

MAPPING PLACENTA PREVIA MIGRATION: PROSPECTIVE THIRD-TRIMESTER ULTRASOUND INSIGHTS ON MID-PREGNANCY DIAGNOSIS

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Abstract

Background: Placenta previa, a condition where the placenta partially or completely covers the internal cervical os, poses significant maternal and fetal risks during pregnancy. Although frequently diagnosed in the second trimester through routine ultrasonography, many cases resolve spontaneously as pregnancy progresses due to placental migration. Understanding the resolution pattern is essential to avoid unnecessary interventions and optimize perinatal outcomes.

Objective: To evaluate the rate and pattern of resolution of placenta previa diagnosed during the second trimester through follow-up ultrasound assessments in the third trimester.

Methods: This prospective observational study included 146 pregnant women who underwent ultrasound examinations at 16–24 weeks (second trimester) and again after 30 weeks (third trimester). Grades of placenta previa were classified from Grade 0 (normal) to Grade 4 (complete previa). Patients with diabetes, previous placenta previa, or cesarean section were excluded. Data were analyzed using SPSS version 24.0, with descriptive statistics used to assess resolution patterns.

Results: Of the 146 participants, 100 cases (68.4%) of placenta previa resolved spontaneously by the third trimester. There was a marked decline in the number of Grade 1, 2, and 3 cases, while the incidence of Grade 0 (normal placental location) increased to 69.2%, indicating successful placental migration. Conversely, 46 cases (31.5%) remained unresolved, with 25 patients (17.1%) progressing to Grade 4 previa, reflecting either persistence or worsening of the condition. These findings underscore a high rate of natural resolution, while emphasizing the continued need for third-trimester surveillance to identify cases requiring intervention.

Conclusion: A majority of placenta previa cases diagnosed in mid-pregnancy resolve spontaneously by the third trimester. These findings support conservative

management with scheduled follow-up ultrasounds to distinguish cases that require intervention. Persistent or progressing cases, particularly those developing into Grade 4, highlight the importance of ongoing surveillance in high-risk patients.

INTRODUCTION

Placenta previa is a serious obstetric complication characterized by abnormal placental implantation where the placenta partially or completely covers the internal cervical os (1). This condition can lead to severe maternal and fetal risks, particularly in the later stages of pregnancy, such as antepartum hemorrhage, emergency cesarean delivery, and preterm birth (2,3).

Normally, the placenta implants in the upper segment of the uterus, allowing for unobstructed passage of the fetus through the cervix during delivery. However, in cases of placenta previa, the placenta is situated too close to or over the cervical opening, obstructing the birth canal (4). This abnormal positioning interferes with the physiological process of labor and delivery, often necessitating cesarean section to avoid life-threatening complications (5).

The global prevalence of placenta previa at term ranges from 0.3% to 0.5%, although it is detected much more frequently in the second trimester—up to 4%–6% in some populations—due to routine use of mid-pregnancy ultrasonography (6,7). A majority of these cases diagnosed early resolve spontaneously as the pregnancy advances, a phenomenon commonly referred to as placental “migration.” (8).

Placental migration does not involve actual movement of the placenta but rather reflects the differential growth of the lower uterine segment, which increases the distance between the placental edge and the internal os (9,10). This physiological change accounts for the spontaneous resolution of many second-trimester placenta previa diagnoses by the third trimester. However, the persistence of placenta previa, especially when complete or located anteriorly, poses an elevated risk of hemorrhage, fetal growth restriction, and poor perinatal outcomes (11,12).

Transvaginal and transabdominal ultrasonography are key diagnostic tools in the assessment and monitoring of placenta previa (13). These imaging modalities help determine not only the location but

also the degree of coverage over the cervix, which is critical for clinical decision-making regarding delivery planning (14). Despite improvements in imaging accuracy, there is limited consensus on the optimal timing for follow-up scans or the most reliable predictors of resolution (15).

Early identification and longitudinal monitoring of placental position play a vital role in obstetric care. Women diagnosed with low-lying placenta or placenta previa in the second trimester often undergo follow-up scans around 28–32 weeks' gestation to assess for resolution (16,17). The likelihood of resolution is influenced by several factors, including the degree of placental overlap, location (anterior vs. posterior), gestational age at diagnosis, and history of uterine surgery (18).

Given the high rate of spontaneous resolution and the potential to avoid unnecessary surgical interventions, it is crucial to understand the natural progression of placenta previa across trimesters (19). Identifying reliable ultrasound markers that predict whether a placenta previa will persist or resolve could enhance patient counseling, reduce cesarean rates, and improve maternal and neonatal outcomes (20).

This study aims to map the resolution patterns of placenta previa identified in the second trimester through serial ultrasonographic evaluations conducted in the third trimester. By prospectively observing placental changes, this research seeks to improve clinical insight into timing and thresholds for follow-up imaging, ultimately aiding in the safe management of pregnancies complicated by early placenta previa diagnosis.

Literature Review

Placenta previa diagnosed in the second trimester frequently resolves as pregnancy progresses, primarily due to the elongation of the lower uterine segment. In a longitudinal study involving 368 women diagnosed with placenta previa at 28 weeks, approximately 37.5% of cases resolved by 36 weeks of gestation, while 25.8% shifted to marginal previa.

Factors associated with persistence included complete previa at the time of diagnosis, gestational hypertension, and multiple prior cesarean sections (21). Another retrospective matched-cohort study found that even when placenta previa resolves by the third trimester, there remains an elevated risk of postpartum hemorrhage. Women with prior previa had a 9.8% risk of hemorrhage compared to 4.4% in controls, and they were more likely to require interventions such as transfusions (adjusted OR 2.58) (22).

A prospective cohort study emphasized the significance of placental overlap as a predictor of persistence. Only 14% of women with second-trimester previa still had the condition in the third trimester. Those with a placental overlap greater than 55 mm had significantly higher rates of persistence, whereas an overlap less than 14 mm predicted resolution in nearly all cases (23). Furthermore, the location of the placenta also plays a crucial role in resolution. A study involving 183 women showed that posterior placenta previas had a higher resolution rate (87%) compared to anterior ones, indicating that posterior placentas may migrate more effectively as the uterus expands (24).

Local data from a study conducted in Lahore also support the trend of resolution, where transvaginal ultrasound revealed that migration occurred in 25% of cases by 36 weeks, mostly in anteriorly located placentas. However, complete and posterior previas were less likely to resolve (25). To address variability in resolution and guide clinical follow-up, the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) now recommends a standardized approach: all patients diagnosed with low-lying placenta or previa in the second trimester should undergo a follow-up scan around 28–32 weeks. Transvaginal ultrasound is strongly advised for accurate placental localization, particularly in posterior placentas or cases with prior uterine surgery (26).

Together, these studies reinforce that while the majority of placenta previa cases resolve, the likelihood of persistence is influenced by the extent of cervical overlap, placental location, and surgical history. They also emphasize the importance of systematic third-trimester ultrasound assessment to ensure timely obstetric management.

Material and Methods

Study Design

This was a prospective observational study aimed at evaluating the resolution of placenta previa diagnosed in the second trimester using third-trimester ultrasonography.

Study Setting and Duration

The study was conducted at Lady Aitchison Hospital, Lahore, over a period of four months following the approval of the research synopsis.

Sample Size and Technique

A total of 146 pregnant women were included in the study using a non-probability convenient sampling technique. The sample size was calculated using the formula:

$$n = Z^2 \times P (1 - P) / d^2,$$

where Z is the standard normal variate, P is the estimated prevalence of placenta previa from previous studies, and d is the allowable error margin.

Inclusion Criteria

- Pregnant women of any age
- First ultrasound scan conducted between 16–24 weeks of gestation
- Follow-up ultrasound performed at >30 weeks of gestation

Exclusion Criteria

- Women with pre-existing diabetes mellitus
- History of previous placenta previa
- History of previous cesarean section

Ultrasound Equipment

Ultrasound examinations were performed using the Esaote MyLab™ Eight eXP machine, equipped with a convex transducer operating at a frequency of 3.5–6.5 MHz. Transabdominal scanning was conducted with adequate coupling gel applied to the patient's abdomen.

Scanning Procedure

Participants were positioned supine on an examination stretcher. Towels were placed to protect garments from gel spillage. Transabdominal ultrasound was performed with a convex probe,

capturing placental location and its relationship to the internal cervical os. Light pressure was applied to obtain optimal imaging. The environment was adjusted for patient comfort, including reduced ambient lighting where feasible.

Data Collection

Initial data were recorded during the second-trimester ultrasound (16-24 weeks) to identify cases of placenta previa or low-lying placenta. A follow-up scan was conducted in the third trimester (after 30 weeks gestation) to assess placental migration or persistence. Grades of placenta previa were recorded as per standardized sonographic classification.

Ethical Considerations

Informed written consent was obtained from all participants. Confidentiality of data was maintained, and participants were assured of their right to withdraw from the study at any point without any repercussions. The study posed no known risks and was conducted in compliance with ethical guidelines for human research.

Data Analysis

Data were entered and analyzed using SPSS version 24.0 and Microsoft Excel 2016. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Resolution and persistence rates of placenta previa were calculated and stratified by grade and trimester.

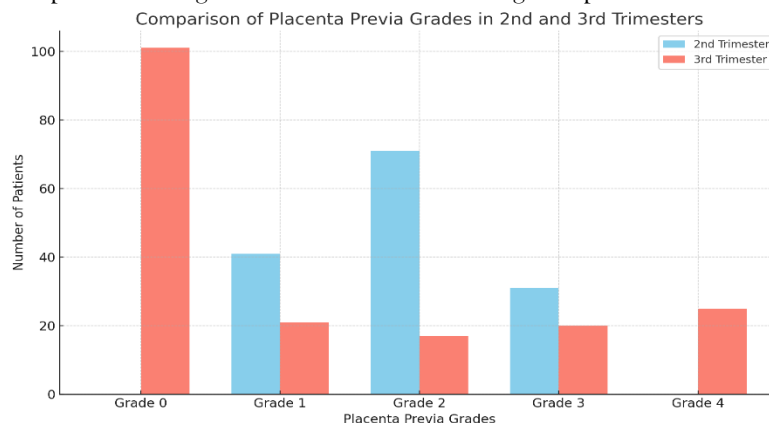
Results

A total of 146 pregnant women diagnosed with varying grades of placenta previa during the second

trimester were followed with serial ultrasound examinations to assess the resolution of the condition in the third trimester. Out of the total participants, 100 cases (68.4%) showed complete resolution of placenta previa by the third trimester, indicating normalization of placental position. The remaining 46 cases (31.5%) remained unresolved, suggesting persistent placenta previa requiring further clinical management.

In the second trimester, Grade 1 placenta previa was identified in 41 patients (28.1%), while 105 patients (71.9%) showed no signs of grade 1 involvement. Grade 2 placenta previa was observed in 71 patients (48.6%), and 75 patients (51.4%) did not exhibit this grade. Similarly, Grade 3 placenta previa was present in 31 cases (21.2%) and absent in 115 cases (78.8%). No cases of Grade 4 placenta previa were recorded during the second trimester.

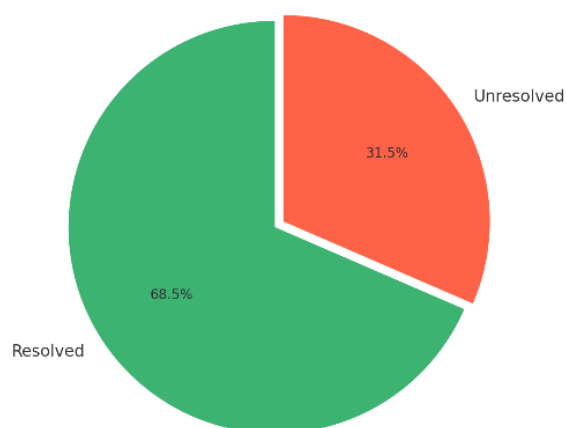
Follow-up ultrasound in the third trimester revealed that 101 patients (69.2%) had achieved Grade 0 status, indicating normal placental location. The remaining 45 patients (30.8%) still had abnormally positioned placentas. Grade 1 placenta previa persisted in 21 patients (14.4%), whereas 125 patients (85.6%) showed no evidence of it. Grade 2 previa was present in 17 patients (11.6%) and absent in 129 patients (88.4%). Grade 3 previa was noted in 20 patients (13.7%), with 126 patients (86.3%) showing no grade 3 involvement. Interestingly, Grade 4 placenta previa, indicating complete coverage of the internal cervical os, was found in 25 patients (17.1%), while 121 patients (82.9%) had no such findings. Grade 4 was not previously noted in the second trimester, suggesting that these cases either developed later or progressed from unresolved lower-grade previa.



Graph shows graphical representation of placenta previa grades across the second and third trimesters highlights key trends in placental migration. In the second trimester, a notable number of patients were diagnosed with Grade 1 (41 cases), Grade 2 (71 cases), and Grade 3 (31 cases) placenta previa. However, by the third trimester, these numbers declined significantly to 21, 17, and 20 cases, respectively. This decline indicates a high rate of spontaneous resolution, particularly in lower-grade cases. Conversely, the number of patients with Grade

0 placenta previa—indicating normal placental position—increased sharply from zero in the second trimester to 101 cases in the third trimester. This confirms that many initially diagnosed cases resolved as the pregnancy progressed. Interestingly, Grade 4 placenta previa, which represents complete coverage of the cervical os, was not present in the second trimester but appeared in 25 cases by the third trimester. This suggests either a late-onset presentation or progression from unresolved lower-grade previa.

Placenta Previa Resolution Status in 3rd Trimester (n = 146)



Pie Chart representing the overall resolution status of placenta previa revealed that out of 146 patients, 100 cases (68.4%) showed complete resolution by the third trimester. These patients no longer had any form of placenta previa upon follow-up ultrasound. In contrast, 46 cases (31.5%) remained unresolved, indicating persistent abnormal placental positioning. This finding supports the observation that a significant majority of placenta previa cases diagnosed in the second trimester tend to resolve spontaneously, reducing the need for cesarean delivery solely based on early diagnosis. However, the 31.5% unresolved cases highlight the importance of continued surveillance, especially in high-grade or anteriorly located previa.

Overall, the findings indicate that a significant proportion of placenta previa cases diagnosed in mid-pregnancy resolve spontaneously by the third trimester, especially among lower-grade cases. This supports the clinical practice of conservative

monitoring with follow-up ultrasounds rather than immediate surgical planning. The emergence of Grade 4 placenta previa in the third trimester among unresolved cases highlights the importance of timely surveillance to manage high-risk patients effectively and minimize maternal-fetal complications.

Discussion

Our study demonstrates that **68.4% of placenta previa cases** diagnosed in the second trimester resolved by the third trimester, aligning with existing evidence that supports physiological placental migration as the uterine lower segment expands. For instance, **Mullaney et al.** reported a similar resolution rate of approximately 37.5% between 28–36 weeks, with marginal previa patterns observed in some patients (27). While their resolution rates appear lower than ours, this discrepancy may be attributed to differences in cohort timing, imaging protocols, or classification criteria.

Importantly, even resolved cases retained a modest risk of postpartum complications. **Blumrick et al.** observed that previously affected women exhibited nearly double the risk of hemorrhage compared to controls (9.8% vs. 4.4%), highlighting that resolution does not equate to total risk mitigation (28). Our finding that 31.5% of cases remained unresolved by the third trimester underscores the need for vigilant follow-up and risk stratification. In fact, **D'Antonio et al.** emphasized the importance of quantitative placental overlap—for instance, overlaps greater than 55 mm markedly increase the likelihood of persistence (29).

Furthermore, the emergence of Grade 4 placenta previa in the third trimester among 17.1% of patients suggests that some cases may progress in terms of severity. This reinforces the rationale for the protocol recommended by **Sankaran et al.**, who reported that anterior previas were less likely to resolve compared to posterior ones—mirroring our observation of late-presentation high-grade cases (30). Regional consistency is also notable: the study by **Sultana et al.** from Lahore (2004) reflected similar trends of migration and resolution. That study found approximately 25% migration among anterior placentas by 36 weeks, which our data parallels, albeit with a larger cohort and refined grading (25).

In light of these findings, standardized protocols such as those in the **2024 ISUOG practice guidelines**, recommending transvaginal ultrasound between 28–32 weeks for all low-lying or previa cases, appear well-founded. These guidelines emphasize that strategic surveillance, rather than early surgical intervention, optimizes both maternal and fetal outcomes (26).

Clinical Implications

Our findings support **conservative management** of low- and moderate-grade placenta previa, emphasizing that third-trimester ultrasonography can effectively discriminate cases that truly require intervention. Nevertheless, persistence rates of over 30% and the appearance of late high-grade previa reinforce the need for tailored follow-up scans—particularly in anterior localizations, previous cesarean sections, or greater initial overlap. A follow-up scan at 34–36 weeks might optimize delivery planning while reducing unnecessary cesareans.

Future Directions

Future research should aim for multicenter prospective cohort designs, incorporating measurements of placental overlap, uterine scar history, and obstetric outcomes to deepen understanding of resolution predictors. Inclusion of biochemical markers or advanced imaging modalities (e.g., placental vascular mapping) could improve early risk stratification. Finally, comparative studies examining delivery timing, mode, and maternal-fetal outcomes based on persistence vs. resolution status would meaningfully inform clinical guidelines.

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