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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/19788
DOI URL: http://dx.doi.org/10.21474/IJAR01/19788

RESEARCH ARTICLE

EVALUATION OF UTERINE ARTERY, UMBILICAL ARTERY AND FETAL MIDDLE CEREBRAL ARTERYUSING COLOR DOPPLER IN PATIENTS WITH PREGNANCY INDUCED HYPERTENSION IN PREDICTING THE PERINATAL OUTCOME

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Manuscript Info

Manuscript History
Received: 29 August 2024
Final Accepted: 30 September 2024
Published: October 2024

Key words:-
Pregnancy-Induced Hypertension, Doppler Ultrasound, Uterine Artery, Umbilical Artery, Middle Cerebral Artery, Perinatal Outcome

Abstract

Background: Pregnancy-induced hypertension (PIH) is associated with adverse perinatal outcomes. Doppler ultrasound of the uterine artery (UtA), umbilical artery (UA), and fetal middle cerebral artery (MCA) is a non-invasive tool for predicting these outcomes.
Objective: To evaluate Doppler ultrasound in predicting perinatal outcomes in PIH.
Methods: A longitudinal study of pregnant women with PIH (gestation >26 weeks) was conducted using color Doppler to assess UtA, UA, and MCA. Doppler indices (PI, RI, S/D ratio) were analyzed in relation to perinatal outcomes, particularly low Apgar scores.
Results: Umbilical artery PI showed the highest sensitivity (73.3%) for predicting low Apgar scores. The uterine artery RI had the highest sensitivity (96.7%) but low specificity. MCA SD ratio had high specificity (80%) and sensitivity (70%). Doppler indices of UtA, UA, and MCA were useful in predicting adverse perinatal outcomes, with MCA and umbilical artery abnormalities being highly specific.
Conclusion: Doppler ultrasound of UtA, UA, and MCA provides valuable prognostic information in PIH. MCA and umbilical artery abnormalities are particularly predictive of adverse outcomes, while uterine artery RI, though sensitive, lacks specificity.

Introduction:-

- Hypertensive disorder during pregnancy brings invarious complications such as abnormal placentation, oxidative stress with release of vasoactive substances, increased thromboxane and/or cytokines triggered vascular and organ dysfunction1.
- USG studies with Doppler have helped to revolutionize the study of vascular disturbances in various human diseases and the vascular abnormalities during pregnancy, particularly high risk pregnancies, hypertensive disorders of pregnancy and IUGR2.
- Nowadays, Doppler ultrasound of utero-placental, umbilical and fetal vessels has become established method of antenatal monitoring, allowing the non-invasive assessment of fetal circulation3.
- Various indices are used to assess the Doppler waveforms, such as systolic flow velocity/diastolic flow velocity (S/D ratio), Pulsatility index (PI), resistance index (RI), cerebroplacental ratio (CP Ratio), cerebrouterine ratio

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(CU ratio). Doppler studies of the uterine artery (UtA), umbilical artery (UA) and middle cerebral artery (MCA) have shown excellent predictive value in different studies in evaluation of pregnancies at risk4,5.

Aims And Objectives:-

- To assess the value of Doppler Ultrasound in predicting the perinatal outcome in patients with pregnancy induced hypertension.
- To evaluate the role of Doppler Ultrasound in the management of pregnancy induced hypertension.

Research Methodology:-

Longitudinal follow-up study was done in Pregnant women with pregnancy induced hypertension referred from the department of Obstetrics & gynecology to antenatal ultrasound in the department of Radio diagnosis in Mahadevappa rampure medical college and hospital, Kalaburgi by using GE LOGIQ P5, LOGIQ P9, LOGIQ F6color Doppler with multi frequency curvilinear probe 3-5 MHz.

Inclusion Criteria:

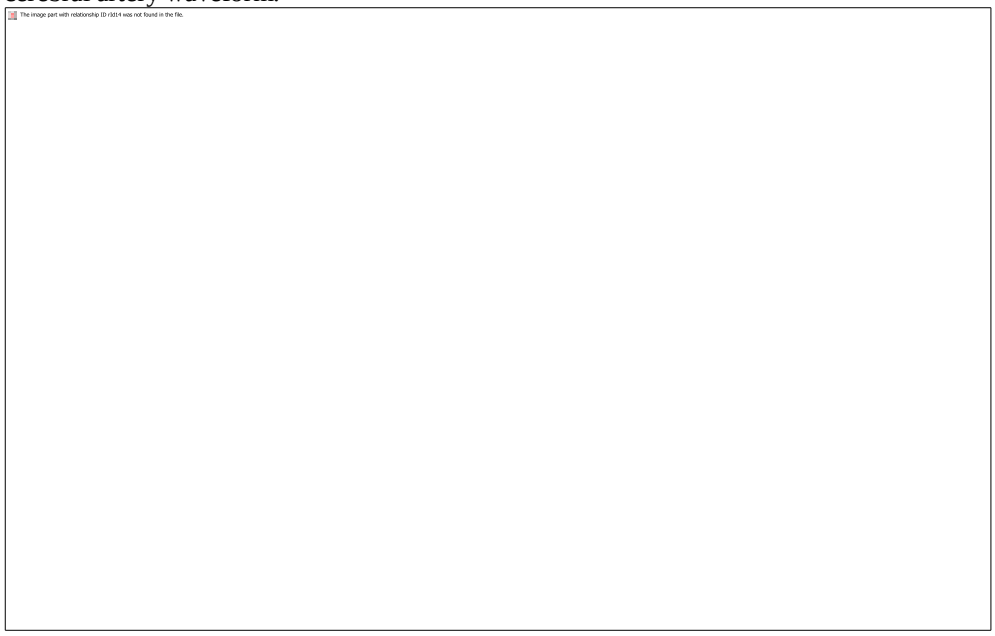
All antenatal women more than 26 weeks of gestation clinically diagnosed as pregnancy induced hypertension with criteria of Systolic Blood pressure >140 to <160 mmHg , Diastolic Blood pressure >90 to <110 mmHg during pregnancy beyond 20 weeks of gestation. Proteinuria (>30mg/24hr urine collection) Patient with age 19 years – 45 years. All pregnant women diagnosed with pregnancy induced hypertension with or without previous history of gestational hypertension

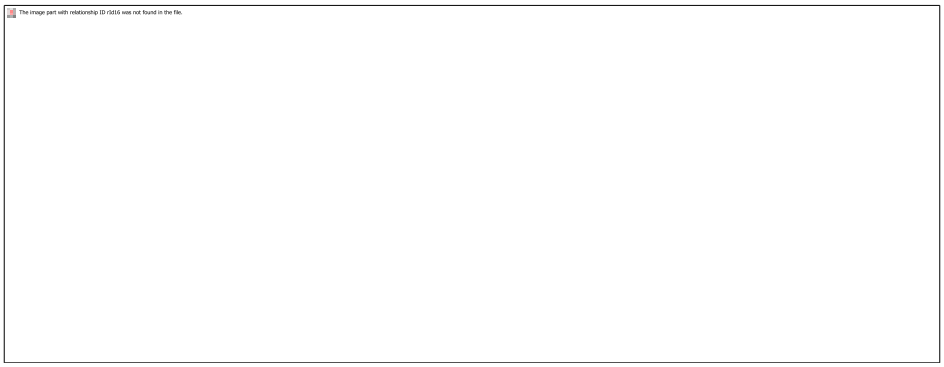
Exclusion Criteria:

- All antenatal women with overt hypertension with criteria of: Blood pressure >140 to <160 mmHg, systolic, blood pressure >90 to <110 mmHg diastolic during pregnancy before 20 weeks of gestation
- All antenatal women with co morbid conditions affecting theuteroplacental blood flow as in gestational diabetes mellitus, neural tube defects, cardiovascular disease, multiple pregnancy, CKD, HIV, thyroid disease.
- Intrauterine death at time of first Doppler examination.
- Doppler indices like pulsatility index, resistive index and S/D ratio were calculated for all the three vessels in consideration.

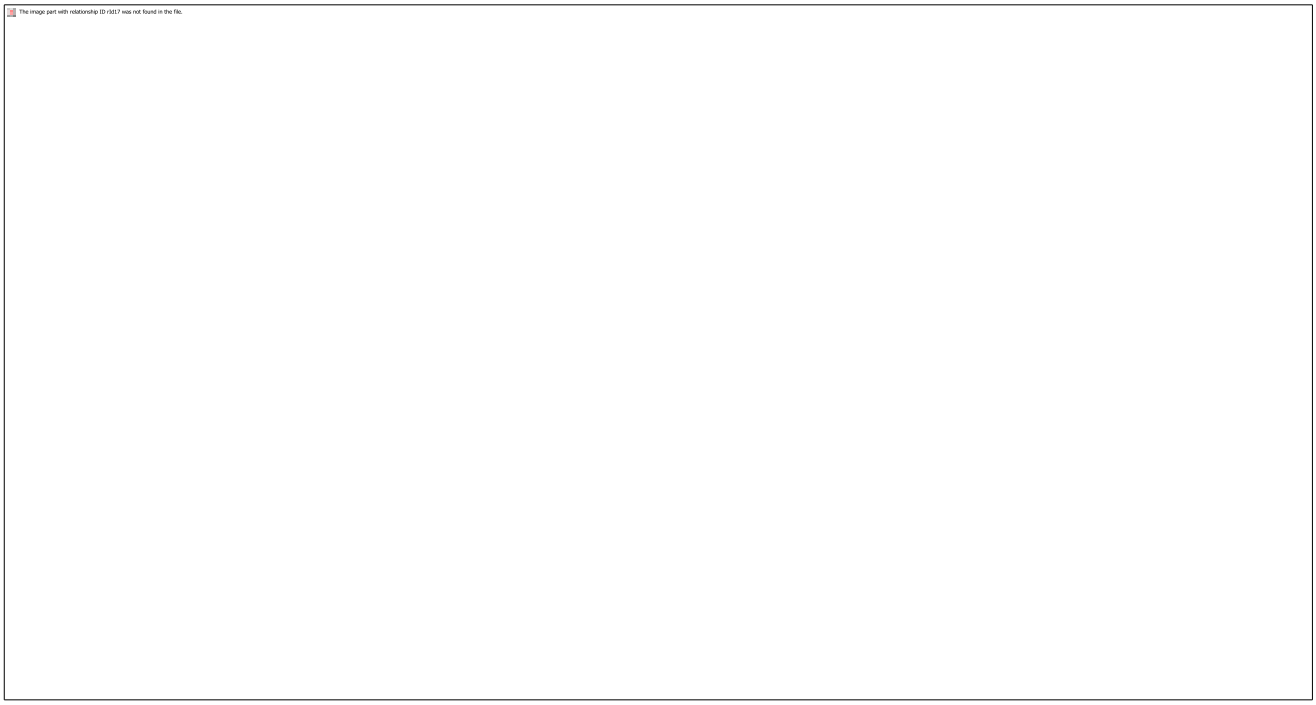
Observation: Abnormal Doppler Waveforms:-

- Normal uterine doppler artery waveform
- High-resistance uterine artery Doppler with a dichrotic notch.
- Abnormal high resistance flow in umbilical artery.
- Middle cerebral artery waveform.





Results:-



- On evaluating the performance of different Doppler flowmetric parameters for prediction of outcome low Apgar among PIH cases, for umbilical artery parameters PI had the maximum sensitivity (73.3%) while SD had maximum specificity (73.3%). The sensitivity and specificity of umbilical artery PI, RI and SD were 73.3% & 63.3%, 66.7% & 70.0% and 60.0% & 73.3% respectively. Accuracy of PI, RIand SD was 68.3%, 68.3% and 66.7% respectively.

- For uterine artery parameters, RI had maximum sensitivity (96.7%) but a very poor specificity (6.7%). The sensitivity & specificity of PI and SD were 26.7% & 66.7% and 63.3% & 23.3% respectively.

- Among different MCA parameters, the sensitivity ranged from 46.7% (PI and RI) to 70% (SD) while specificity ranged from 80% (SD) to 90% (RI). Accuracy of MCA PI, RI and SD in prediction of low Apgar was 66.7%, 68.3% and 66.7% respectively.

Conclusion:-

- The findings of study showed that third trimester Color Doppler flowmetric studies of umbilical artery, uterine artery and middle cerebral artery were useful in prediction of adverse perinatal outcomes. MCA abnormalities in general and umbilical artery SD ratio abnormality in particular were highly specific about prediction of adverse outcomes. Though uterine artery RI was highly sensitive yet it did not have adequate specificity.
- The present study was carried out in a high risk population with a high possibility of deranged Doppler parameters hence there was a high proportion of abnormal Doppler findings based on previously reported cut-off values.
- Further studies with a larger sample size are recommended to derive newer cut-off values specific to high risk pregnant women.

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