

Color Doppler Versus Non Stress test as Predictors of Adverse Perinatal Outcomes in Pre Eclampsia

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Abstract

Objectives: To Compare The Efficacy Of Doppler Technique Over Nonstress Test (Nst) In Predicting Fetal Compromise In Utero In Cases Of Pre Eclampsia Pregnancies And Feto Maternal Outcome.

Method: A Total Of 100 Third Trimester Pregnant Patients Hospitalized As Pre Eclampsia Cases, Were Examined Prospectively And Serially Color Doppler And Nst.

After Admission, The Patients Underwent Routine Antenatal Surveillance Including External Ultrasound Cardiocography Recordings Performed As Nst For 20 Min Daily Or Sometimes Twice Daily.. The Umbilical Cord Was Insonated By Doppler Ultrasound Beam Directed Towards The Fetal Abdomen, The Fetal Vessels Were Located In The Standard Plane And Doppler Evaluated Regards To Pulsatility Index; Cerebroplacental Ratio And Absence Or Reversal Of Flow. For Analysis Of The Results, The Patients Were Grouped According To Findings At The Cardiocography And Doppler Flow Examinations: **Group A** Had Normal Nst And Normal Flow Velocity, **Group B** Had Abnormal Nst (Suspect, Slight Or Severe Pathological Nst), At One Or More Occasions And Normal Flow Velocity Waveform, **Group C** Had Normal Nst And Abnormal Flow Velocity Waveform At One Or More Occasions **Group D** Had Both Abnormal Nst And Flow Velocity Waveform

The Chi Square Test Was Used For Statistical Analysis Of The Data With Continuity Correction As Appropriate, A P Value <0.05 Being Considered Significant.

Odds Ratio and Confidence Interval Were Calculated In Comparative Groups

Results: Fetal Doppler Has The Power To Discriminate Between Sick And Healthy Fetuses And With Serial Measurements It Is Possible To Monitor Any Deterioration In The Fetus. In Chronic Hypoxia Doppler Changes Occur First While Abnormal Fetal Heart Tracings Represent Late Signs Of Fetal Deterioration. Though Both Test Results Were Effective In Predicting Abnormal Outcome, The Significant Advantage Of Doppler Over Nst Observed In Our Study In Group D Was That Doppler Showed Changes Earlier Than Nst Giving A Significant Lead Time Of Up To 9 Days With An Average Of 4.14 Days.

Conclusion: Doppler Is Useful In Recognizing Fetal Compromise Earlier Than Nonstress Test Giving A Lead Time Which Is Important In The Management Of Pre Eclampsia Pregnancies. Combined Fetal Testing Modalities Such As Doppler, Nst And Biophysical Profile Provide A

Wealth Of Information Regarding Fetal Health. Integrated Fetal Testing Would Be Ideal For Individualized Care Of The Preterm Compromised Fetus For Timed Intervention.

Keywords: Color Doppler, Non-stress, Pre Eclampsia

Introduction

The Timely Detection Of Morbid Changes In The Fetal Status Followed By Adequate Interventions To Avoid Death Or Disability Is One Of The Most Important Objectives Of Prenatal Care. Antepartum Surveillance Tests To Evaluate Fetal Health Have Been The Focus Of Intense Interest For More Than Three Decades. This Prospective Longitudinal Study Is Designed To Ascertain Whether Changes In Umbilical Artery Flow Velocity Waveform Predict Fetal Compromise Earlier And With Better Accuracy Than Cardiotocography By Means Of Non-Stress Test (Nst).^{1,2} This Could Therefore Permit The Timing Of Delivery Thus Reducing Perinatal Morbidity And Mortality.

Aims and Objectives

To Compare The Efficacy Of Doppler Technique Over Nonstress Test (Nst) In Predicting Fetal Compromise In Utero In Cases Of Pre Eclampsia Pregnancies And Feto Maternal Outcome.

Materials and methods

The Prospective Study Was Conducted For A Period Of 3 Years. All Pregnant Women In The Third Trimester Attending The Antenatal Clinic With Preeclampsia, Were Selected. A Detailed History Regarding The Age And Parity, Booked/Unbooked Status, Rural–Urban Origin, And Drug History Of The Women Was Noted. Women Who Agreed To Participate In The Study Were Subjected To The Protocol Of Study.

Exclusion Criteria

Intra uterine Foetal demise, Fetus with congenital anomaly, Women in labour, Antepartum haemorrhage, Diabetes mellitus, Chronic medical disorders of pregnancy,

Small for gestational age , Multiple pregnancy.

After Admission, The Patients Underwent Routine Antenatal Surveillance Including External Ultrasound Cardiotocography Recordings Performed As Nst For 20 Min Daily Or Sometimes Twice Daily. The Tracings Were Evaluated With Regards To Baseline, Variability, Occurrence Of Accelerations, Decelerations And Reactivity. The Tracings Were Classified As:

Normal Nst

At Least Two Accelerations with Fetal Movements Or Contractions, Baseline Heart Rate 120-160 Beats/Min, Baseline Variability 5-10 Beats/Min Or >25 Beats/Min For > 20 Min

Suspected Pathological Nst

No Acceleration, Baseline Heart Rate 100 – 120 Beats/Min Or 160 -180 Beats/Min, Baseline Variability 5 – 10 Beats /Min Or > 25 Beats/Min For >20 Min.

Slight Pathological Nst

Baseline Heart Rate <100 Or .180 Beats/Min, Occasional Moderate Variable Decelerations

Severe Pathological Nst

Silent Pattern/Sinusoidal, Late Decelerations, Severe Variable Decelerations.

The Use Of Doppler Ultrasound During Pregnancy And The Examinations Were Performed After The Patients Had Given Their Informed Oral Consent. The Examinations Were Done At The Bedside With The Patient In Semirecumbent Position And During Fetal Quiescence.

The Fetal Vessels Were Located In The Standard Plane. Doppler Study Was Considered Abnormal When Any Of The Parameters Mentioned Below Was Abnormal.

1. Pulsatility Index Of Umbilical Artery (Ua) > 2 Sd For The Gestational Age.
2. Absence Or Reversal Of End Diastolic Flow In Ua
3. Pi Of Mca < 5th Percentile For The Gestational Age
4. Abnormal Cerebroplacental Ratios Pi Mca/Ua < 1.083

All Women Were Subjected To Doppler Velocimetry, And Nsts Were Divided Into Group A (Doppler And Nst Normal), Group B (Doppler Abnormal And Nst Normal), Group C (Doppler Normal And Nst Abnormal), And Group D (Doppler And Nst Both Abnormal) On The Basis Of The Last Nst And Doppler At Least 1 Week Before Delivery.

Doppler Velocimetry Was Repeated Weekly Or Twice Weekly Depending Upon The Severity Of The Compromise. Nst Was Repeated Daily In Cases Of Severe Preeclampsia Or On Alternate Days In Other Cases. If The Nst Was Reassuring And The Doppler Was Also Normal, The Surveillance Tests Were Repeated According To Protocols Mentioned Above Unless The Maternal Condition Necessitated Delivery.

Observations and results

In table no 1 mean age among the groups in this study group the mean as of mother is between 20-30 years. In all four groups no statically significant difference. NST was significantly 100% Absent in Group C and Group D as compared to Group A and group B. (P < 0.001S). according to NST group A have abnormal NST cases 0 and group B have 0 and group c have 8(10%) group D have 30(38%)

ABSENCE OF EDF was present in significantly more 100% in group C, 94.59% in Group A compared to 72% in Group B and 73.33% in Group D (P < 0.033S)

according to absence of EDF group A 2 cases 5.41 and group B have 7 cases 28 and group c have 0 cases and group d have 8 cases 26.67. mean abnormal CP ratio among the groups we can see that group A have abnormal cp ratio in range of 2.038 ± 0.7149 group B see shows 1.070 ± 0.5325, group C shows 1.694 ± 0.9366, group D shows 1.477 ± 0.7814 all four groups has statically significant difference. No significant difference was observed according to gravidity status. (P = 0.224NS). distribution of the cases according to parity group A 15(40.54%) Primi cases and group b have 15 primi (60%) group c have 4 (50%) and group D have 20 (66.67%) distribution of the cases according to mode of delivery group A have 10(27.03%) group B have 17 (68%) group c have 4 (50%) group d have maximum no of cases 22(73.33%). LSCS were significantly more in Group B and group D (68% and 73.33% respectively) as compared to group A and group C (27.03% and 50% respectively) P < 0.001S.

Table no. 2 Shows Distribution of the cases according to perinatal at outcome group A have live issue 33(89.19%) maximum in group A, group B have live 20 (80%) group c have 8 (10%) group d have 24(80%).

mean birth weight if the baby (in kgs) among the group A have baby birth weight mean 2.1, group B have 1.95 group c have 2.2 group d have 1.77 all four groups are statically significant difference in baby birth weight. According to APGAR < 7 AT 5 MINS) group A have 5 (13.51%) neonate and group b 2(8%) groups c 2(25%) group d 8(26.67%), according to NICU admission group A have 10 NICU ADMISSION (27.03%) group B have 17 (68%) group c have 4 (50%) group d have maximum no of

cases 22(73.33%) maximum NICU ADMISSION. There is statically significant difference, according to neonatal complications group A have 7(18.92%) group B have 8 (32%) group c have 0 group d have 24(80%) maximum no of cases with neonatal complications.

Study of Doppler Variable

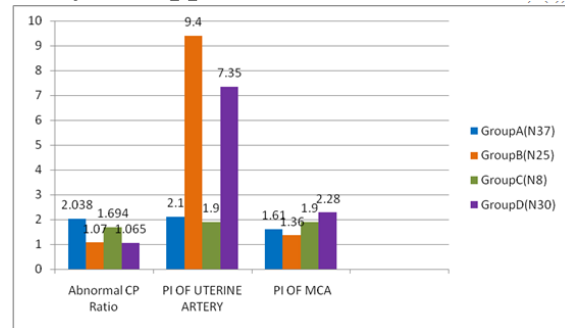


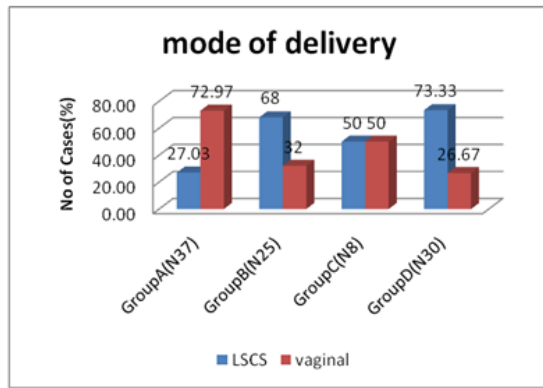
Table 1

	GroupA (N37)	GroupB (N25)	GroupC (N8)	GroupD (N30)	P Value LS
	NO(%)	NO(%)	NO(%)	NO(%)	
Age	28.42±4.05	26.32±3.04	27.5±1.93	25.8±2.5	0.009
Abnormal nst	0(0)	0(0)	8(100)	30(100)	<0.001
Absence of EDF	35(94.59)	18(72)	8(100)	22(83)	<0.033
Pi of uterine artery	21.92±88.72	9.40±25.5	1.9±1.70	7.35±23.02	0.663
Pi of mca	1.61±0.78	1.36±0.47	1.90±0.51	2.28±2.77	0.185
Parity	NO(%)	NO(%)	NO(%)	NO(%)	
Multi	22(59.46)	10(40)	4(50)	10(33.33)	
Primi	15(40.54)	15(60)	4(50)	20(66.67)	0.22
Mode of delivery					
Lscs	10(27.03)	17(68)	4(50)	22(73.33)	
Vaginal	27(72.97)	8(32)	4(50)	8(26.67)	<0.001

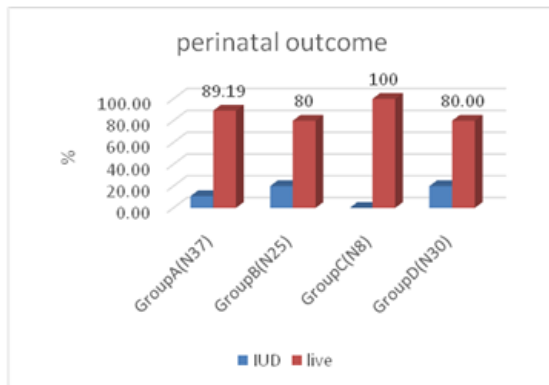
Table 2

	GroupA (N37)	GroupB (N25)	GroupC (N8)	GroupD (N30)	P Value
Perinatal Outcome	NO(%)	NO(%)	NO(%)	NO(%)	
Birth Weight Of The Baby (In Kgs)Mean ±Sd	2.19±.422	1.95±.289	2.20±.407	1.77±.262	<0.001
Iud (No%)	4(10.81)	5(20)	0-	6(20)	
Live(No%)	33(89.19)	20(80)	8(100)	24(80)	
Apgar <7 At 5 Mins) (No%)	5(13.51)	2(8)	2(25)	8(26.67)	
Nicu Ad. (No%)	10(27.03)	17(68)	6(75)	22(73.33)	<0.001
Neonatal Complications(No%)	7(18.92)	8(32)	0	24(80)	<0.001

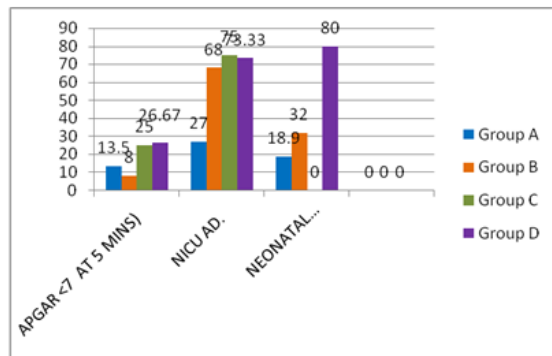
Mode of Delivery



Perinatal outcome



Neonatal Characteristics



Discussion

It is evident that when both NST and Doppler are abnormal the baby weight and gestational age at birth are low while overall morbidity and mortality is high. Though both test results were effective in predicting abnormal outcome, the significant advantage of Doppler over

NST observed in our study in Group D was that Doppler showed changes earlier than NST giving a significant lead time of up to 9 days with an average of 4.14 days. Though Doppler was abnormal in both B and D groups, perinatal outcome was better in Group B. When neonatal survival prospects are good it is better to deliver the compromised fetus than to monitor till the development of abnormal NST as is evident from the perinatal outcome in Group B.

Doppler can detect fetal adaptations like BSE occurring early in the decompensation cascade. A low PI in MCA and/or cerebroplacental ratio <1.08 reflects it.

Fetal Doppler has the power to discriminate between sick and healthy fetuses and with serial measurements it is possible to monitor any deterioration in the fetus. In chronic hypoxia Doppler changes occur first while abnormal fetal heart tracings represent late signs of fetal deterioration.

Combined fetal testing modalities such as Doppler, NST and biophysical profile provide a wealth of information regarding fetal health. Integrated fetal testing would be ideal for individualized care of the preterm compromised fetus for timed intervention.

Group C where NST is abnormal and Doppler is normal forms such a small group that it becomes statistically insignificant.

Conclusion

Doppler is useful in recognizing fetal compromise earlier than nonstress test giving a lead time which is important in the management of preterm pre-eclampsia pregnancies. An abnormal NST following an abnormal Doppler is associated with the worst perinatal outcome. In cases with abnormal Doppler if the prospects for neonatal survival are good, it is better

To Deliver The Fetus Before Nst Becomes Abnormal. We Observed That In Cases With Normal Doppler, Sudden Abnormal Nst Indicates Acute Hypoxia. Nst Still Holds Its Importance In Fetal Monitoring Because Of Its Ease Of Performance And Cost Effectiveness. But Both The Tests Are Complimentary To One Another In Fetal Surveillance Of Pre Eclampsia Pregnancy. The Clinical Scenario However Dictates The Choice Of The Appropriate Test..

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