidence of operative deliveries , APGAR score at 1 and 5 min and NICU admissions.Perinatal outcome was defined as adverse when atleast 2 of the following were present.[2] (1)Interventions done for fetal distress.(2)APGAR score at 5min was<7.(3)need for NICU admissions.

IV.   Results

The results of the study are tabulated and analysed:

Table 1comparing Parity And Age In High Risk And Low Risk Groups:

Total	Low risk	High risk	Gravida
50	20	22	Primi
50	30	28	Multi
			Age
49	27	22	< 20 yrs
37	27	23	21 - 25 yrs
13	3	7	26 - 30 yrs
1		1	31 - 35 yrs

Table2 Ctg Pattern In High Risk And Low Risk Group:

OMINOUS	SUSPICIOUS	REACTIVE	CASES	
9	10	31	50	HIGH RISK
2	6	42	50	LOW RISK

Table 3   Distribution Of Risk Factors In High Risk Group:

24	PIH
9	POST DATED PREGNANCY
3	ANTEPARTUM ECLAMPSIA
2	BAD OBSTETRIC HISTORY
1	DIABETES
2	HEART DISEASE
2	JAUNDICE
5	OLIGOHYDRAMNIOS
1	PPROM
1	PROM
8	ANEMIA
3	IUGR

Table 4distribution Of Mode Of Delivery And Ctg Pattern In High Risk Group:

HIGH RISK						MODE OF DELIVERY
23 (46 %)						VAGINAL
OMINOUS		SUSPICIOUS		REACTIVE		
%	Cases	%	Cases	%	Cases	
22.2	2	40	4	54.83	17	
21 (42 %)						LSCS
OMINOUS		SUSPICIOUS		REACTIVE		
%	Cases	%	Cases	%	Cases	
55.5	5	50	5	35.48	11	
6 (12 %)						OUTLET
OMINOUS		SSUSPICIOUS		REACTIVE		
%	Cases	%	Cases	%	Cases	
22.2	2	10	1	9.6	3	

Table5 Distribution Of Mode Of Delivery And Ctg Pattern In Low Risk Group:

LOW RISK						MODE OF DELIVERY
39 (78 %)						VAGINAL
OMINOUS		SUSPICIOUS		REACTIVE		
%	Cases	%	Cases	%	Cases	
100	2	66.6	4	78.5	33	
6 (12 %)						LSCS
OMINOUS		SUSPICIOUS		REACTIVE		
Cases	%	Cases	%	Cases		
#	#	16.6	1	11.9	5	
5 (10 %)						OUTLET
OMINOUS		SUSPICIOUS		REACTIVE		
%	Cases	%	Cases	%	Cases	

#	#	1 6 . 6 7	1	9	4

P value(0.001) for vaginal and cesarean section was statistically significant but for outlet forceps p value(0.749)the difference was not statistically significant.

Table 6indications For Lscs In High Risk And Low Risk Group:

LOW RISK	HIGH RISK	RISK FACTOR
1	5	CPD
4	9	FETAL DISTRESS
#	2	BOH
#	2	DTA
1	3	PROM WITH FAILURE TO PROGRESS

Table 7results Of Admission Test In Relation To Incidence Of Fetal Distress And Meconium Stained Liquor In High Risk Group:

HIGH RISK						INDICATION OF FETAL DISTRESS
					n = 5 0	APGAR <7
N O F E T A L D I S T R E S S			F E T A L D I S T R E S S (1 7)			
OMINOUS	SUSPICIOUS	REACTIVE	0MINOUS	SUSPICIOUS	REACTIVE	
2	6	2 5	7	4	6	
					n = 3 3	MECONIUM STAINED LIQUOR
C L E A R L I Q U O R			T H I C K M E C O N I U M L I Q U O R (1 7)			
OMINOUS	SUSPICIOUS	REACTIVE	OMINOUS	SUSPICIOUS	REACTIVE	
3	8	2 2	6	2	9	

Admission test in relation to incidence of fetal distress (APGAR<7)in high risk group:sensitivity:64.70%,specificity:75.75%,positive predictive value:57.89% and negative predictive value :80.65%. In relation to incidence of meconium stained liquor sensitivity: 47.15%,specificity:66.66%,positive predictive value:42.10%and negative predictive value:70.96% .

Table 8result Of Admission Test In Relation To Incidence Of Fetal Distress And Meconium Stained Liquor In Low Risk Group:

LOW RISK						INDICATION OF FETAL DISTRESS
					n = 5 0	APGAR<7
N O F E T A L D I S T R E S S			F E T A L D I S T R E S S (5)			
O	S	R	O	S	R	
2	5	3 8	#	1	4	
					n = 4 5	MECONIUM STAINED
C L E A R L I Q U O R			T H I C K M E C O N I U M L I Q U O R (5)			
O	S	R	O	S	R	
3 8	5	2	4	1	#	

Admission test in relation to incidence of fetal distress(APGAR score<7)and thick meconium stained liquor in low risk group:sensitivity:20%,specificity:84.44%,positive predictive value:12.5%and negative predictive value:90.47% .

Table 9result Of Admission Test In Relation To Incidence Of Apgar Score<7 In Total Cases:

APGAR SCORE >7	APGAR SCORE<7	NO OF CASES	ADMISSION TEST
63	10	73	REACTIVE
11	5	16	SUSPICIOUS
4	7	11	OMINOUS

Admission test in relation to incidence of APGARscore <7 in total(high risk+low risk)cases:sensitivity:54.54%,specificity:80.77%,positive predictive value:44.44%and negative predictive value:86.30%.

Table 10result Of Admission Test In Relation To Incidence Of Thick Meconium Stained Liquor In Total Cases:

CLEAR LIQUOR	MECONIUM STAINED	NO OF CASES	ADMISSION TEST
60	13	73	REACTIVE
13	3	16	SUSPICIOUS
5	6	11	OMINOUS

Admission test in relation to incidence of thick meconium stained liquor in total(high risk+low risk)cases:sensitivity:40.90%,specificity:76.92%,positive predictive value:33.33%and negative predictive value:82.19%.

Table 11results Of Admission Test In Relation To Nicu Admissions In High Risk And Low Risk Group:

TOTAL CASES			LOW RISK			HIGH RISK			
R	S	O	R	S	O	R	S	O	NO OF CASES
73	16	11	42	6	2	31	10	9	
R	S	O	R	S	O	R	S	O	NICU ADMISSION
9	4	5	3	1	#	6	3	5	
R	S	O	R	S	O	R	S	O	HEALTHY
64	12	6	39	5	2	25	7	4	

O- OMINOUS, S-SUSPICIOUS ,R-REACTIVE Admission test in relation to NICU admissions in high risk groups: sensitivity:57.14%specificity:69.44%positive predictive value:42.10% and negative predictive value:80.64%. Admission test in relation to NICU admission in low risk group: sensitivity:25%,specificity:84.78%,positive predictive value:12.5% and negative predictive value:92.85%.NICU admissions in relation to admission test in total cases: sensitivity:50%,specificity:78.04%,positive predictive value:33.33% and negative predictive value:87.67%.

Table 12perinatal Moratality:

CAUSE	OUTCOME	APGAR	DELIVERY	ADMISSION TEST
BIRTH ASPHYXIA	DIED AFTER 3 HOURS	<7	LSCS	OMINOUS
BIRTH ASPHYXIA	STILL BORN	-	VAGINAL	OMINOUS
MECONIUM ASPIRATION SYNDROME	DIED AFTER 2 DAYS	<7	OUTLET FORCEPS	OMINOUS

Most of the women included in the study group were multigravidas and were around 20 yrs of age(TABLE1)**.** There was more incidence of ominous pattern in high risk group,when compared to low risk group(TABLE2).High risk group consisted of 50 patients.the common high risk factors were,pregnancy induced hypertension(24),post dated pregnancy(9),others being IUGR ,anemia and antepartum eclampsia(TABLE 3).39 women in low risk group and 23 women in high risk group had vaginal delivery,21 women in high risk and 6 women in lowrisk group had caesarean section. 6 women in high risk and 5 women in low risk had outlet forceps.The difference in modes of delivery were compared.P value less than 0.05 is significant, p value for vaginal and cesarean section was statistically significant ,but for outlet forceps the difference was not statistically significant. Among the patients with ominous pattern 5 out of 9 cases had cesarean section,fetal distressbeing the indication in 3 cases.2 delivered by outlet forceps and 2 delivered by vaginal delivery.Among the patients with suspicious pattern,5 out of 9 cases had cesarean section,fetal distress being the indication of 2 cases.4 patients had spontaneousvaginal delivery and one patient deliveredby outlet forceps.In patients with reactive pattern group,11 out of 31 cases had cesarean section in which indication for 4 cases was fetal distress.while in the rest of cases ,cesarean section was done due to other causes like cephalopelvic disproportion,premature rupture of membranes with failure to progress.3 patients delivered by outlet forceps while the rest delivered spontaneously.In low risk group, 33 women with reactive pattern ,4 women with suspicious pattern and 2 with ominous pattern delivered vaginally.Out of the women undergoing lscs,5 had reactive pattern and 1 had suspicious pattern.4 women with reactive pattern and 1 with suspicious pattern delivered by outlet forceps.(TABLE 4 & 5).In this study,the common indications for cesarean section were,fetal distress and cephalopelvic disproportion,others being bad obstetric history and deep transverse arrest.(TABLE 6). It was observed that, APGAR<7 was seen in 17 babies in high risk and 5 babies in low risk group. This difference was statistically significant(<0.05).Thick meconium stained liquor was seen in 17 women in high risk and 5 women in low risk, which was statistically significant(<0.05).NICU admissions were done for 14babies in high risk and 4 babies in low risk group. The difference being statistically significant(0.05).Among 31 women with reactive pattern, 6 women had babies with APGAR<7, in which one case had abruption placenta leading to low APGAR.4 out of 10 cases with suspicious pattern and 7 out of 9 cases with ominous pattern had low APGAR.7 out of 9 cases with ominous pattern ,developed fetal distress.the predictive value of an ominous pattern in high risk group,for detecting fetal distress was high(77.77%). In low risk women ,among 42 women with reactive pattern,4 babies had fetal distress.In women with suspicious pattern ,one baby had low APGAR score.but both the babies with the ominous pattern had healthy babies.The predictive value of a reactive pattern,for a healthy baby was high(90.48%).

The incidence of thick meconium stained liquor was significantly high in groups with suspicious and ominous pattern when compared to reactive pattern.6 out of 9 cases with ominous pattern,had thick meconium

stained liquor.In suspicious pattern,2 out of 10 cases had thick meconium stained liquor. In cases with reactive pattern,9 out of 31 cases had thick meconium stained liquor.One case had abruption placenta with blood stained liquor.The predictive value of an ominous pattern for detecting fetal distress was high(66.67%).The predictive value of a reactive pattern for a healthy baby was 70.97%.In low risk group,both the cases with ominous pattern had clear liquor.One case with suspicious pattern had thick meconium stained liquor. In patients with reactive pattern,4 cases had thick meconium stained liquor.the negative predictive value of admission test, in low risk group was high 90.47%. The incidence of thick meconium stained liquor was more in cases with ominous pattern .6 cases out of 11 cases with ominous pattern had fetal distress .In suspicious pattern,3 out of 11 cases developed thick meconium.13 out of 73 cases with reactive pattern had thick meconium stained liquor.The predictive value of a reactive pattern for healthy baby was 82.19%.(TABLE 7&8).

Among 100 cases in the study group 10 out of 73 women with reactive pattern had fetal distress.in women with suspicious pattern 5 out of 16 cases and in women with ominous pattern,7 out of 11 cases had low APGAR score.The predictive value of a reactive pattern,for a healthy baby was high(86.30%).the predictive value for an ominous pattern for detecting fetal distress was high(63.63%).(TABLE 9). The incidence of thick meconium stained liquor was more in cases with ominous pattern.6 out of 11 cases with ominous pattern had fetal distress.in suspicious pattern,3 out of 11 cases developed thick meconium stained liquor.13 out of 73 cases with reactive pattern had thick meconium stained liquor.(TABLE10)

Significantly more number of babies born to women with ominous and suspicious pattern,had NICU admissions when compared to women with reactive group.only 6 out of 31 cases with reactive pattern,were admitted in NICU.The predictive value of a reactive test for a healthy baby was 80.64%.5 out of 9 cases with ominous pattern,3 out of 10 cases with suspicious pattern had NICU admissions.Sensitivity of NICU admissions in low risk group was low.Only one baby, with non reactive pattern being admitted in NICU.3 babies in reactive group had NICU admissions.the predictive value of a reactive pattern for a healthy baby was 92.85%.9 babies out of 27 cases with non reactive pattern had NICU admissions.9 babies out of 73 cases with reactive pattern had NICU admissions.the predictive value of a reactive pattern for a healthy baby was 87.67%.(TABLE-11). Perinatal moratlity was seen in 3 cases in high risk group.one baby was delivered by normal vaginal delivery,it was a fresh still birth. It had ominous pattern admission test and it was antepartum eclampsia complicating pregnancy.other baby was delivered by LSCS which also had ominous pattern and died in NICU 3 hours after birth due to severe birth sphyxia.the third baby was delivered by outlet forceps which also had ominous pattern .the baby died in NICU after 2 days due to meconium aspiration syndrome.(TABLE- 12)

V. Discussion

In our study incidence of thick meconium stained (22%),delivery by lscs (27%),APGAR SCORE<7 at 5min(17%),NICU admission(18%) and perinatal mortality(3%) is comparable to another study.which showed the incidence of meconium stained(28.3%),delivery by lscs (60.9%),APGAR SCORE <7 at 5min(8.7%),NICU admission(15.2%) and perinatal mortality(4.3%).[3]Our study showed a good correlation between abnormal CTG and APGAR score <7 and NICU admission as compared to another study.[3] The present study showed an incidence of 73% normal pattern,16% suspicious pattern and 11% ominous pattern,which is comparable to another study which showed 68% normal pattern,29%suspicious pattern and 6% ominous pattern.[4]Our study showed higher percentage of both suspicious and ominous pattern. This may be probably due to the fact that, our hospital is a tertiary referral centre,where most of the complicated deliveries were referred from PHC's and district hospitals.[4] In our study,admission test in relation to APGAR score<7,the sensitivity is54.54%,specificity is80.77%,positive predictive value is44.44% and negative predictive value is86.30%,which is comparable to another studywhere the sensitivity is21.43%, specificity is 87.50%,positive predictive value is40.0%and negative predictive value is74.12%.Our study had a higher sensitivity and negative predictive value and the positive predictive value were almost similar.[5]In another study sensitivity(44%),specificity(93.12%),negative predictive value(52.2%)and negative predictive value(90.6%).Our study had a higher sensitivity when compared to the other study but specificity and negative predictive value were almost similar in both studies.[6] In our study in high risk group,perinatal morbidity in suspicious(40%)and ominous group(77.77%)were similar to perinatal morbidity in suspicious(31.42%) and ominous group(85.71%) of another study.[7] In the present study,labour admission test is effective as screening test the sensitivity for admission test is 54.54%,specificity:80.77%,positive predictive value:44.44%and negative predictive value:86.30%.In another study the sensitivity(66.7%),specificity(93.3%) and positive predictive value(53.3%),the sensitivity and positive predictive value of both the studies were comparable for admission test as a screening test.[8]

VI. Conclusion

The goal for intrapartum fetal surveillance is to identify the fetus at risk.it signifies,the need for early detection and timely intervention.the conclusion drawn from this study are, 1.Admission carditocography testing is used to identify patients likely to develop adverse fetal outcome.Admission test is a simple safe,non

invasive,economical investigation which can be done on every patient in labour.A reactive test has a high predictive value for a healthy baby.An ominous pattern also has high predictive value for detecting fetal distress.Thus labour admission test can be used as an intranatal screening test. 2. A normal admission test is a reliable indicator of fetal well being. The incidence of fetal distress is significantlymore in patient with suspicious and ominous pattern admission test.Ominous and suspicious patternrequire vigilant monitoring. 3. The admission test in high risk group has more sensitivity when compared to that of low risk group. Hence the admission test has a role in high risk group. 4. There is increased incidence of operative delivery in high risk group when compare to low risk group. The incidence of operative delivery is even more in suspicious and ominous pattern of admission test in high risk groups. Hence these results suggest that by early recognition of fetal compromise by labour admission test ,timely intervention can be done there by reducing fetal morbidity and mortality.Thus electronic fetal monitoring should be appropriately utilized,neither too much nor too little.The result of admission test is used to identify patients likely to develop adverse fetal outcomes and help in optimal utilization of labour room resources.

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