J. of Obst. & Gyn. of India Vol. 52, No. 5 : September/October 2002 Pg 26-29

Admission Test as a Screening Procedure for Perinatal Outcome

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Summary

Intrapartum foetal monitoring appeared to take a great leap forward in the 1960's; when Hon introduced foetal electrode for continuos monitoring of foetal heart activity and Saling introduced foetal blood sampling and blood gas/PH estimation.

This study was undertaken to evaluate the utility and reliability of admission test for perinatal outcome and to compare the subjective visual interpretation of the test results with that of Fischer's Scoring System. It was found that admission test could be used as a screening procedure to detect preexisting foetal hypoxia and plan early intervention to prevent adverse perinatal outcome. The interpretation of the test by both methods was in agreement and found no added adverse outcome, as a consequence of different methods used for interpretation. So the simple and less time consuming subjective visual interpretation can be used to read the test results in our day-to-day practice.

Introduction

Fetal Heart Rate is an indirect indicator of fetal well being during the intrapartum period. Although the FHR was monitored by using Pinard Stethoscope, 1 in 100 babies alive at the onset of labour was born dead, without showing any premonitory signs of distress (Bracero & Schulman 1986). A fetal heart rate outside the normal limits (normal =120 – 160 beats /min). was recognized, indicating fetal distress, emergency delivery of the fetus did not show any signs of compromise (Bracero & Schulman 1986). Hence electronic fetal monitoring pioneered by Edward Hon in late 1960's had been used as continuous electronic fetal monitoring to evaluate fetal well being in labour. The electronic fetal monitoring is clearly a screening and not a diagnostic tool (Zuspan et al 1979). It has got many advantages. The technique is easy, data is continuous not intermittent and with direct recording information. Fetal heart rate and uterine activity are objectively measured and displayed together, provide reliable, reproducible, recoverable and predictive information about the fetal condition (Schifrin and Dame 1972). In most institutions, where routine fetal monitoring has been instituted, the fetal death rate in labour has been reduced to close to zero (Haverkamp et al 1979). The main limitation of electronic monitoring is the difficulty in interpretation of fetal heart rate-uterine contraction record (Tejani et al 1975). External tocograph showing uterine tonus and contractile amplitude are misinterpreted. Economic constraints in the developing countries curtailed the use of this modality to monitor the entire labour of all patients.

Hence a short recording of the fetal heart rate for 15 to 20 minutes on admission in labour has been suggested as a screening "admission test" (Ingemarsson et al 1986). It can detect fetal distress already present at admission and unnecessary delay in intervention can be avoided in such cases. It seems to have some predictive value for the fetal well being for the next few hours of labour. The test is simple to perform. A reactive test with two accelerations in the first 10 minutes probably makes extension of the recording unnecessary

and such a short test time makes screening convenient statistical analysis including only reactive and ominous tests shows a high predictive value of a normal test (98.7%) and high a specificity (99.4%) (Ingemarsson et al 1986). But there is only a low predictive value (40%) and a low sensitivity (23.5%) for abnormal test.

This study was undertaken firstly, to evaluate the utility and reliability of admission test for perinatal outcome. Secondly, to compare the methods of interpretation of the test results. Fischer et al introduced a scoring system based on baseline, FHR variability, acceleration, and deceleration to interpret antepartum and intrapartum FHR monitoring. We used this scoring system to interpret the admission test and compared it with the criteria as suggested by Ingemarsson and Arulkumaran in 1986.

Ingemarsson's and Arulkumaran's Criteria

Reactive/normal : Two accelerations (greater than 15 beats, greater than 15 seconds) in 20 minutes. Traces with no accelerations but normal baseline rate and normal baseline variability (10-25 beats/minute). Normal baseline rate with early deceleration but with accelerations.

Equivocal : Normal baseline rate with no accelerations in 20 minutes and reduced baseline variability (5-10 beats/minute). Abnormal baseline rate (greater than or equal to 160 beats per minute) with no accelerations. Variable decelerations without ominous signs.

Ominous : Baseline variability of less than five beats per minute and abnormal baseline rate. Repeated late decelerations. Repeated variable decelerations with any of the following ominous signs; duration greater than 60 seconds and decelerating greater than 60 beats from the baseline FHR, rebound tachycardia, slow recovery, reduced variability between decelerations, late component.

Material and Methods

200 patients admitted to the labour room of St John's Medical College Hospital during April-May 2000 were enrolled in the study. All patients in labour who had completed 37 weeks of gestation were included in the study. Patients admitted in second stage of labour, for elective caesarean section and with preterm labour were excluded from the study.

All patients had an electronic tracing (admission test) in semilateral position for 20 minutes. The results of the tests were interpreted after delivery, so as not to influence the clinical management. All the low risk patients were monitored by intermittent auscultation with a stethoscope every 30 minutes till delivery. High risk patients like gestational diabetes, PIH, IUGR, Oligohydramnios, BOH etc. were monitored by intermittent tracing or by continuous electronic monitoring.

Foetal distress was found to be present when ominous tracings led to early intervention either by caesarean section or by instrumental vaginal delivery or if the new born was depressed (Apgar less than 7 at 5 min) after spontaneous vaginal delivery. Statistical analysis was done using Chi square test and Kappa coefficient.

The admission tests were analysed after delivery by the two authors independently by two different methods. Both authors were not aware of the foetal outcome while interpreting the results. One used the Fischer Hammacher and Krebs scoring system; while the other used Visual scoring system devised by Ingemarsson and Arulkumaran.

Results

Table I :- shows the outcome of the admission test in relation to intra uterine asphyxia. 136 patients

Fischer's FHR Scoring System

	0	1	2
Baseline FHR (BPM)	<100 >180	100-119 161-180	120-160
High frequency waves			
Amplitude (BPM)	<5	5-10	>10
Frequency	<3	3 – 6	>6
Low frequency waves/ 20 minutes			
above baseline (acceleration)	0	1-3	>3
Below baseline (deceleration)	>3	1 – 3	0

Table I – Perinatal outcome of admission test

Outcome of Admission Test	Perinatal outcome					
	Normal		Fetal Distress		Total	
	N	%	N	%	N	%
Reactive	127	93.3	9	6.6	136	100
Equivocal	42	72.4	16	27.6	58	100
Ominous	2	33.3	4	66.6	6	100

Table II – Mode of Delivery in Relation to outcome of Admission Test

Mode of Delivery		Reactive		Equivocal		Ominous	
FTND	FD+VE	1	0.73%	3	5.17%	2	33.3%
	FD-VE	96	70.58%	39	67.24%	2	33.3%
LSCS	FD+VE	3	2.2%	8	13.79%	2	33.3%
	FD-VE	2	15.44%	2	3.44%	0	-
Instrumental	FD+VE	5	3.67%	5	8.62%	0	-
Delivery	FD-VE	10	7.35%	1	1.72%	0	-
Total		136	100%	58	100%	6	100%

FD = Fetal Distress

Table III – Scoring System Vs Visual Impression

Fischer's Score	Ingemarrson's & Arulkumarn's Visual Impression							
	Reactive		Equivocal		Ominous		Total	
	N	%	N	%	N	%	N	%
8-10	99	92.5	8	7.5	0	-	107	100
5-7	35	45.45	40	51.94	2	2.59	77	100
< 5	2	12.5	10	62.5	4	25	16	100

had a reactive admission test, out of which 127 (93.3%) babies had a normal perinatal outcome. 9 (6.6%) showed evidence of fetal distress. Out of the latter group 5 had forceps delivery, 1 delivered spontaneously and 3 had LSCS. In the forceps group 4 patients were with PIH, IUGR and oligohydramnios and one with RHD with MS and MR. In the LSCS group one had abruption at 3 cm dilatation and a 3.2 kg baby was extracted at LSCS with good outcome. The other 2 were post dated for whom ARM was done and on continuous EFM showed FHR changes requiring emergency LSCS.

58 patients had tracing of non reassuring pattern. 6 patients had ominous tracings at admission of which 4 delivered spontaneously and 2 had LSCS. Out of the 4 FTND, 2 babies had good apgar while the third patient was unbooked with hydrocephalous detected after admission test and cephalocentesis was done in labour resulting in a still born baby. The fourth baby was born to a multi gravida with anemia, IUGR and oligohydramnios with low apgar and required NICU care for 3 weeks. Out of the LSCS group, one patient had PIH, IUGR and APH and a 1.92 kg baby kept in NICU for 2 weeks. The other patient had thick meconium stained liquor with abnormal FHR changes on EFM for which LSCS was done and a 2.58 kg baby of low apgar with meconium aspiration syndrome kept in NICU for 10 days.

Table II shows the mode of delivery in relation to admission test and foetal distress. 136 patients belonged to the reactive group; of which 9 (6.6%) had foetal distress. In this group 1 (0.73%) had spontaneous delivery, 3 (2.2%) had caesarean section and 5 (3.67%) had instrumental delivery. 58 patients belong to suspicious group of which 16 (27.5%) had foetal distress. In this group 3 (5.17%) had spontaneous delivery, 8 (13.79%) had caesarean section and 5 (8.62%) had instrumental delivery, 6 patients belong to ominous group of which 4 (66.6%) had foetal distress. In this group 2 (33.3%) had spontaneous delivery and 2 (33.3%) had caesarean section.

Table III shows the comparison between Fischer's scoring system and Ingemarsson's visual criteria of admission test for 200 patients. Here 107 had

a score of 8-10; of which 99 (92.5%) had reactive NST and 8 (7.5%) suspicious NST and none had ominous NST. 77 patients had a score of 5-7 of which 35 (45.45%) had reactive NST and 40 (51.9%) had suspicious and only 2 (2.59%) had ominous NST. 16 patients had a score of <5 of which 4 (25%) had ominous NST. 10 (62.5%) had suspicious NST and 2 (12.5%) had reactive NST.

Using Kappa method of statistical analysis

Observed agreement	=	0.7152
Kappa Coefficient	=	0.4542
Std error of Kappa	=	0.0588
One tail P value	=	0.000000

This analysis shows the probability of error in using subjective visual interpretation is almost negligent. In other words both methods of interpretation of the test results are in agreement.

Discussion

While evaluating the role of admission test in predicting fetal outcome, it was seen that out of 136 patients with reactive NST, 9 had fetal distress. Of these one had abruptio placenta and another had cardiac disease complicating pregnancy. The others had no obvious reasons to develop fetal distress late in labour requiring operative intervention. Hence this is a useful screening test but for a limited time period only. Krebs et al (1979) had concluded in his study that FHR changes are frequently complicated by multiple abnormalities in the last 30 minutes of labour and hence a normal tracing arly in labour does not give us total assurance that abnormalities will not occur late in labour. Probably another study is needed to evaluate the reliability of reactive test in relation to time period. Kulkarni and Shrotri (1998) found that fetal distress showed a progressive rise from reactive (5.17%) to ominous (28.5%) group. The perinatal morbidity also showed a rise from 6.8% in the reactive to 31.42% in the equivocal and 85.71% in the ominous group (Kulkarni and shrotri 1998). In this study the perinatal morbidity was 6.6% in the reactive, 27.5% in the suspicious and 66.6% in the ominous group (P = 0.00000083). Ingemarsson et al found that while assessing the usefulness of the admission test in patients in labour, a statistical analysis shows a predictive value of 98.7% for a reactive test with high specificity of 99.4%. In this present study we found a predictive value of 93.4% for a reactive test with a specificity of 98.45%. The predictive value of an abnormal test was 66.6% with a low sensitivity of 30.9% which was similar to that of Ingemarsson et al-40% predictive value and 23.5% sensitivity.

The scoring system introduced by Hammachar et al 1974, modified by Fischer et al in 1976 using multiple factors to analyse the intrapartum FHR, was found by Krebs et al 1979 to have a better predictability of fetal outcome. So while comparing this system with the criteria established by Ingemarsson and Arulkumaran we found that both methods of interpretations were in agreement and there was no adverse perinatal outcome as a consequence of this. Hence the latter method which is simple and less time consuming is adequate to interpret the admission test and there is no added advantage using the time consuming Fischer's scoring system.

While continuous electronic fetal monitoring is being used widely for intrapartum monitoring for all patients in labour in a developing country like ours the cost factor has to be taken into consideration. So the admission test can be used as a screening technique to detect preexisting fetal distress and plan early intervention to prevent adverse perinatal outcome. Continuous monitoring or intermittent tracing can be restricted to only those patients with high risk factors like severe PIH, IUGR, Oligohydramnios, Gestational diabetes, BOH etc. reducing the perinatal mortality and morbidity to a great extent.

References

1. Bracero L A, Schulman M. Clin Obstet Gynecol 29: 3-11, 1986.
2. Fischer W M, Stude I, Brandt H Z. Geburtshilfe Perinatol 180: 116, 1976.
3. Hammacher K, Braun Del R R, De Grande P, Richter R Gynaekol. Rdsch (Suppl.) 14: 61, 1974.
4. Haverkamp A D, Orleans M, Langendoerfer S, McFee J, Murphy J, Thompson H. E. Am. J. Obstet. Gynecol 134: 399, 1979.
5. Ingemarsson I, Arulkumaran S, Ingemarsson E, Tambyraja R C, Ratnam S S. Obstet Gynecol. 68: 800, 1986.
6. Krebs H B, Petres R E, Dunn L J, Jordaan H V F, Segreti A. Am J Obstet Gynecol 133: 762, 1979.
7. Kulkarni AA, Shrotri A N, J. Obst Gyn Res. 24(4): 255, 1998.
8. Schifrin B. S., and Dame L. JAMA 219; 1322 (No. 10) 1972.
9. Tejani N, Mann L. Bhakthavathasalan A, Weiss R. R., Obstet Gynecol 46; 396, 1975.
10. Zuspan F P, Qnilligan E J, Iams J D, Geiju H P Van. Am. J. Obstet Gynecol 135; 287, 1979.