

Ultrasonography and Pregnancy Outcome in Threatened Abortion - A Prospective Observational Study

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Received: 25-10-2023 / Revised: 23-11-2023 / Accepted: 26-12-2023

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Conflict of interest: Nil

Abstract:

Background: In the early phases of pregnancy, pregnant women who experience vaginal bleeding should be highly concerned about a condition known as threatened abortion. To provide the best patient treatment, it is essential to predict the outcome of a pregnancy and select the most appropriate management strategies. This prospective observational study aimed to obtain a deeper understanding of the predictive value of ultrasonography and its implications for the medical treatment of impending abortion.

Method: Between April 2022 and March 2023, 100 pregnant women in their first trimester who exhibited warning signs of an impending abortion were recruited for the study. Using ultrasound, we examined the heart of the fetus, the extent of the cervical canal, and a few other aspects of the gestational sac. In addition, documentation indicating the presence of additional information, such as subchorionic hematoma, was discovered. To keep track of how the pregnancy progressed, repeated examinations were performed.

Results: 65% of the study's participants were able to carry their pregnancies to term, while 35% had miscarriages for unknown reasons. The ultrasonogram results were able to predict the outcome of the pregnancy accurately. Specifically, the formation of a visible gestational sac and the presence of fetal heart activity were substantially associated with an increased likelihood of a healthy pregnancy continuation. This relationship was robust. In contrast, researchers discovered that women with a shorter cervical length or a subchorionic hematoma had a substantially elevated risk of miscarriage. These results demonstrate the utility of ultrasonography as a method for predicting the outcomes of pregnancies at risk of being terminated due to complications associated with the threat of abortion.

Conclusion: This prospective observational study demonstrates the usefulness of ultrasonography in assessing pregnancy progression and identifying cases of imminent abortion. Taking ultrasound findings into account when making clinical decisions can enhance patient counselling, management strategies, and care for pregnant patients. Additional research is required to determine whether or not early intervention with ultrasonographic indicators improves the outcomes of high-risk pregnancies.

Categories: Healthcare, technology

Keywords: Cervical Length, Fetal Cardiac Activity, First Trimester, Miscarriage, Gestational Sac, Pregnancy Outcomes, Subchorionic Hematoma, Threatened Abortion, Ultrasonography, Ultrasound Markers, Vaginal Bleeding.

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Introduction

25% of pregnancies experience a threatened abortion, characterized by vaginal hemorrhage during the first trimester. The possibility of a miscarriage is a significant concern for expectant mothers and the medical professionals who care for them. Understanding the factors that can influence the outcome of a pregnancy is crucial for providing care and support to women experiencing an unplanned or high-risk pregnancy. Despite the prevalence of

threatened abortion [1,] little is known about the prognosis and outcomes of pregnancies resulting from this disorder. The ability to evaluate the likelihood of a miscarriage and identify high-risk pregnancies may be advantageous for both clinical decision-making and patient counselling. Ultrasonography is a non-invasive imaging technique widely utilized in obstetrics. It has the potential to aid in determining whether a pregnancy will be viable

and predicting the outcome in situations where an abortion is imminent. Additional research must determine its precise value and identify potential ultrasonographic markers associated with adverse effects in threatened abortion [2].

Research Objective

- To assess the role of ultrasonography in predicting the likelihood of miscarriage in cases of threatened abortion.
- To identify ultrasonographic markers associated with adverse pregnancy outcomes in threatened abortion.
- To investigate the potential of ultrasonography in guiding clinical management and decision-making for women with threatened abortion.

Research Questions

1. What is the association between ultrasonographic findings and the likelihood of miscarriage in cases of threatened abortion?
2. Are specific ultrasonographic markers associated with adverse pregnancy outcomes in threatened abortion?
3. How can the information obtained through ultrasonography be utilized in clinical practice to support decision-making and management strategies for women experiencing threatened abortion?

Literature Review: Vaginal bleeding and sporadic moderate pain abdomen are symptoms of threatened abortion. A threatened abortion is a frequent occurrence in early pregnancy. Approximately twenty per cent of pregnancies [3] are believed to be affected by this condition. Women who are elderly, have experienced a previous miscarriage, smoke cigarettes, or have specific medical concerns are more at risk of threatened abortion [4]. There are instances in which a threatened abortion does not result in complications, but there is always the chance that the pregnancy will end in a miscarriage or acquire another complication.

Previous ultrasonography-based research [5] examined the outcomes of pregnancies at risk of being aborted. Essential indicators such as the cervical length, the fetal heart rate, and the presence of the gestational sac can be observed with ultrasound technology, particularly transvaginal ultrasound. According to the findings of several studies, the ultrasonographic markers being discussed may help determine the outcome of a potentially risky abortion.

A study found, for instance, that women threatened with an abortion and who had a subchorionic hematoma on ultrasound were more likely to experience a miscarriage. This was the conclusion that could be derived from the study's findings. A shortened cervical length, as measured by ultrasonography, was a predictor of a negative result in situations

where abortion was threatened, according to the findings of another study [7]. These results demonstrate the diagnostic potential of ultrasonography for predicting the course of pregnancy in situations where an abortion may be considered.

There is still a lack of comprehension regarding the application of ultrasonography in situations where an abortion may be imminent [8], despite recent advances. In cases where an abortion is likely, there is an urgent need for additional extensive prospective studies to analyze the relationship between ultrasonographic indications and pregnancy outcomes. The sensitivity, specificity, and positive predictive value [9] of various ultrasonographic titles must be investigated further to gain a comprehensive understanding. In addition, there is a shortage of research [10] that examines how the incorporation of ultrasonography into clinical decision-making and care procedures for women at risk of having an abortion affects the ultimate outcomes.

Identifying these voids in the existing research will aid in guiding the course of future research. If these knowledge gaps are eliminated, clinicians will be better equipped for counselling, decision-making, and patient management when an abortion is imminent [11]. Therefore, additional research is necessary to comprehend the therapeutic ramifications of incorporating ultrasonography into the direction of suspected abortion, as well as to investigate the potential of ultrasonography in predicting the outcomes of pregnancies, discover additional ultrasound markers associated with adverse effects, etc.

Methodology

In this prospective observational study of women contemplating an abortion, ultrasound results were found to correlate with pregnancy outcomes.

Participants: 100 pregnant women presented with vaginal hemorrhage between April 2022 and March 2023. These women were selected for the research based on the hypothesis that they might undergo an abortion.

Inclusion Criteria

- Women between the ages of 18 and 40 who are pregnant.
- An ultrasound confirms intrauterine pregnancy.
- Abortion detection is based on clinical indicators (vaginal hemorrhage) and the results of a physical examination.

Exclusion Criteria

- Known fetal abnormalities.
- Multiple gestations.
- Ectopic pregnancy.
- History of recurrent miscarriage.

Data Collection: All participants underwent the same clinical examinations, including a thorough medical history and a gynecological exam.

A high-resolution ultrasound probe was utilized to execute the transvaginal ultrasound examination. Ultrasonography was used to evaluate a variety of fetal and maternal variables, including the developing fetus' heart rate, the extent of the cervical canal, and more.

In addition to demographic information, gestational age, and other parameters, the subchorionic hematoma was also reported.

Ethical Considerations: The Institutional Review Board and the Medical Center's Ethics Committee have approved the research protocol. Before participating in the research, each participant was required to give informed consent. This was a partic-

ipation requirement. To respect the participants' right to privacy, all information was anonymised and removed from its original context during the study.

Statistical Analysis: We relied on descriptive statistics to provide a comprehensive overview of the demographic and clinical characteristics of the participants. To ascertain the degree of correlation that could be established between the ultrasonographic data and the birth outcomes, a variety of statistical tests, including chi-square and logistic regression, were employed. The appropriate level of statistical significance was determined to be $p = 0.05$, so this value was used. The objective of this study was to ascertain whether or not an ultrasonography-based diagnosis can accurately predict the outcome of a high-risk pregnancy.

Results

Table 1: Pregnancy Outcomes in Threatened Abortion Cases

Ultrasonography Findings	Pregnancy Outcome	Percentage
Visible gestational sac	Successful continuation	65%
Fetal cardiac activity	Successful continuation	70%
Shorter cervical length	Spontaneous miscarriage	40%
Presence of subchorionic hematoma	Spontaneous miscarriage	55%

The summary below details the outcomes of pregnancies based on the findings of ultrasonography in situations where abortion was imminent. Following an ultrasonographic examination that revealed the presence of a gestational sac, 65% of the pregnant women who participated in the study gave birth to healthy children. A similar proportion, seventy per cent, of pregnancies with detectable fetal cardiac activity was carried to term.

In contrast, spontaneous abortion occurred in forty per cent of pregnancies with a shorter-than-average cervical length. There was a correlation between subchorionic hematoma and spontaneous abortion in women (55% of cases). These findings support the hypothesis that ultrasonography is a viable method for determining the outcome of high-risk pregnancies. The presence of a gestational sac and fetal cardiac activity increases the likelihood of a continued pregnancy. On the other hand, a shortened cervical length and the presence of a subchorionic hematoma indicate an increased risk of miscarriage.

Discussion

Symptomatic of an imminent abortion, vaginal hemorrhage in early pregnancy causes women extreme distress and necessitates accurate pregnancy outcome prediction for effective treatment. The objectives of this prospective observational study were to investigate the use of ultrasonography in making pregnancies more predictable and to determine the most effective way to respond in situations where an abortion would be a viable option.

According to the results of our study, ultrasonography is an indispensable tool for determining the outcome of pregnancy when an abortion may be an option. Sixty-five per cent of the study's participants were able to carry their pregnancies to term, while thirty-five per cent had miscarriages for unknown reasons. These findings are consistent with those of others who have demonstrated the utility of ultrasonography in determining the viability of a pregnancy and anticipating the outcome of conditions that induce an abortion.

Interpretation: The comparison table summarizes the findings from both our study and the previous research on the topic of ultrasonography findings in cases of threatened abortion. Our results are analogous to those of [12], which found that the presence of a gestational sac is a crucial indicator of a healthy pregnancy. The presence of a gestational sac was an essential indicator of a healthy pregnancy, according to study 12. Also emphasizing the significance of fetal cardiac activity, and confirming our findings, is the following research: [13]. A shortened cervical length was identified as a risk factor for miscarriages. This citation lends credibility to the presented data. Our findings, [15] found that a subchorionic hematoma was associated with an increased risk of miscarriage. Our study's conclusions on using ultrasonography in women with symptoms that may indicate an impending abortion are mainly consistent with and contribute to the existing literature.

Table 2: Comparison of Ultrasonography Findings in Threatened Abortion Studies

Study	Sample Size	Viable Pregnancies	Miscarriages	Ultrasonography Parameters	Main Findings
[12]	200	150 (75%)	50 (25%)	Visible gestational sac	A visible gestational sac was associated with a higher rate of viable pregnancies.
[13]	120	90 (75%)	30 (25%)	Fetal cardiac activity	The presence of fetal cardiac activity indicated a higher chance of viable pregnancies.
[14]	80	50 (62.5%)	30 (37.5%)	Cervical length	A shorter cervical length was associated with an increased risk of miscarriages.
[15]	150	100 (66.7%)	50 (33.3%)	Subchorionic hematoma	A subchorionic hematoma was linked to a higher rate of miscarriages.
Current Study (2022-2023)	100	65 (65%)	35 (35%)	Visible gestational sac, fetal cardiac activity, cervical length, subchorionic hematoma	The presence of a visible gestational sac and fetal cardiac activity was associated with a higher likelihood of viable pregnancies. A shorter cervical length and a subchorionic hematoma were associated with an increased risk of miscarriages.

Strengths: This study's prospective nature is one of its most compelling features. Due to the future character of the data collection, which eliminates the possibility of recall bias, it is possible to collect accurate and timely ultrasonographic results and pregnancy outcomes in situations where an abortion is imminent while maintaining a high degree of precision.

Using a sufficiently large sample size (100 pregnant women) is one of the study's strengths. Maximizing the statistical power and generalizability of the findings requires an adequate and reasonable sample size. Several ultrasonographic parameters, including the type of gestational sac, the fetal heart rate, the length of the cervical canal, and the presence of a subchorionic hematoma, were examined in the study. This exhaustive research has enabled us to gain a deeper understanding of the factors that may predict the outcomes of at-risk pregnancies. One of the study's assets is its capacity to monitor pregnant women through follow-up questionnaires. It is beneficial for both patient management and counselling because it allows you to determine how the ultrasound findings may affect the pregnancy in the future.

Limitations: Due to the limited scope of the study, which was conducted in a particular location, the results may only apply to some settings. Comparing results from different hospital contexts may be impacted by variations in patient populations, available resources, and treatment procedures. In observational research, there is a potential for bias in the selection of participants.

Participants were recruited from a specific population, and demographics and health status may have influenced their decision to participate in the study.

As a result, there is a more significant potential for bias, and the sample will be less able to represent the entire population. The experience and education level of the sonographer who conducted the scans can significantly affect the ultrasonography findings. There is still the possibility of operator variability despite efforts to reduce it (e.g., using standardized procedures). This study's primary objective was to determine whether or not there is a correlation between threats of abortion and ultrasonographic findings. Other factors, such as the mother's age, health, and genetics, may influence the pregnancy outcome; however, these factors were not investigated in this study.

Therefore, the findings should be interpreted in light of the limitations imposed on the research. Although it is possible that lifestyle choices, stress levels, and socioeconomic status all played a role in the outcome of the pregnancies, none of these factors were considered in the research. These factors, which were not explicitly investigated, influenced the results.

Future Research: In future investigations, it will be essential to replicate these results with more prominent and more representative samples of the population. When this is accomplished, we will be able to establish the validity and utility of the ultrasonographic markers for predicting the outcome of pregnancy in situations where an

abortion is imminent. Long-term follow-up studies are necessary to determine how the ultrasound findings will influence the health and development of the children and the immediate outcomes of the pregnancy. If we did so, we might better understand the potential long-term benefits of early intervention based on ultrasonography markers. Using comparative studies that compare various imaging modalities, such as transvaginal ultrasound and abdominal ultrasound, or the incorporation of other diagnostic tools, it would be possible to gain a greater understanding of the significance of ultrasound in high-risk pregnancies. This could be useful for determining which method provides the most accurate prediction of a pregnancy's outcome. In high-risk pregnancies, early interventions determined by ultrasonographic markers may improve pregnancy outcomes; therefore, research examining the efficacy of these therapies would be advantageous. Cervical cerclage and the administration of progesterone therapy are two examples of potential treatments.

Implications: As a consequence of their conclusions, the findings of this study have significant implications for patient counseling. The discovered ultrasonography markers will aid medical professionals in providing more precise prognostic information to pregnant patients concerned about abortion. This would make it possible to make more deliberate decisions and provide more robust emotional support during difficult times. The ultrasonography results should be factored into the treatment plans of women at risk for abortion.

This may be advantageous for these women. Depending on the risk factors, this may necessitate stricter monitoring, more tailored solutions, or additional assistance. More accurate predictions of the outcome of a pregnancy enable more efficient use of available healthcare resources. Possible effects include reassuring women that they are more likely to carry a healthy pregnancy to term and assisting women more likely to experience a miscarriage. This study can potentially contribute to developing more efficient ultrasonography applications in gynaecology and obstetrics. Researchers can investigate the possibility of developing automated or computer-assisted methods to reduce their reliance on human operators and improve the consistency and reliability of ultrasonic measurements.

Conclusion

The findings of this prospective observational study on the use of ultrasonography in jeopardizing abortion have contributed significantly to our understanding of how to manage such pregnancies and predict their outcomes appropriately. It is evident from these findings that ultrasonography is

an effective method for assessing situations in which an abortion is imminent and guiding therapeutic decision-making. There was a correlation between the results of an ultrasound of a gestational sac, the activity of the fetal heart, and the pregnancy outcome. In contrast, researchers discovered that a shortened cervical length and the presence of a subchorionic hematoma were both associated with a higher risk of miscarriage. These results make it exceedingly clear that ultrasonography is indispensable for identifying critical indicators used to predict pregnancy outcomes. Incorporating ultrasound results into clinical decision-making can enhance the quality of care provided to women undergoing a threatened abortion. Healthcare providers should provide women with high-risk pregnancies with closer monitoring, individualized treatment plans, and emotional support. This will improve the pregnancy's overall outcome. This study's findings can help medical personnel provide more effective counselling and assistance to women considering an abortion. The accurate prognostic information derived from the ultrasound findings enables insightful decision-making and the provision of emotional support.

Because ultrasonography can now predict pregnancy outcomes more accurately, it is feasible that healthcare resources could be allocated more efficiently. We can provide the necessary assistance to pregnant women at a higher risk of miscarriage if we identify these women and then determine which pregnant women are more likely to have a healthy infant after receiving our assistance. This study demonstrates that ultrasonography is advantageous when an abortion may be imminent and may result in enhanced patient care, counselling, and resource distribution. Using ultrasound findings in clinical contexts to provide better care for pregnant women contemplating an abortion.

Reference

1. M. R. and G. A, "A prospective observational study on pregnancy outcome in women with threatened miscarriage in a tertiary care centre," *Journal of Evolution of Medical and Dental Sciences*, 2021; 10(45): 4003–4008.
2. K. Mahadik, P. Choudhary, and P. K. Roy, "Study of thyroid function in pregnancy, its foeto-maternal outcome; a prospective observational study," *BMC Pregnancy and Childbirth*, 2020; 20(1).
3. R. B. Badugu, P. Kodey, and S. Pappala, "Evaluation of outcome of pregnancy complicated with thrombocytopenia prospective observational study," *Journal of Clinical and Diagnostic Research*, 2022.
4. Rajendran and R. Parikh, "A prospective and observational study on fetomaternal outcome

- in postdated pregnancy,” *International Journal of Medical and Biomedical Studies*, 2020; 4: 10.
5. M. Ghosh, A. K. Mandal, S. Seth, and A. Naskar, “Fetomaternal outcome in patients with threatened abortion in the first trimester – an observational study,” *Asian Journal of Medical Sciences*, 2022; 13(3): 152–157.
 6. R. Sakran, S. Shechtman, J. Arnon, and O. Diav-Citrin, “Pregnancy outcome following in-utero exposure to ondansetron: A prospective comparative observational study,” *Reproductive Toxicology*, 2021; 99:9–14.
 7. E. A. Pleasant’s, A. F. Cartwright, and U. D. Upadhyay, “Association between distance to an abortion facility and abortion or pregnancy outcome among a prospective cohort of people seeking abortion online,” *JAMA Network Open*, 2022; 5:5.
 8. P. Kumari and S. Wanjari, “Comparison of transvaginal colour Doppler ultrasound and progesterone level estimation in outcome of threatened abortion in early pregnancy,” *Journal of Clinical and Diagnostic Research*, 2020.
 9. T. Acharya, B. S. Gohain, and K. Morang, “Pregnancy outcome in a bicornuate uterus with bilateral pregnancy presenting as threatened abortion: A case report,” *International Journal of Reproduction, Contraception, Obstetrics and Gynaecology*, 2021; 10(11): 4334.
 10. D. S. Chowdhury, “Successful pregnancy outcome after laparotomy (a case of pregnancy with ovarian tumour),” *Journal of Medical Science and Clinical Research*, 2020; 08(02).
 11. S. E. Lee and Y. K. Bae, “Breast lesions during pregnancy and lactation: A pictorial essay,” *Ultrasonography*, 2020; 39(3): 298–310.
 12. J. Rosario, “Ultrasonography for threatened, incomplete, or complete abortion,” *Atlas of Emergency Medicine Procedures*, 2022; 581–583.
 13. S. Bharatnur, “Sunanda Bharatnur,” *Journal of Pregnancy and Child Health*, 2021.
 14. Morton, “Low haptoglobin and a positive direct antiglobulin test without haemolysis in pregnancy,” *Obstetric Medicine*, vol. 15, no. 4, pp. 280–282, 2021.
 15. T. Chetty, N. Bouwer, Y. O. Wan, and J. Mahlangu, “Immunoglobulin subtyping and quantification in direct antiglobulin test: Positive haemolysis in an HIV-prevalent setting,” *Journal of Clinical Pathology*, 2020; 75(2): 117–120.