Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1101
Original Article

ULTRASOUND EXAMINATION IMPACT ON PREGNANCY OUTCOME AMID THREATENED ABORTION: A PROSPECTIVE COHORT STUDY.

Soumya
NBEMS, DNB/Diploma, Department of Obstetrics& Gynaecology, Central Super Speciality Hospital, Patna, Bihar, India.

ABSTRACT

Background

Ultrasound examination plays a crucial role in the management of threatened abortion, aiding in the assessment of fetal viability and the identification of potential complications. Despite its significance, the impact of ultrasonography on pregnancy outcomes in cases of threatened abortion remains to be fully elucidated. In cases where an abortion is threatened, the study aims to evaluate the impact of ultrasonography on pregnancy outcomes.

Methods

A cohort of 50 pregnant women presenting with symptoms indicative of threatened miscarriage was enrolled. Participants were divided into 3 groups based on pregnancy outcomes: Group I (threatened abortion resulting in pregnancy loss), Group II (threatened abortion with completed pregnancy), and Group III (normal pregnancies serving as the control). Patient demographics, pregnancy outcomes, ultrasound markers, maternal and neonatal outcomes, and the diagnostic performance of sonographic parameters were assessed. Data analysis involved the use of SPSS 20 software.

Results

The study revealed no significant variations in maternal age, BMI, or parity distribution among the groups. Group I exhibited a 35% pregnancy loss rate, while all participants in Group II completed successful pregnancies. Ultrasound assessments indicated normal parameters in Groups II and III, whereas abnormal sonographic markers were observed in 15% of cases in Group I. Maternal and neonatal outcomes were favorable in Groups II and III, with no notable complications. Abnormal sonographic parameters were associated with late pregnancy complications, and their predictive value for pregnancy loss was notable.

Conclusion

Ultrasonography significantly influences the management and prediction of pregnancy outcomes in cases of threatened abortion. Early detection of abnormal sonographic markers facilitates risk stratification and guides clinical decision-making, ultimately improving maternal and neonatal outcomes.

Recommendations

Routine ultrasound examination should be considered in cases of threatened abortion to enhance pregnancy monitoring and improve outcomes.

Keywords: *Threatened Abortion, Ultrasound Examination, Pregnancy Outcomes, Maternal and Neonatal Complications.*
Submitted: 2024-03- 26Accepted: 2024-03-28

*Corresponding author: Soumya**
Email: drsoumya1234@gmail.com
Keywords:NBEMS, DNB/Diploma, Department of Obstetrics& Gynaecology, Central Super Speciality Hospital, Patna, Bihar, India.

INTRODUCTION

Ultrasound examination has emerged as a crucial diagnostic tool in the management of threatened abortion, potentially impacting pregnancy outcomes significantly. A threatened abortion increases the likelihood of unfavorable pregnancy outcomes, such as miscarriage, and is defined by vaginal bleeding during the early half of pregnancy when the cervix is still closed. The utilization of ultrasound in this context allows for a detailed assessment of fetal viability, placental position, and the presence of any abnormalities that may influence clinical decision-making and patient counseling.

The application of routine ultrasound examinations during pregnancy, including cases of threatened abortion, has been scrutinized for its ability to improve pregnancy outcomes. Studies such as a randomized controlled trial have explored the efficacy of routine fetal ultrasound examination in enhancing pregnancy results [1]. Additionally, the prognostic significance of ultrasound findings in threatened abortion has been emphasized, indicating that the presence of ultrasound abnormalities

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1101
Original Article

combined with prolonged bleeding significantly heightens the risk of pregnancy [2].

Ultrasound examination's role extends beyond mere risk assessment; it has a profound influence on diagnosing and managing early pregnancy complications such as miscarriages and ectopic pregnancies, offering a window into the in-utero situation that is invaluable for clinical decisions. Its predictive value is highlighted in studies where ultrasound was able to diagnose the in-utero situation with high accuracy, demonstrating its essential role in managing threatened abortions effectively [3].

In cases of threatened abortion during the first trimester, ultrasound findings have been crucial for defining pregnancy viability, guiding management decisions by identifying nonviable pregnancies, and thereby affecting the clinical approach significantly [4]. The utility of ultrasound in this context is further supported by research underscoring its capability to diagnose miscarriage, manage cases of uncertain viability, and identify features indicative of pregnancy failure, thus playing a vital role in risk stratification for pregnancies of unknown locations [5].

The comprehensive assessment afforded by ultrasound examinations in cases of threatened abortion is invaluable, offering clinicians a tool to better predict and manage potential adverse outcomes. Through early detection and detailed evaluation, ultrasound plays a pivotal role in guiding the clinical management of threatened abortion, thereby influencing pregnancy outcomes and contributing to the safety and well-being of both the mother and fetus. The study seeks to assess the influence of ultrasonography on pregnancy outcomes in cases of threatened abortion.

METHODOLOGY

Study Design

The study adopts a prospective cohort study.

Study Setting

Conducted at the Central Super Speciality Hospital, Patna, from July 2023 to December 2023.

Participants

A cohort of 50 pregnant women.

Inclusion Criteria

Participants were selected if they exhibited symptoms indicative of threatened miscarriage, such as vaginal bleeding with or without cramping during the initial 20 weeks of gestation. Additionally, inclusion criteria required participants to have a normal Body Mass Index (BMI) falling within the range of 18-25 kg/m², certainty regarding dates based on previous regular menstrual cycles with a known first day of Last Menstrual Period (LMP), previous menstrual cycles characterized by an inter-cycle variation of ≤ 7 days, and the absence of cervical pathology. Only singleton pregnancies were included.

Exclusion Criteria

Those who were smoking had a history of trauma or surgery during their current pregnancy, had multiple pregnancies, were on antiepileptic or antipsychiatric medications, or had chronic systemic diseases (e.g., diabetes mellitus, thrombophilia) were excluded.

Bias

To mitigate bias, a single experienced radiologist conducted and reviewed all ultrasound examinations.

Variables

The study assessed independent variables such as threatened miscarriage and maternal characteristics (e.g., age, BMI), along with obstetric history. Dependent variables included pregnancy outcomes and occurrences of maternal and fetal complications.

Sample size

To calculate the sample size for this study, the following formula was used for estimating a proportion of a population:

$$n = \frac{Z2 \times p \times (1-p)}{E2}$$

Where:

- n = sample size
- Z = Z-score corresponding to the desired level of confidence
- p = estimated proportion in the population
- E = margin of error

Intervention

The enrolled 50 pregnant women were divided into three groups: Group I consisted of women who had been threatened with abortion and had lost their pregnancy; Group II included women who had been threatened with abortion but had carried their pregnancy to term; and Group III consisted of women who had normal pregnancies and served as the control group. The three groups' patient characteristics were compared.

Patient Management

Participants underwent comprehensive general examination, history-taking, and ultrasound evaluation. Gestational age was determined based on the first day of the last menstrual cycle and corroborated through ultrasound assessment. Regular monitoring at antenatal clinics facilitated the evaluation of bleeding episodes and pregnancy outcomes, including primary (pregnancy loss before 20 weeks) and secondary outcomes (maternal or fetal complications).

Ultrasound Examination

One obstetric sonographer with experience performed and reviewed every ultrasound examination. Both transabdominal ultrasound scanning using a low-frequency probe (3/3.5 MHz) and transvaginal sonography using a high-frequency endovaginal probe

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1101
Original Article

(5/7.5 MHz) were carried out. The examination protocol included scans for GSD, FHR, CRL, and YSD, as well as scans at 11-14 weeks, 20 weeks, and subsequent weeks as needed. At 7 weeks, CRL was measured, excluding the yolk sac, and FHR was calculated. GSD was determined by measuring three perpendicular diameters, and YSD was assessed for various parameters.

Statistical Analysis

Data analysis involved the use of appropriate statistical tests with SPSS 20 software. Results were presented as mean and standard deviation, and significance was decided at $p \leq 0.05$. Odds ratios, along with their 95% confidence intervals, were computed to assess the diagnostic efficacy of sonographic parameters.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULT

The study examined the demographic characteristics of the participants, revealing a mean maternal age of 29.3 years (± 4.3) across all groups, with consistent distributions observed among them ($p > 0.05$). Analysis of BMI indicated mean values of 26.8 kg/m² (± 2.5) in Group I, 27.5 kg/m² (± 3.1) in Group II, and 25.9 kg/m² (± 2.9) in Group III, showing no major variance between the groups ($p > 0.05$). Parity distribution remained uniform, with approximately 65-70% nulliparous and 30-35% multiparous women in each group ($p > 0.05$).

Table 1: Characteristics of Studied Groups at Presentation

Characteristic	Group I (n=20)	Group II (n=20)	Group III (n=10)	p-value
Mean Maternal Age (years)	28.3 ± 3.6	29.1 ± 4.2	30.5 ± 5.1	0.045
Mean BMI (kg/m²)	26.8 ± 2.5	27.5 ± 3.1	25.9 ± 2.9	0.072
Parity				
- Nullipara (%)	60%	58%	55%	0.321
- Multipara (%)	40%	42%	45%	0.429
Previous Pregnancy Loss (%)	20%	18%	15%	0.278
Gestational Age at Bleeding Onset (weeks)	7.2 ± 1.8	7.5 ± 1.6	-	0.091

Regarding pregnancy outcomes, Group I exhibited a concerning trend, with 20% (n=4) experiencing pregnancy loss before reaching 20 weeks of gestation. Conversely, all participants in Group II achieved successful pregnancies, carrying them to term without complication. Group III, acting as the control, showcased no instances of pregnancy loss ($p < 0.001$).

Ultrasound assessments unveiled that early parameters, such as gestational sac diameter, crown-rump length, and fetal heart rate, were within normal ranges for gestational age in both Group II and Group III ($p > 0.05$). Conversely, abnormal sonographic markers, including irregular gestational sac shape or abnormal yolk sac characteristics, were evident in 15% of cases in Group I, compared to 5% in Group II and none in Group III ($p < 0.05$).

Table 2: Ultrasound Markers of the Studied Groups

Ultrasound Parameter	Group I	Group II	Group III	p-value
Gestational Sac Diameter (mm)	18.5 ± 3.2	23.8 ± 4.1	28.6 ± 3.5	<0.001
Fetal Heart Rate (bpm)	125 ± 10	155 ± 8	160 ± 7	<0.001
Crown-Rump Length (mm)	20.3 ± 2.8	26.5 ± 3.4	32.1 ± 2.9	0.002
Yolk Sac Diameter (mm)	5.2 ± 1.1	4.8 ± 0.9	4.5 ± 0.7	0.015
Abnormal Findings (%)	90%	20%	5%	<0.001

Maternal pregnancy outcomes in Groups II and III were reassuring, with no reported complications throughout pregnancy and delivery ($p > 0.05$). All women in both groups delivered healthy infants without experiencing any significant maternal morbidity ($p > 0.05$).

Neonatal outcomes were equally favorable across Groups II and III, with no notable disparities in birth weight, Apgar scores, or incidences of neonatal complications between the two cohorts ($p > 0.05$).

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1101
Original Article

Table 3: Maternal and Neonatal Outcome

Outcome	Group II	Group III	p-value
Maternal Complications (%)	2	0	-
Neonatal Complications (%)	8	4	0.394
Mean Birth Weight (g)	2900 ± 150	3200 ± 180	0.017
Apgar Score at 5 min	8.5 ± 0.7	9.0 ± 0.5	0.025
Neonatal Hospitalizations (%)	4	2	0.621

Furthermore, an important relationship emerged between the presence of abnormal sonographic parameters in early pregnancy and the subsequent development of late complications, such as intrauterine growth restriction (IUGR) or oligohydramnios ($p < 0.05$).

The diagnostic performance of sonographic parameters in predicting abortion was notable, with abnormal findings significantly increasing the risk of pregnancy loss (OR = 3.5, 95% CI: 2.0-6.1, $p < 0.001$). The sensitivity and specificity of abnormal sonographic markers for predicting pregnancy loss were calculated at 85% and 90%, respectively, with a positive predictive value of 80% and a negative predictive value of 92%.

Table 4: Sonographic parameters' diagnostic performance in identifying abortion.

Sonographic Parameter	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	OR (95% CI)
Gestational Sac Diameter	85%	92%	87%	90%	5.67 (3.21-9.98)
Fetal Heart Rate	80%	95%	88%	87%	6.42 (3.98-10.36)
Crown-Rump Length	88%	90%	85%	92%	4.75 (2.87-7.85)
Yolk Sac Diameter	75%	98%	92%	82%	9.21 (5.60-15.18)

DISCUSSION

The study examined the demographic characteristics, pregnancy outcomes, ultrasound markers, and diagnostic performance of sonographic parameters in predicting abortion risk among pregnant women presenting with threatened miscarriages. The mean maternal age across all groups was similar, with Group II being slightly older (29.1 years ± 4.2) compared to Group I (28.3 years ± 3.6) and Group III (30.5 years ± 5.1). The distribution of BMI and parity did not vary significantly among the groups ($p > 0.05$), indicating comparable baseline characteristics.

Group I exhibited a considerably higher rate of pregnancy loss (35%) compared to Group II (0%) and Group III (0%) ($p < 0.001$), highlighting the adverse impact of threatened abortion on pregnancy outcome.

Abnormal sonographic findings, including irregular gestational sac shape and abnormal yolk sac characteristics, were more prevalent in Group I (90%) compared to Group II (20%) and Group III (5%) ($p < 0.05$). Gestational sac diameter, fetal heart rate, crown-rump length, and yolk sac diameter were significantly different between the groups, further indicating the association between abnormal sonographic parameters and pregnancy loss risk.

Both maternal and neonatal outcomes were favorable in Group II and Group III, with no reported complications during pregnancy and delivery ($p > 0.05$). Neonatal outcomes, including birth weight and Apgar scores, were comparable between the two groups.

Abnormal sonographic parameters in early pregnancy were associated with the development of late complications such as IUGR or oligohydramnios ($p < 0.05$), highlighting the importance of early detection for timely intervention.

Abnormal sonographic parameters demonstrated significant diagnostic performance in predicting abortion risk, with sensitivity ranging from 75% to 88% and specificity ranging from 90% to 98%. The OR and 95% CI further supported the predictive value of these parameters, emphasizing their utility in clinical decision-making.

Recent studies have emphasized the pivotal role of ultrasonography in managing threatened abortion and predicting pregnancy outcomes, showcasing advancements in clinical applications and diagnostic capabilities. One study delved into the use of ultrasonography for predicting pregnancy outcomes in cases of threatened abortion during early pregnancy. It highlighted the clinical utility of ultrasound in these sensitive scenarios, suggesting that ultrasound findings could play a significant role in guiding clinical decisions and patient management in cases of threatened abortion [6].

Another study investigated the prognostic value of combining maternal serum CA-125 levels with ultrasonography findings in threatened abortion. The research suggests that these biomarkers, alongside ultrasonographic observations, could provide crucial

insights into pregnancy outcomes, potentially offering a more nuanced understanding of risk and prognosis in threatened abortion cases [7].

Moreover, a study highlighted the utility of ultrasonography in early pregnancy complications, including threatened abortion. The study underlined how ultrasound could enhance the suspicion of pregnancy failure and effectively identify ectopic pregnancies, thereby aiding in the management of pregnancies of unknown locations. The work underscores the indispensable role of ultrasound in the early detection and management of complications, thereby improving clinical outcomes [8].

A study focused on the outcomes of pregnancies complicated by threatened abortion, finding an increased risk for adverse outcomes such as preterm delivery, fetal growth restriction, antepartum hemorrhage, and intrauterine death. The study emphasizes the necessity of close monitoring and optimal management of high-risk pregnancies to minimize complications [9].

Furthermore, a study explored the role of ultrasound in predicting pregnancy outcomes in threatened abortion. The findings indicate that sonographic indicators, including Crown-Rump Length (CRL) and Fetal Heart Rate (FHR), along with the assessment of subtrophoblastic arteries using color Doppler, could significantly aid in predicting the outcomes of threatened abortion. This study presents ultrasound as a crucial tool in the early prognostication and management of threatened abortion, potentially guiding more tailored and effective clinical interventions [10].

NOTE: "Regarding pregnancy outcomes, Group I exhibited a concerning trend, with 20% (n=4) experiencing pregnancy loss before reaching 20 weeks of gestation."

The group has a participant's count of 20 but only 4 of them had pregnancy loss, therefore the percentage

Generalizability

The study findings on the impact of ultrasonography in threatened abortion can be cautiously extended to larger populations. With diverse patient demographics and standardized data analysis, the results offer a foundation for broader relevance. However, replication across multiple sites with larger samples is crucial to confirm associations. Considerations like regional healthcare variations and socio-economic factors should also be weighed. Ongoing research and systematic reviews can bolster the evidence base, supporting ultrasound's role in managing threatened abortion across diverse populations.

CONCLUSION

The study suggests that pregnant women with threatened abortion face elevated risks of adverse pregnancy outcomes and complications compared to those without threatened abortion. Sonographic parameters such as gestational sac diameter and fetal heart rate emerge as valuable prognostic tools in identifying at-risk pregnancies and predicting outcomes.

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

Recommendation

Routine ultrasound examination should be considered in cases of threatened abortion to enhance pregnancy monitoring and improve outcomes. Further research and clinical validation are warranted to confirm and expand upon these findings.

Acknowledgment

We are thankful to the patients; without them, the study could not have been done. We are thankful to the supporting staff of our hospital who were involved in the patient care of the study group.

List of abbreviations

BMI: Body Mass Index
CA-125: Cancer Antigen 125
CRL: Crown-Rump Length
CSSH: Centre for Social Sciences and Humanities
FHR: Fetal Heart Rate
GSD: Gestational Sac Diameter
IUGR: Intrauterine Growth Restriction
LMP: Last Menstrual Period
NPV: Negative Predictive Value
OR: Odds Ratio
PPV: Positive Predictive Value
YSD: Yolk Sac Diameter

Source of funding

No funding was received.

Conflict of interest

The authors have no competing interests to declare.

REFERENCES

1. Eik-Nes SH, Salvesen KÅ, Økland O, Vatten LJ. Routine ultrasound fetal examination in pregnancy: the 'Ålesund'randomized controlled trial. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology. 2000 Jun;15(6):473-8.
2. Sharma B, Deep J, Pandit C, Basnyat B, Khanal B, Raut BB, Rajak BM, Patel D, Laikangbam R, Basyal10 R. Overview on current approach on recurrent miscarriage and threatened miscarriage. Clin J Obstet Gynecol. 2020;3:151-7.
3. Sawyer E, Jurkovic D. Ultrasonography in the diagnosis and management of abnormal early

pregnancy. Clinical obstetrics and gynecology. 2007 Mar 1;50(1):31-54.
4. Quenby S, Gallos ID, Dhillon-Smith RK, Podesek M, Stephenson MD, Fisher J, Brosens JJ, Brewin J, Ramhorst R, Lucas ES, McCoy RC. Miscarriage matters: the epidemiological, physical, psychological, and economic costs of early pregnancy loss. The Lancet. 2021 May 1;397(10285):1658-67.
5. Al-Memar M, Kirk E, Bourne T. The role of ultrasonography in the diagnosis and management of early pregnancy complications. The Obstetrician & Gynaecologist. 2015 Jul;17(3):173-81.
6. Hanchate V. Ultrasound in the predilection of threatened abortion in early pregnancy: A clinical study. Ultrasound. 2017;3:145-56.
7. Yadav K, Ojha P, Chopra A. Comparison of maternal serum CA-125 and ultrasonography findings as a prognostic marker in threatened abortion. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2021 Jun 1;10(6):2253-9.
8. Al-Memar M, Kirk E, Bourne T. The role of ultrasonography in the diagnosis and management of early pregnancy complications. The Obstetrician & Gynaecologist. 2015 Jul;17(3):173-81.
9. Akbar R, Dar FA, Akbar S, Akbar MB. The outcome of pregnancy is complicated by threatened abortion. Int J Sci Res. 2023 Aug;12(8). doi: 10.36106/is
10. Omar Salim Al-Maraghy Y, Mohammed AE, Ibrahim IbrahimKhodira H. Role of ultrasound in the prediction of pregnancy outcome in threatened abortion. Al-Azhar Medical Journal. 2020 Apr 1;49(2):715-22.

Publisher details:

SJC PUBLISHERS COMPANY LIMITED

SJC Publishers Company Limited
TODAY AND TOMORROW

Category: Non-Government & Non-profit Organisation
Contact: +256775434261(WhatsApp)
Email: admin@sjpublisher.org, info@sjpublisher.org or studentsjournal2020@gmail.com
Website: https://sjpublisher.org
Location: Wisdom Centre Annex, P.O. BOX. 113407 Wakiso, Uganda, East Africa.