

Intrapartum Vibroacoustic Stimulation Test and Cardiotocography for the Prediction of Neonatal Outcome

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ABSTRACT

Objectives: To evaluate the role of intrapartum vibroacoustic stimulation (VAST) and cardiotocography (CTG) for the prediction of neonatal outcome.

Materials and methods: One hundred and twenty-five patients in labor with cephalic presentation were selected and subjected to CTG and VAST was done further to find out whether fetus is reactive or nonreactive and findings were correlated with the fetal outcome.

Results: VAST is a good predictor of fetal well being. It is less time consuming, inexpensive and technically easy to perform. In developing countries, where fetal scalp blood sampling is not available in all institutions, VAST can effectively be used as a clinical tool to complement abnormal CTG traces for better prediction of fetal outcome.

Keywords: Vibroacoustic stimulation test, Cardiotocography.

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INTRODUCTION

Electronic fetal monitoring became a tool for early detection and management of fetal distress. Accelerations of fetal health surveillance (FHS) observed with fetal movements is regarded as a reliable sign of fetal well being.⁴ Often fetus is asleep and there is absence of spontaneous fetal heart rate (FHR) acceleration, manual manipulation, auditory or visual stimuli has been shown to evoke a response of FHR acceleration during intrapartum period^{1,6}

Vibroacoustic stimulation is a simple noninvasive method and it has been proposed as a tool in the assessment of fetal well being in the presence of nonreassuring CTG during first and second stages of labor. Presence of normal FHR tracing is associated with almost good outcome, but nonreassuring CTG is not uniformly associated with acidosis. It always needs further testing. Fetal scalp blood pH determination has been used since long for further assessment. VAST can be used as an alternative to fetal blood sampling for further assessment of abnormal CTG traces as it is simple and noninvasive.²

MATERIALS AND METHODS

Around 125 patients in labor, with cephalic presentation, were selected and, after detailed history and examination, patients were subjected to cardiotocography (CTG). The equipment used for monitoring was Agilent fetal monitor series 50 IP monitor.

Interpretation of CTG traces during labor was done according to Arulkumaran et al 1987.¹ Acoustic stimulator by Teksonic instruments with sound pressure level of 80 to 85 dB was used for VAST. The fetus was stimulated for 3 seconds. If no quantifying accelerations were noted, the stimulus was repeated at 1 minute interval for maximum three times and recording was done for 5 minutes. Interpretation of VAST was done according to Ingemarrson et al 1988.³ All patients were carefully followed till delivery to find out the pregnancy outcome. Parameters like meconium staining of liquor, fetal distress during labor, mode of delivery, Apgar score, NICU admission and perinatal mortality were recorded. Z and P test were used for statistical analysis of the significance of incidence rate of each measure of pregnancy and perinatal outcome.

OBSERVATIONS

In the present study of 125 patients comparison of CTG with VAST was done (Table 1). CTG was reactive in 62 patients (49.6%), Suspicious in 45 patients (36%) and ominous in 18 patients (14.4%). VAST was reactive in 95 patients (76%) and nonreactive in 30 patients (24%). Out of 45 suspicious traces of CTG, 31 patients (68.9%) were found to be reactive and 14 patients (31.1%) were nonreactive by VAST. Among the 18 ominous traces, two patients (11.1%) were reactive and 16 patients (88.9%) were nonreactive by VAST. Thus, there was increase in the number of reactive trace from 62 patients (49.6%) in CTG group to 95 patients (76%) in VAST group.

When correlation of CTG, VAST with meconium staining of liquor was done (Table 2). The incidence of meconium staining was nine (14.5%) in reactive normal trace, five (16.1%) in reactive suspicious trace and 0 (0%) in reactive ominous trace compared to 0 (0%), 9 (64.3%) and 11 (68.8%) in nonreactive trace of normal, suspicious and ominous traces respectively. It shows that, if suspicious and ominous CTG traces have reactive VAST, the incidence of meconium staining is less.

When correlation of CTG, VAST and mode of delivery was done (Table 3), the incidence of LSCS for clinical fetal distress (CFD) was 3 (4.8%), 10 (32.3%) and 1 (50%) in reactive normal, suspicious and ominous traces respectively

Table 1: Correlation of CTG and VAST

CTG	No.	Reactive		Nonreactive	
		No.	%	No.	%
Normal	62	62	100	0	0
Suspicious	45	31	68.9	14	31.1
Ominous	18	02	11.1	16	88.9
Total	125	95	76.0	30	24.0

Table 2: Correlation of CTG, VAST with meconium staining of liquor

CTG	VAST	No.	Meconium	
			No.	%
Normal	R	62	09	14.5
	NR	00	00	00.0
	Total	62	09	14.5
Suspicious	R	31	05	16.1
	NR	14	09	64.3
	Total	45	14	31.1
Ominous	R	02	00	00.0
	NR	16	11	68.8
	Total	18	11	61.1
Total		125	34	27.2

Table 3: Correlation of CTG, VAST and mode of delivery

CTG	VAST	No.	LSCS (CFD)	
			No.	%
Normal	R	62	03	4.8
	NR	00	00	0.0
	Total	62	03	4.8
Suspicious	R	31	10	32.3
	NR	14	08	57.1
	Total	45	18	40.0
Ominous	R	02	01	50.0
	NR	16	11	68.8
	Total	18	12	66.7
Total		125	33	26.4

as compared to 0 (0%), 8 (57.1%) and 11 (68.8%) in nonreactive group normal, suspicious and ominous traces respectively. Table 4 shows correlation of CTG, VAST with neonatal outcome. In normal traces none of the babies had Apgar score less than 7 at 1 and 5 minutes. In suspicious traces only 3 (9.7%) babies in the reactive group had Apgar score of less than seven out of them two recovered in 5 minutes compared to nonreactive group in which five (37.7%) babies were having less than 7 Apgar score at 1 minutes and four babies recovered at 5 minutes and one (7.1%) expired. In ominous traces in reactive group

one (50%) baby out of two and in nonreactive group, two (12.5%) out of 16 babies were having Apgar score of less than 7 at 1 minute. At 5 minutes, one (50%) baby recovered in nonreactive group and other baby had less Apgar score and finally her baby died.

DISCUSSION

In the present study, when correlation of CTG with VAST was done among the normal 62 traces, all were reactive after VAST. Out of 45 suspicious traces, 68.9% were reactive and 31.1% were nonreactive. In the ominous traces, 11.1% were reactive and 88.9% were nonreactive. When we compare our results with Arulkumaran et al¹ study, reactive responses were 90.2% in suspicious group and 42.9% were reactive in ominous group. Thus, there was increase in the number of reactive traces on further subjecting to VAST from 62 patients (49.6%) to 95 patients, 76% out of 125 patients studied. Thus, VAST can effectively be used to compliment abnormal CTG traces.

When correlation of CTG, VAST with meconium staining of liquor was done, it was found that if suspicious and ominous CTG traces have reactive VAST, the incidence of meconium was less (16.1% and 0%) as compared to nonreactive traces (64.3% and 68.8%) respectively. Our results were comparable with the study of Sarno et al.

When CTG and VAST were compared for mode of delivery, it was found that the reactive suspicious and ominous traces have less incidence of cesarean section for clinical fetal distress (32.3% and 50%) as compared to nonreactive trace (57.1% and 68.8%) respectively. Thus, we can avoid unnecessary operative interference for fetal distress, if suspicious and ominous traces became reactive on further testing by VAST. Our findings were in consistent with the study of Sarno et al.⁵

When suspicious and ominous traces had reactive VAST than very less number of babies had poor Apgar score at 1 minute (9.7% and 50%) as compared to nonreactive suspicious and ominous traces (35.7% and 12.5%). At 5 minutes, the incidence of low Apgar score is less in reactive group (3.2% and 0%) as compared to nonreactive group (7.1% and 6.3%) in suspicious and ominous traces.

Table 4: Correlation of CTG, VAST and neonatal outcome

CTG	VAST	No.	Apgar score (<7)				NICU admission		Expired	
			1 min		5 mins		No.	%	No.	%
			No.	%	No.	%				
Normal	R	62	0	0	0	0	0	0	1	1.6
	NR	00	0	0	0	0	4	6.5	0	0
	Total	62	0	0	0	0	4	6.5	1	1.6
Suspicious	R	31	3	9.7	1	3.2	3.0	9.7	0	0
	NR	14	5	35.7	1	7.1	5	35.7	1	7.1
	Total	45	8	17.8	2	4.4	8	17.8	1	2.2
Ominous	R	02	1	50	0	0	1	50	0	0
	NR	16	2	12.5	1	6.3	7	43.8	1	6.3
	Total	18	3	16.7	1	5.6	8	44.4	1	5.6
Total		125	11	8.8	3	2.4	20	16	3	2.4

NICU admission was less in reactive suspicious group as compared to nonreactive (9.7% and 35.7%). While in ominous group, NICU admission rate was almost same in reactive and nonreactive group (50% and 43.8%).

None of the baby expired in both suspicious and ominous reactive group, while 7.1% and 6.3% babies expired in nonreactive suspicious and ominous traces respectively. Thus, from the present study, it was seen that, when there is acceleration on VAST, the incidence of clinical fetal distress, meconium staining of liquor, admission NICU and mortality were less especially in suspicious and ominous reactive traces. In cases of suspicious traces, there is a need to double check, so VAST can be used as an adjunct for better prediction of hypoxia so that unnecessary operation interference for CFD can be avoided.

CONCLUSION

The presence of a normal traces is associated with an almost good fetal outcome. Alternatively suspicious and ominous pattern are not uniformly associated with acidosis. Thus, the appearance of an abnormal FHR pattern always need an additional method of assessment to avoid unnecessary operative interference so VAST is a good predictor of fetal well being. It is less time consuming, inexpensive and technically easy to perform. In developing countries, where fetal scalp blood sampling is not available in all institutions, VAST can effectively be used as a clinical tool to compliment abnormal CTG traces for better prediction of fetal outcome.

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