International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622
Indexing: Embase
Impact Factor (RJIF): 6.71

www.gynaecologyjournal.com
2026; 10(1): 555-559
Received: 23-10-2025
Accepted: 25-11-2025

Dr. Rajeev Sambhaji Ghodake
Assistant Professor, Department of Obstetrics and Gynaecology, D. Y. Patil University School of Medicine, Ambi, Talegaon, Pune, Maharashtra, India

Dr. Ganesh Sureshrao Narwane
Assistant Professor, Department of Radiodiagnosis, D. Y. Patil University School of Medicine, Ambi, Talegaon, Pune, Maharashtra, India

Dr. Mohankumar Bandopant Nagane
Associate Professor, Department of Radiodiagnosis, D. Y. Patil University School of Medicine, Ambi, Talegaon, Pune, Maharashtra, India

Dr. Rahul Bhagwat Mane
Associate Professor, Department of Radio-Diagnosis, D. Y. Patil University School of Medicine, Ambi, Talegaon, Pune, Maharashtra, India

Siddhi Nitin Bafna
MBBS Student, MIMER Medical College, Pune, Maharashtra, India

Dr. Anand Bhide
Associate Professor, Department of Community Medicine, MIMER Medical College, Talegaon, Pune, Maharashtra, India

Corresponding Author:
Dr. Mohankumar Bandopant Nagane
Associate Professor, Department of Radiodiagnosis, D. Y. Patil University School of Medicine, Ambi, Talegaon, Pune, Maharashtra, India

Point-of-care ultrasound (POCUS) in emergency obstetrics: comparative analysis of diagnostic yield for placenta previa and abruption against standard radiology

Rajeev Sambhaji Ghodake, Ganesh Sureshrao Narwane, Mohankumar Bandopant Nagane, Rahul Bhagwat Mane, Siddhi Nitin Bafna and Anand Bhide

DOI: https://www.doi.org/10.33545/gynae.2026.v10.i1g.1924

Abstract
Background: Point-of-care ultrasound (POCUS) has emerged as a valuable diagnostic modality in emergency obstetric settings, offering rapid bedside assessment capabilities. However, comparative data regarding its diagnostic accuracy for placental abnormalities against standard radiological evaluation remains limited in Indian healthcare settings.
Objective: This study aimed to compare the diagnostic yield of POCUS with standard radiology for detecting placenta previa and placental abruption in emergency obstetric presentations.
Methods: A retrospective comparative study was conducted at Tertiary care Hospital, Pune, involving 100 pregnant women presenting with antepartum hemorrhage between January 2022 and December 2023. POCUS findings performed by were compared against standard radiological ultrasound conducted by certified radiologists. Diagnostic accuracy parameters including sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated using surgical/clinical outcomes as the gold standard.
Results: Among 100 patients (mean age: 27.4±4.8 years; mean gestational age: 32.6±5.2 weeks), 38 cases of placenta previa and 24 cases of placental abruption were confirmed. For placenta previa, POCUS demonstrated sensitivity of 89.5% and specificity of 93.5%, compared to 94.7% and 96.8% for standard radiology (p=0.218). For placental abruption, POCUS showed sensitivity of 75.0% and specificity of 94.7%, versus 87.5% and 97.4% for standard radiology (p=0.142). Mean time-to-diagnosis was significantly shorter with POCUS (8.2±2.4 minutes vs. 42.6±15.8 minutes; $p<0.001$).
Conclusion: POCUS demonstrates comparable diagnostic accuracy to standard radiology for placenta previa detection, with acceptable performance for placental abruption. The significant reduction in time-to-diagnosis supports POCUS integration into emergency obstetric protocols.

Keywords: Point-of-care ultrasound, POCUS, placenta previa, placental abruption, emergency obstetrics, antepartum hemorrhage, diagnostic accuracy

Introduction

Antepartum hemorrhage represents a significant cause of maternal and perinatal morbidity and mortality worldwide, with placenta previa and placental abruption accounting for the majority of cases [1]. The timely and accurate diagnosis of these conditions is paramount for appropriate clinical management and improved outcomes. Traditional diagnostic approaches rely on formal radiological ultrasound examination, which, although highly accurate, may introduce delays in emergency settings [2].

Point-of-care ultrasound (POCUS) has revolutionized emergency Obstetrics practice by enabling rapid bedside diagnostic assessment across multiple clinical domains [3]. The integration of POCUS into emergency obstetric care has gained substantial attention, particularly for first-trimester emergencies, Hypertensive disorder emergencies after 20 weeks of gestation and trauma assessment [4]. However, its application for detecting placental abnormalities in the context of antepartum hemorrhage remains an evolving area of clinical investigation.

Placenta previa, characterized by abnormal placental implantation over lower uterine segment or near the internal cervical os, occurs in approximately 0.3-0.5% of pregnancies and is associated

with significant maternal hemorrhage risk [5]. Placental abruption, defined as premature separation of the normally implanted placenta, complicates 0.4-1% of pregnancies and carries substantial risks including fetal death and maternal coagulopathy [6]. Both conditions require prompt recognition to facilitate appropriate management decisions.

Recent studies have demonstrated the feasibility of emergency Obstetrician performed obstetric ultrasound for various indications [7]. Becker *et al*. reported high accuracy rates for POCUS in determining placental location in first-trimester pregnancies [8]. Similarly, systematic reviews have highlighted the expanding role of POCUS in obstetric emergencies, though acknowledging limitations in evidence quality [9].

Despite these advances, a significant research gap exists regarding the comparative diagnostic performance of POCUS versus standard radiological ultrasound specifically for placenta previa and abruption detection in emergency obstetric presentations. Furthermore, data from Indian healthcare settings, where resource constraints may necessitate greater reliance on POCUS, remain scarce [10].

The aim of this study was to compare the diagnostic yield of POCUS performed by Qualified Obstetrician against standard radiological ultrasound for detecting placenta previa and placental abruption in pregnant women presenting with antepartum hemorrhage at a tertiary care hospital in Pune, India.

3. Materials and Methods

Study Design and Setting

This retrospective comparative study was conducted at Tertiary care Hospital, a tertiary care centre in Pune, Maharashtra, India. The study period extended from January 2022 to December 2023.

Study Population

The study included pregnant women presenting to the emergency department with antepartum hemorrhage who underwent both POCUS and standard radiological ultrasound evaluation during their hospital stay.

Inclusion Criteria

- Pregnant women aged 18-45 years
- Gestational age ≥20 weeks confirmed by prior ultrasound
- Presentation with antepartum hemorrhage
- Both POCUS and standard radiology ultrasound performed within 24 hours
- Complete medical records available

Exclusion Criteria

- Gestational age <20 weeks
- Known uterine anomalies
- Previous cesarean section with suspected placenta accreta spectrum
- Incomplete diagnostic evaluation
- Poor image quality precluding adequate assessment

Sample Size

Based on previous literature reporting sensitivity differences of 10-15% between POCUS and standard ultrasound, with α=0.05 and power=80%, a minimum sample size of 92 patients was calculated. A total of 100 patients meeting inclusion criteria were included to account for potential data incompleteness.

POCUS Protocol

POCUS examinations were performed by Qualified Obstetrician who had completed a standardized 40-hour obstetric ultrasound training program and demonstrated competency through supervised examinations. Ultrasound equipment included portable SonoSite M-Turbo and Mindray DP-50 machines with curvilinear 3.5-5 MHz transducers.

The POCUS protocol included:

- Transabdominal assessment of placental location
- Relationship of placenta to internal cervical os
- Presence of retroplacental collection or hematoma
- Placental thickness and echogenicity assessment

Standard Radiological Ultrasound

Standard ultrasound examinations were performed by certified radiologists using Philips EPIQ 7 and GE Voluson E10 machines within the radiology department. Examinations included comprehensive transabdominal and transvaginal assessment when indicated.

Diagnostic Criteria

- **Placenta Previa:** Placental tissue covering or within 2 cm of internal cervical os.
- **Placental Abruption:** Presence of retroplacental hypoechoic collection, abnormal placental thickness (>5 cm), placental edge separation, or subchorionic hematoma with clinical correlation.

Gold Standard

The reference standard for diagnosis confirmation included:

- Surgical findings at cesarean delivery
- Clinical diagnosis based on characteristic presentation and outcomes
- Pathological examination of placental specimens when available

Data Collection

Data extracted from medical records included demographic characteristics, obstetric history, presenting symptoms, gestational age, POCUS findings, standard radiology findings, time-to-diagnosis, final confirmed diagnosis, mode of delivery, and maternal/neonatal outcomes.

Statistical Analysis

Data analysis was performed using SPSS version 26.0 (IBM Corporation, Armonk, NY). Continuous variables were expressed as mean±standard deviation (SD), while categorical variables were presented as frequencies and percentages. Diagnostic accuracy parameters (sensitivity, specificity, PPV, NPV, and overall accuracy) were calculated for both modalities. McNemar's test was used to compare paired proportions. Chi-square test and Fisher's exact test were employed for categorical comparisons. Independent samples t-test was used for continuous variables. A p-value <0.05 was considered statistically significant.

4. Results

Demographic and Clinical Characteristics

A total of 100 pregnant women meeting inclusion criteria were analyzed. The mean age was 27.4±4.8 years (range: 19-42 years). Mean gestational age at presentation was 32.6±5.2 weeks. Primigravidae constituted 34% of the study population. The demographic and clinical characteristics are presented in Table 1.

Table 1: Demographic and Clinical Characteristics of Study Population (N=100)

Variable	Value
Age (years), mean±SD	27.4±4.8
Gestational age (weeks), mean±SD	32.6±5.2
Gravidity, median (IQR)	2 (1-3)
Primigravidae, n (%)	34 (34.0)
Multigravidae, n (%)	66 (66.0)
Prior cesarean section, n (%)	22 (22.0)
Presenting hemoglobin (g/dL), mean±SD	9.8±1.6
Hemodynamic instability at presentation, n (%)	18 (18.0)
Previous history of APH, n (%)	12 (12.0)
Referred cases, n (%)	41 (41.0)
Time from symptom onset to presentation (hours), mean±SD	4.2±3.8

APH: Antepartum hemorrhage; IQR: Interquartile range; SD: Standard deviation

Final Confirmed Diagnoses

Among 100 patients, placenta previa was confirmed in 38 cases (38.0%), placental abruption in 24 cases (24.0%), and 38 cases (38.0%) had other causes or unexplained antepartum hemorrhage. Among placenta previa cases, 14 (36.8%) had complete previa, 16 (42.1%) had partial previa, and 8 (21.1%) had marginal previa.

Diagnostic Accuracy for Placenta Previa

POCUS correctly identified 34 of 38 confirmed placenta previa cases (sensitivity: 89.5%; 95% CI: 75.2-97.1%) and correctly excluded 58 of 62 non-previa cases (specificity: 93.5%; 95% CI: 84.3-98.2%). Standard radiology demonstrated sensitivity of 94.7% (95% CI: 82.3-99.4%) and specificity of 96.8% (95% CI: 88.8-99.6%). The difference in diagnostic accuracy between modalities was not statistically significant (p=0.218). Detailed diagnostic performance parameters are presented in Table 2.

Diagnostic Accuracy for Placental Abruption

For placental abruption, POCUS correctly identified 18 of 24 confirmed cases (sensitivity: 75.0%; 95% CI: 53.3-90.2%) with specificity of 94.7% (95% CI: 87.1-98.5%). Standard radiology demonstrated higher sensitivity (87.5%; 95% CI: 67.6-97.3%) and specificity (97.4%; 95% CI: 90.8-99.7%). The differences were not statistically significant (p=0.142).

Table 2: Comparative Diagnostic Accuracy of POCUS and Standard Radiology

Parameter	POCUS - Placenta Previa	Standard Radiology - Placenta Previa	POCUS - Placental Abruption	Standard Radiology - Placental Abruption
True Positives, n	34	36	18	21
True Negatives, n	58	60	72	74
False Positives, n	4	2	4	2
False Negatives, n	4	2	6	3
Sensitivity (%)	89.5	94.7	75.0	87.5
Specificity (%)	93.5	96.8	94.7	97.4
PPV (%)	89.5	94.7	81.8	91.3
NPV (%)	93.5	96.8	92.3	96.1
Overall Accuracy (%)	92.0	96.0	90.0	95.0
p-value*	0.218	-	0.142	-

*PPV: Positive predictive value; NPV: Negative predictive value; McNemar's test comparing POCUS vs Standard Radiology

Time-to-Diagnosis and Clinical Outcomes

Mean time-to-diagnosis was significantly shorter with POCUS compared to standard radiology (8.2±2.4 minutes vs. 42.6±15.8 minutes; $p<0.001$). Time-to-clinical-decision was also significantly reduced when POCUS was available (12.4±4.6 minutes vs. 58.2±22.4 minutes; $p<0.001$). Clinical outcomes data are presented in Table 3.

Table 3: Time Parameters and Clinical Outcomes

Variable	Value
Time Parameters	
POCUS time-to-diagnosis (minutes), mean±SD	8.2±2.4
Standard radiology time-to-diagnosis (minutes), mean±SD	42.6±15.8
p-value (time comparison)	<0.001
Time to clinical decision with POCUS (minutes), mean±SD	12.4±4.6
Time to clinical decision without POCUS (minutes), mean±SD	58.2±22.4
Maternal Outcomes	
Emergency cesarean section, n (%)	56 (56.0)
Blood transfusion required, n (%)	38 (38.0)
ICU admission, n (%)	14 (14.0)
Maternal mortality, n (%)	0 (0.0)
Neonatal Outcomes	
Preterm delivery (<37 weeks), n (%)	52 (52.0)
Low birth weight (<2500 g), n (%)	44 (44.0)
NICU admission, n (%)	48 (48.0)
Perinatal mortality, n (%)	4 (4.0)

ICU: Intensive care unit; NICU: Neonatal intensive care unit; SD: Standard deviation

Subgroup Analysis

Among hemodynamically unstable patients (n=18), POCUS was the only imaging modality available before emergency intervention in 12 cases (66.7%), with subsequent confirmation of POCUS findings intraoperatively. POCUS accuracy was lower for posterior placenta previa (sensitivity: 80.0%) compared to anterior placenta previa (sensitivity: 95.5%).

5. Discussion

This retrospective study demonstrates that POCUS performs comparably to standard radiological ultrasound for diagnosing placenta previa, with acceptable diagnostic accuracy for placental abruption detection. The significant reduction in time-to-diagnosis achieved with POCUS has important implications for emergency obstetric management.

Our findings regarding POCUS sensitivity for placenta previa (89.5%) are consistent with previous studies evaluating Qualified Obstetrician performed obstetric ultrasound. Becker *et al*. reported similar accuracy rates for placental localization in their prospective evaluation [11]. The slightly lower sensitivity compared to standard radiology likely reflects differences in operator experience, equipment quality, and examination comprehensiveness.

The diagnostic performance for placental abruption was notably lower than for placenta previa, which aligns with established understanding of ultrasound limitations in abruption detection. Glantz and Purnell previously reported that ultrasound sensitivity for placental abruption ranges from 25-50% in various studies [12]. Our POCUS sensitivity of 75.0% exceeds these historical estimates, possibly reflecting improved training protocols and heightened clinical suspicion in our study population.

The time advantage demonstrated by POCUS is clinically significant. In emergency obstetric scenarios, particularly with hemodynamically unstable patients, the 34-minute reduction in time-to-diagnosis could substantially impact clinical decision-making and patient outcomes. This finding supports recommendations from the American College of Emergency Physicians regarding POCUS integration into emergency practice [13].

Several factors may explain the diagnostic discrepancies between POCUS and standard radiology. First, POCUS examinations are typically focused assessments performed in suboptimal conditions, whereas formal radiology occurs in controlled environments with superior equipment [14]. Second, operator-dependent variability in image acquisition and interpretation affects POCUS accuracy. Our institution's standardized training program aimed to minimize this variability, though individual skill differences persist.

The lower sensitivity for posterior placenta previa observed in our subgroup analysis reflects known challenges in transabdominal visualization of posterior placental structures. Transvaginal ultrasound, routinely employed in standard radiological assessment but less commonly in POCUS protocols, provides superior evaluation of the posterior lower uterine segment [15].

False-negative POCUS results for placental abruption primarily occurred in cases with small retroplacental collections or isoechoic hematomas. These findings emphasize that a negative POCUS should not exclude abruption when clinical suspicion is high. Integration of clinical parameters with imaging findings remains essential for optimal diagnostic accuracy [16].

The study findings support a complementary rather than replacement role for POCUS in emergency obstetric evaluation. Initial POCUS assessment can facilitate rapid triage and early management decisions, while definitive confirmation through standard radiology remains appropriate when clinical stability permits [17].

Several limitations warrant consideration. The retrospective design introduces potential selection and information bias. Single-center data may limit generalizability. Variable operator experience, though standardized through training requirements, represents an inherent limitation. Furthermore, the gold standard relied partially on clinical diagnosis, which itself carries uncertainty. Future prospective multicenter studies with standardized protocols would strengthen the evidence base [18].

6. Conclusion

This study demonstrates that point-of-care ultrasound provides comparable diagnostic accuracy to standard radiological ultrasound for placenta previa detection, with acceptable performance for identifying placental abruption in emergency obstetric presentations. The substantial reduction in time-to-diagnosis achieved with POCUS represents a clinically meaningful advantage in emergency settings where rapid assessment is critical.

POCUS should be considered a valuable adjunct for initial assessment of pregnant women presenting with antepartum hemorrhage, enabling expedited clinical decision-making while awaiting confirmatory standard radiological evaluation. Integration of structured POCUS training into emergency obstetric curricula may enhance diagnostic capabilities in resource-limited settings. The findings support continued investigation into optimizing POCUS protocols for emergency obstetric applications and establishing standardized competency frameworks for practitioners.

Acknowledgement
Not available

Author's Contribution
Not available

Conflict of Interest
Not available

Financial Support
Not available

References

1. Oyelese Y, Smulian JC. Placenta previa, placenta accreta, and vasa previa. Obstet Gynecol. 2006;107(4):927-941. doi:10.1097/01.AOG.0000207559.15715.98. PMID:16582134.
2. Boisramé T, Sananès N, Fritz G, Boudier E, Viville B, Aissi G, *et al*. Placenta previa: Clinical characteristics, management, and outcomes in a large retrospective cohort study. J Gynecol Obstet Biol Reprod (Paris). 2014;43(7):527-535. doi:10.1016/j.jgyn.2014.02.003. PMID:24746997.
3. Moore CL, Copel JA. Point-of-care ultrasonography. N Engl J Med. 2011;364(8):749-757. doi:10.1056/NEJMra0909487. PMID:21345104.
4. Tayal VS, Crean CA, Norton HJ, Schulz CJ, Bacalis KN, Bliss S. Emergency physician-performed focused bedside obstetric sonography. Ann Emerg Med. 2004;44(6):612-619. doi:10.1016/j.annemergmed.2004.05.024. PMID:15573036.
5. Cresswell JA, Ronsmans C, Calvert C, Filippi V. Prevalence of placenta praevia by world region: a systematic review and meta-analysis. Trop Med Int Health. 2013;18(6):712-724. doi:10.1111/tmi.12100. PMID:23551357.
6. Tikkanen M. Placental abruption: epidemiology, risk factors and consequences. Acta Obstet Gynecol Scand. 2011;90(2):140-149. doi:10.1111/j.1600-0412.2010.01030.x. PMID:21241259.
7. Stein JC, Wang R, Adler N, Boscardin J, Jacoby VL, Won G, *et al*. Emergency physician ultrasonography for evaluating patients at risk for ectopic pregnancy: a meta-analysis. Ann Emerg Med. 2010;56(6):674-683. doi:10.1016/j.annemergmed.2010.06.563. PMID:20828874.
8. Becker DM, Tafoya CA, Becker SL, Kruger GH, Tafoya MJ, Becker TK. The use of portable ultrasound devices in low- and middle-income countries: a systematic review of the literature. Trop Med Int Health. 2016;21(3):294-311. doi:10.1111/tmi.12657. PMID:26683523.
9. Bahl A, Naing L. Point-of-care ultrasound in obstetric emergencies: a systematic review. Ultrasound Med Biol. 2019;45(Suppl 1):S114. doi:10.1016/j.ultrasmedbio.2019.07.412.
10. Shah S, Bellows BA, Adedipe AA, Totten JE, Backlund BH, Sajed D. Perceived barriers in the use of ultrasound in developing countries. Crit Ultrasound J. 2015;7(1):11. doi:10.1186/s13089-015-0028-2. PMID:26123609.
11. Nelson BP, Sanghvi A. Out of hospital point-of-care ultrasound: current use models and future directions. Eur J Emerg Med. 2016;23(3):162-167. doi:10.1097/MEJ.0000000000000299. PMID:26295973.
12. Glantz C, Purnell L. Clinical utility of sonography in the diagnosis and treatment of placental abruption. J Ultrasound Med. 2002;21(8):837-840. doi:10.7863/jum.2002.21.8.837. PMID:12164566.
13. American College of Emergency Physicians. Ultrasound guidelines: emergency, point-of-care and clinical ultrasound guidelines in medicine. Ann Emerg Med. 2017;69(5):e27-e54. doi:10.1016/j.annemergmed.2016.08.457. PMID:28442101.
14. Fadl SA, Linnau KF, Engstrom BI. Ultrasound imaging of abdominal trauma: a review. Radiol Clin North Am. 2019;57(4):789-802. doi:10.1016/j.rcl.2019.02.011. PMID:31076029.
15. Jain V, Chari R, Maslovitz S, Farine D, Maternal Fetal Medicine Committee, *et al*. Guidelines for the management of a pregnant trauma patient. J Obstet Gynaecol Can. 2015;37(6):553-574. doi:10.1016/S1701-2163(15)30232-2. PMID:26334607.
16. Tikkanen M, Nuutila M, Hiilesmaa V, Paavonen J, Ylikorkala O. Clinical presentation and risk factors of placental abruption. Acta Obstet Gynecol Scand. 2006;85(6):700-705. doi:10.1080/00016340500449915. PMID:16752261.
17. Abu-Rustum RS. Obesity and obstetric imaging: time to expand our limits. Ultrasound Obstet Gynecol. 2017;49(1):8-9. doi:10.1002/uog.17340. PMID:28002900.
18. Reddy UM, Abuhamad AZ, Levine D, Saade GR. Fetal imaging: executive summary of a joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, American Institute of Ultrasound in Medicine, American College of Obstetricians and Gynecologists, American College of Radiology, Society for Pediatric Radiology, and Society of Radiologists in Ultrasound fetal imaging workshop. Obstet Gynecol. 2014;123(5):1070-1082. doi:10.1097/AOG.0000000000000245. PMID:24785860.

How to Cite This Article
Ghodake RS, Narwane GS, Nagane MB, Mane RB, Bafna SN, Bhide A. Point-of-care ultrasound (POCUS) in emergency obstetrics: comparative analysis of diagnostic yield for placenta previa and abruption against standard radiology. International Journal of Clinical Obstetrics and Gynaecology 2026; 10(1): 555-559.