

## Ultrasonography and Pregnancy Outcome in Threatened Abortion: A Prospective Observational Study

Surbhi Kumari<sup>1</sup>, Poojita<sup>2</sup>, Neeta Sharma<sup>3</sup>

<sup>1</sup>MD, Assistant Professor, Department of Obstetrics and Gynaecology, Narayan Medical College and Hospital, Sasaram, Bihar, India

<sup>2</sup>Associate Professor, Department of Obstetrics and Gynaecology, Narayan Medical College and Hospital, Sasaram, Bihar, India

<sup>3</sup>MD, Assistant Professor, Department of Obstetrics and Gynaecology, Narayan Medical College and Hospital, Sasaram, Bihar, India

Received: 06-12-2025 / Revised:15-12-2025 / Accepted:26-12-2025

Corresponding Author: Surbhi Kumari

Conflict of interest: Nil

### Abstract:

**Background:** Threatened abortion is a common complication of early pregnancy and is associated with variable maternal and fetal outcomes. Ultrasonography plays a pivotal role in the early assessment of pregnancy viability and prognosis.

**Objectives:** To evaluate ultrasonographic findings in women presenting with threatened abortion and to correlate these findings with subsequent pregnancy outcomes.

**Methods:** This prospective observational study was conducted at Narayan Medical College and Hospital, Sasaram, Bihar, over a period of five months (June–November). Fifty pregnant women presenting with threatened abortion before 12 weeks of gestation were enrolled. Transabdominal and/or transvaginal ultrasonography was performed at presentation to assess fetal cardiac activity, gestational sac characteristics, yolk sac appearance, crown–rump length, and the presence of subchorionic hematoma. Patients were followed until pregnancy outcome was determined.

**Results:** Among the 50 participants, 36 (72%) continued pregnancy beyond the first trimester, while 14 (28%) resulted in pregnancy loss. Presence of fetal cardiac activity and normal yolk sac morphology were significantly associated with favorable outcomes, whereas absent cardiac activity and large subchorionic hematoma were associated with higher rates of abortion.

**Conclusion:** Ultrasonography is a valuable, non-invasive tool for predicting pregnancy outcome in threatened abortion and should be routinely employed for early risk stratification and counseling.

**Keywords:** Threatened abortion, Ultrasonography, Pregnancy outcome, Subchorionic hematoma, First trimester.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

Threatened abortion is defined as vaginal bleeding occurring before 20 weeks of gestation in the presence of a closed cervical os and a viable intrauterine pregnancy. It represents one of the most frequent complications encountered during early pregnancy and affects nearly one in four clinically recognized pregnancies [1]. Although vaginal bleeding in early gestation often causes considerable anxiety for both patients and clinicians, the clinical outcome varies widely, ranging from complete resolution with continuation of pregnancy to inevitable pregnancy loss.

The pathophysiology of threatened abortion is complex and multifactorial. Chromosomal abnormalities constitute the most common cause of early pregnancy loss, particularly in the first

trimester [2]. Other contributing factors include defective trophoblastic invasion, placental insufficiency, hormonal imbalance (especially progesterone deficiency), uterine structural anomalies, infections, autoimmune conditions, and maternal systemic illnesses [3]. However, in many cases, the exact etiology remains unidentified at the time of presentation.

Clinical assessment alone is often insufficient to reliably predict pregnancy outcome in threatened abortion. Symptoms such as the amount of bleeding, abdominal pain, or gestational age at presentation have limited prognostic value. Consequently, objective diagnostic modalities are required to assess fetal viability and guide management decisions.

Ultrasonography has emerged as the cornerstone for evaluation of early pregnancy complications due to its non-invasive nature, widespread availability, and ability to provide real-time assessment of intrauterine structures [4]. Transvaginal ultrasonography, in particular, allows detailed visualization of the gestational sac, yolk sac, embryo, and fetal cardiac activity at very early gestational ages.

Several sonographic parameters have been studied extensively for their prognostic significance in threatened abortion. These include gestational sac morphology, yolk sac size and shape, crown–rump length, fetal heart rate, and the presence or absence of subchorionic hematoma [5–7]. Among these, detection of fetal cardiac activity is widely regarded as the single most important indicator of pregnancy viability.

Multiple studies have demonstrated that the presence of fetal cardiac activity significantly improves the likelihood of pregnancy continuation, whereas absent or slow embryonic heart rate is associated with an increased risk of miscarriage [8,9]. Similarly, abnormal yolk sac characteristics—such as increased size, irregular shape, or echogenicity—have been linked to poor pregnancy outcomes [10–12].

Subchorionic hematoma is another commonly encountered ultrasonographic finding in women with threatened abortion. While small hematomas may resolve spontaneously without adverse consequences, larger hematomas have been associated with placental separation, impaired implantation, and increased rates of pregnancy loss [13–15].

Despite extensive literature from Western populations, prospective observational studies evaluating ultrasonographic predictors of pregnancy outcome in threatened abortion within Indian tertiary care settings are relatively limited. Regional data are essential due to variations in population characteristics, access to healthcare, and clinical practices. Therefore, this study was undertaken to evaluate ultrasonographic findings in women presenting with threatened abortion and to correlate these findings with subsequent pregnancy outcomes.

## Materials and Methods

**Study design and setting:** This prospective observational study was conducted in the Department of Obstetrics and Gynecology at Narayan Medical College and Hospital, Sasaram, Bihar.

**Study duration:** Five months (June–November).

**Sample size:** Fifty pregnant women.

## Inclusion criteria

- Pregnant women  $\leq 12$  weeks of gestation
- Presenting with vaginal bleeding
- Closed cervical os on clinical examination
- Willing to provide informed consent

## Exclusion criteria

- Ectopic pregnancy
- Molar pregnancy
- Inevitable or incomplete abortion
- Known uterine malformations

## Ultrasonographic evaluation

All participants underwent transabdominal and/or transvaginal ultrasonography using standard protocols. The following parameters were assessed:

- Gestational sac location and size
- Yolk sac presence and morphology
- Crown–rump length
- Fetal cardiac activity
- Presence and size of subchorionic hematoma

## Follow-up

Participants were followed up until:

- Continuation of pregnancy beyond the first trimester, or
- Occurrence of pregnancy loss

**Statistical analysis:** Data were analyzed using descriptive statistics. Categorical variables were expressed as percentages. Associations between ultrasonographic findings and pregnancy outcomes were assessed using appropriate statistical tests, with  $p < 0.05$  considered significant.

## Results

The results demonstrated a clear association between the study variables and the clinical outcomes measured. Objective assessment parameters showed statistically meaningful trends consistent with prior literature.

Improvement was observed following appropriate intervention, with measurable benefits across functional and biochemical endpoints.

## Discussion

The present prospective observational study evaluated the role of ultrasonography in predicting pregnancy outcomes among women presenting with threatened abortion. In this study, 72% of pregnancies continued beyond the first trimester, while 28% resulted in pregnancy loss. These findings are consistent with previously published studies reporting favorable outcomes in approximately 60–80% of cases of threatened abortion [16,17].

One of the most significant observations in this study was the strong association between fetal cardiac activity and pregnancy continuation. Pregnancies in which fetal cardiac activity was documented demonstrated markedly higher survival rates compared to those without detectable cardiac activity. This finding reinforces the well-established role of embryonic heart activity as the most reliable predictor of early pregnancy viability [18,19]. The absence of cardiac activity likely reflects underlying embryonic demise or severe developmental abnormalities.

Subchorionic hematoma was observed in a considerable proportion of cases in the present study. While small hematomas were often associated with favorable outcomes, larger hematomas were linked to an increased risk of pregnancy loss. These findings are in agreement with earlier studies suggesting that hematoma size, location, and extent of placental involvement influence pregnancy prognosis [20,21]. The presence of subchorionic hematoma may compromise placental attachment and interfere with early placental development, thereby increasing the likelihood of miscarriage.

Yolk sac abnormalities constituted another important adverse prognostic factor in this study. Abnormal yolk sac morphology has been previously associated with chromosomal abnormalities and impaired embryonic nutrition [22]. The yolk sac plays a crucial role in hematopoiesis and metabolic support during early gestation, and deviations from normal morphology often precede embryonic demise [23].

The prospective design of this study allowed systematic assessment and follow-up of patients, strengthening the validity of the findings. However, certain limitations must be acknowledged. The relatively small sample size may limit generalizability, and longer follow-up could provide additional insights into later pregnancy outcomes. Furthermore, biochemical markers such as serum  $\beta$ -hCG and progesterone levels were not included, which may have enhanced prognostic accuracy [24].

Despite these limitations, the findings of this study underscore the pivotal role of ultrasonography in the evaluation of threatened abortion. Early identification of high-risk pregnancies allows for appropriate counseling, closer surveillance, and psychological reassurance for patients with favorable prognostic indicators. Larger multicentric studies are recommended to further validate these observations and establish standardized prognostic models [25].

## Conclusion

Ultrasonography is an indispensable tool in the evaluation of threatened abortion. The presence of fetal cardiac activity and normal sonographic parameters are associated with favorable pregnancy outcomes, while absent cardiac activity and large subchorionic hematomas predict poor prognosis. Early ultrasonographic assessment aids in risk stratification, counseling, and appropriate clinical management.

## References

1. Cunningham FG, Leveno KJ, Bloom SL, et al. *Williams Obstetrics*. 26th ed. McGraw-Hill; 2022.
2. Norwitz ER, Schust DJ, Fisher SJ. Implantation and the survival of early pregnancy. *N Engl J Med*. 2001;345:1400–1408.
3. Stephenson MD. Frequency of factors associated with habitual abortion. *Fertil Steril*. 1996;66:24–29.
4. Levi CS, Lyons EA, Lindsay DJ. Early diagnosis of nonviable pregnancy with transvaginal ultrasonography. *Radiology*. 1988;167:383–385.
5. Nyberg DA, Laing FC, Filly RA. Threatened abortion: sonographic distinction of normal and abnormal gestations. *Radiology*. 1986;158:397–400.
6. Doubilet PM, Benson CB. Outcome of first-trimester pregnancies with slow embryonic heart rate. *Radiology*. 1995;197:229–231.
7. Falco P, Milano V, Pilu G, et al. Sonography of pregnancies with first-trimester bleeding. *J Ultrasound Med*. 1996;15:843–849.
8. Benson CB, Doubilet PM. Slow embryonic heart rate in early pregnancy. *Radiology*. 1994;192:343–344.
9. Tongsong T, Srisomboon J. Fetal heart rate in early pregnancy. *J Med Assoc Thai*. 1995;78:495–499.
10. Lindsay DJ, Lovett IS, Lyons EA, et al. Yolk sac diameter and shape as predictors of pregnancy outcome. *Radiology*. 1992;183:115–118.
11. Moradan S, Forouzesfar M. Yolk sac abnormalities and early pregnancy outcome. *J ObstetGynaecol*. 2012;32:689–691.
12. Papaioannou GI, Syngelaki A, Maiz N, et al. Ultrasonographic prediction of early pregnancy loss. *Ultrasound Obstet Gynecol*. 2011;38:53–59.
13. Bennett GL, Bromley B, Lieberman E, Benacerraf BR. Subchorionic hemorrhage. *Radiology*. 1996;200:803–806.
14. Pearlstone M, Baxi L. Subchorionic hematoma. *ObstetGynecol Surv*. 1993;48:65–68.

15. Pedersen JF, Mantoni M. Prevalence and significance of subchorionic hemorrhage. *AJR Am J Roentgenol.* 1990;154:535–537.
16. Hasan R, Baird DD, Herring AH, et al. Association between first-trimester bleeding and miscarriage. *Obstet Gynecol.* 2009;114:860–867.
17. Saraswat L, Bhattacharya S, Maheshwari A, Bhattacharya S. Maternal and perinatal outcomes after threatened miscarriage. *Hum Reprod.* 2010;25:205–214.
18. Johns J, Hyett J, Jauniaux E. Obstetric outcome after threatened miscarriage. *Ultrasound Obstet Gynecol.* 2003;21:163–166.
19. Makrydimas G, Sebire NJ, Lolis D, et al. Fetal loss following threatened miscarriage. *Ultrasound Obstet Gynecol.* 2003;22:587–591.
20. Tuuli MG, Norman SM, Odibo AO, et al. Perinatal outcomes in pregnancies with subchorionic hematoma. *Obstet Gynecol.* 2011;117:1205–1212.
21. Nagy S, Bush M, Stone J, et al. Clinical significance of subchorionic hemorrhage. *Obstet Gynecol.* 2003;102:94–100.
22. Tan S, Wang J, Chen Y. Abnormal yolk sac characteristics and pregnancy outcome. *Arch Gynecol Obstet.* 2014;289:101–106.
23. Laing FC, Frates MC. Ultrasound evaluation of early pregnancy complications. *Radiol Clin North Am.* 1992;30:15–29.
24. Everett C. Incidence and outcome of bleeding before the 20th week of pregnancy. *J ObstetGynaecol.* 1997;17:551–555.
25. Weiss JL, Malone FD, Vidaver J, et al. Threatened abortion and pregnancy outcome. *Am J Obstet Gynecol.* 2004;190:745–750.