

## Color Doppler Versus Non Stress test As Predictors of Adverse Perinatal Outcomes in High risk Pregnancies

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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 High Risk Pregnancies And Feto Maternal Outcome.

**Method:** A Total Of 50 Third Trimester Pregnant Patients Hospitalized As High Risk Cases,Were Examined Prospectively And Serially With 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 Preterm High Risk 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.

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### I. 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 Cardiocography By Means Of Non-Stress Test (Nst).<sup>1,2</sup> This Could Therefore Permit The Timing Of Delivery Thus Reducing Perinatal Morbidity And Mortality.

### II. Materials And Methods

The Prospective Study Was Conducted For A Period Of 2 Years.All Pregnant Women In The Third Trimester Attending The Antenatal Clinic With Mild Preeclampsia, Severe Preeclampsia, Severe Preeclampsia With Fgr, Or Idiopathic Fgr (Expected Fetal Weight Below The 10th Percentile) 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:** Multiple Pregnancy, Congenital Anomalies, Other Medical Disorders, And Acute Insults Such As Abruption, Scar Dehiscence, Or Cord Prolapse.

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 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 < 5<sup>th</sup> Percentile For The Gestational Age
4. Abnormal Cerebroplacental Ratios Pi Mca/Ua < 1.083

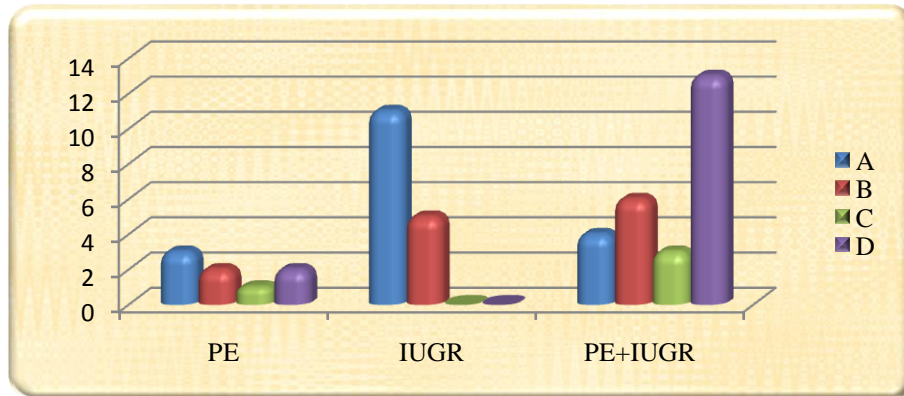
All Women Were Subjected To Doppler Velocimetry, And Nsts Were Divided Into Group A (Doppler And Nst Normal), Group B (Doppler Abnormal And Nst Normal), Group C (Doppler Normal And Nst Abnormal), And Group D (Doppler And Nst Both Abnormal) On The Basis Of The Last Nst And Doppler At Least 1 Week Before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

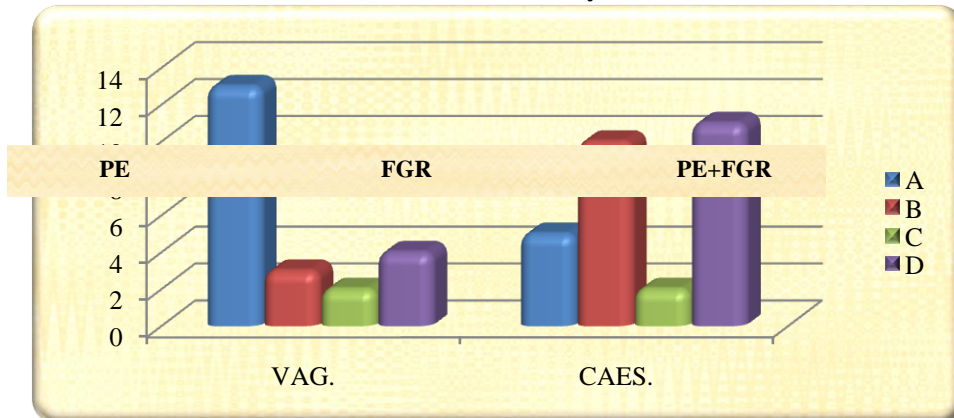
### III. Results And Observation

	Group A (N=18) Nst=N Doppler =N	Group B (N=13) Nst=N Doppler= Ab	Group C (N=4) Nst=Ab Doppler =N	Group D (N=15) Nst=Ab Doppler =Ab
Mean Prd.Of Gestation At Admission (Weeks)	35 Wk	32 Wk	32.5 Wk	31 Wk
<b>Pregnancy Complication</b>				
Preeclampsia (Pe)	3	2	1	2
Fgr	11	5	-	-
Pe+Fgr	4	6	3	13
<b>Mode Of Delivery</b>				
Vaginal	13	3	2	4
Caesarean	5	10	2	11
<b>Perinatal Outcome</b>				
Survival	15	9	4	5
Intrauterine Death	2	3	-	3
Neonatal Death	1	1	-	4
Perinatal Death	-	-	-	3
<b>Neonatal Characteristics</b>				
Period Of Gestation (Weeks)	36	34	33.5	33
Preterm Babies	1	7	1	12
Average Birth Weight	2.2kg	1.9kg	2.1kg	1.5kg
Apgar <7 At 5mts	2	1	1	7
Admission To Nicu	8	11	1	15
Neonatal Complications	1	4	-	11

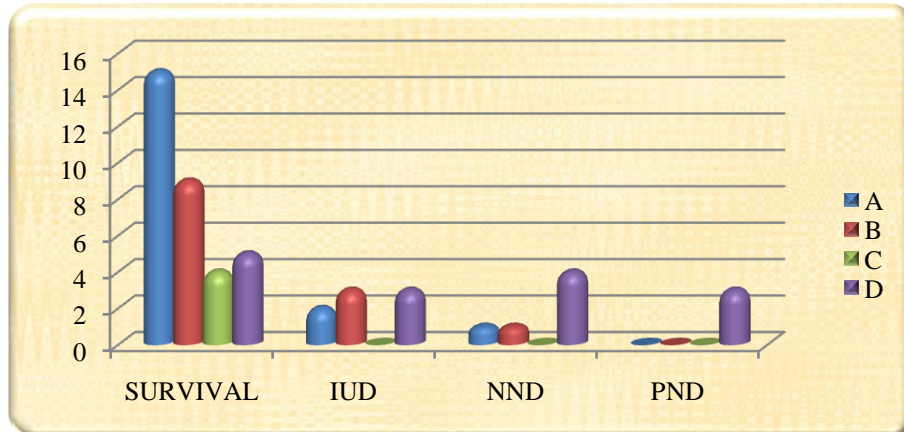
#### Pregnancy Complications



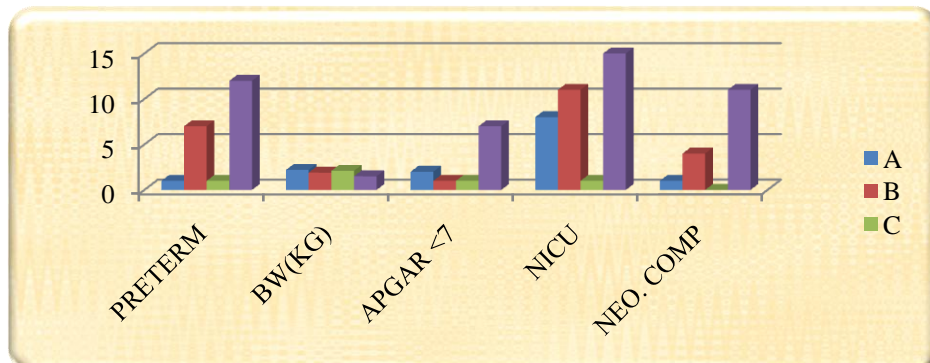
Mode Of Delivery



Perinatal Outcome



Neonatal Characteristics



#### **IV. 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.

#### **V. Conclusion**

Doppler Is Useful In Recognizing Fetal Compromise Earlier Than Nonstress Test Giving A Lead Time Which Is Important In The Management Of Preterm High Risk 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 High Risk Pregnancy. The Clinical Scenario However Dictates The Choice Of The Appropriate Test..

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