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Original Research Article

Maternal outcomes in morbidly adherent placenta: a prospective cohort study

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ABSTRACT

Background: Morbidly Adherent Placenta (MAP), encompassing placenta accreta, increta, and percreta, is a life-threatening obstetric condition associated with high maternal morbidity and mortality. This study aimed to evaluate maternal outcomes in women diagnosed with MAP and to identify risk factors influencing morbidity and mortality.
Methods: A prospective cohort study was conducted at a Government Medical College and Hospital, Akola, Maharashtra from Oct 2022 to Feb 2024, involving 50 women diagnosed with MAP. Data were collected regarding obstetric history, gestational age at delivery, estimated blood loss, need for hysterectomy, intensive care unit (ICU) stay, duration of hospitalization, and maternal mortality. Statistical analysis was performed to identify associations between previous Caesarean scars, emergency versus planned deliveries, and adverse outcomes.
Results: The majority of patients (62%) had placenta accreta, followed by increta (26%) and percreta (12%). MAP incidence and severity increased with the number of prior caesarean scas. The mean estimated blood loss was 1950±450 mL, and 80% of patients required blood transfusion. Caesarean hysterectomy was performed in 38% of cases. ICU admission was required in 56%, and the average hospital stay was 8.4±2.7 days. Planned deliveries were associated with significantly lower blood loss and fewer complications compared to emergency deliveries.
Conclusions: MAP remains a major cause of maternal morbidity, strongly associated with prior caesarean deliveries. Early antenatal diagnosis, and elective delivery in specialized centres significantly reduce blood loss, operative complications, and mortality.

Keywords: Caesarean section, Maternal outcomes, Morbidly adherent placenta, Obstetric haemorrhage, Placenta accreta spectrum

INTRODUCTION

Morbidly Adherent Placenta (MAP) encompasses a spectrum of invasive placental disorders placenta accreta, increta, and percreta arising from partial or complete absence of the decidua basalis and abnormal trophoblastic invasion into the myometrium or surrounding structures.[1] These disorders represent one of the most dangerous causes of obstetric haemorrhage and are associated with massive blood loss, increased need for peripartum hysterectomy, and significant maternal morbidity and mortality.[2]

Globally, the incidence of MAP has risen sharply, primarily due to increasing caesarean delivery rates and prior uterine surgeries.[3] The prevalence has escalated from approximately 1 in 30,000 pregnancies in the 1950s to nearly 1 in 500-700 deliveries today.[4] This rise reflects changing obstetric practices and the cumulative risk of repeated uterine instrumentation.

Major risk factors include previous caesarean section, placenta previa, prior curettage, advanced maternal age, multiparity, and assisted reproductive technologies.[5] The risk increases proportionally with each prior caesarean section, especially in women with placenta previa.

MAP substantially contributes to maternal morbidity and mortality, accounting for around 7-10% of maternal deaths related to obstetric haemorrhage in tertiary care settings.[6] Additional complications include DIC, bladder injury, sepsis, and prolonged ICU stay, along with psychological and reproductive consequences.

Early antenatal diagnosis is central to improving outcomes. Ultrasonography with colour Doppler is the primary diagnostic tool, while MRI provides added value in difficult or posterior placenta cases.[7] Timely diagnosis facilitates planned multidisciplinary management, availability of blood products, and involvement of experienced surgeons and anaesthesiologists.

In many low- and middle-income countries, including India, delayed diagnosis, inadequate referral pathways, and limited access to advanced imaging continue to worsen outcomes.[8] With rising caesarean delivery trends in India, early identification of high-risk women and delivery planning at well-equipped centres are essential.

Therefore, this study was undertaken to evaluate maternal outcomes among women with morbidly adherent placenta, analyse associated risk factors, and emphasize the importance of early diagnosis and multidisciplinary management in reducing maternal morbidity and mortality.

METHODS

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Government Medical College and Hospital, Akola, from October 2022 to February 2024, after obtaining Institutional Ethics Committee approval and written informed consent from all participants.

A total of 50 women diagnosed with morbidly adherent placenta (placenta accreta, increta, or percreta) were included. Diagnosis was made based on antenatal ultrasound findings like loss of retroplacental hypoechoic zone, presence of lacunar spaces, and turbulent blood flow on Color Doppler and also confirmed intraoperatively. Women with normal placental implantation or incomplete data were excluded.

Detailed demographic and obstetric histories, including parity, previous caesarean deliveries, and presence of placenta previa, were recorded. All patients underwent planned or emergency caesarean delivery, and intraoperative findings were documented regarding type of placental adherence, estimated blood loss, operative duration, transfusion requirements, and surgical interventions (e.g., caesarean hysterectomy, stepwise devascularization, or conservative management).

Postoperative parameters such as ICU admission, hospital stay, and maternal morbidity and mortality were analysed. Data were compiled using Microsoft Excel and analysed using descriptive statistics (mean, percentage, standard deviation).

RESULTS

A total of 50 women diagnosed with morbidly adherent placenta (MAP) were studied. The majority of women were in the age group 26-30 years (44%). The mean maternal age was 29.4±4.3 years (Table 1). Among 50 patients, 40 (80%) had ≥1 prior caesarean section, and 25 (50%) had placenta previa. Previous cesarean section (80%) and placenta previa (50%) were the most significant risk factors (Table 2). A positive association was found between number of prior cesarean sections and severity of MAP (χ^2=9.48, p=0.008).

Table 1: Age distribution of women with morbidly adherent placenta (n=50).

Age (years)	Number of patients	Percentage
21-25	8	16
26-30	22	44
31-35	19	38
>35	1	2

Table 2: Risk factors and their association with type of morbidly adherent placenta.

Risk factor	Present (n=50)	Percentage	Association with severe MAP (χ^2, p value)
≥1 previous LSCS	40	80	9.48, p = 0.008
Placenta previa	25	50	6.13, p = 0.013
Multiparity (>3)	12	24	1.65, p = 0.19 (Not Significant)
Previous D&C	7	14	0.74, p = 0.39 (Not Significant)
IVF conception	2	4	-

Placenta accreta was most common (62%), followed by increta (26%) and percreta (12%). The mean estimated blood loss was 1950±450 ml, ranging from 1200 to 3200 ml. Blood transfusion was required in 80% of cases, with an average of 2.6±1.2 units per patient.

Caesarean hysterectomy was performed in 19 (38%) women, while uterine-sparing procedures such as stepwise devascularization, internal iliac artery ligation, and balloon tamponade were employed in 31 (62%) cases.

ICU admission was required in 28 (56%) patients, and the mean hospital stay was 8.4±2.7 days. Maternal morbidity (shock, sepsis, wound infection, bladder injury) occurred in 22% of patients, and maternal mortality in 2 (4%) cases both with placenta percreta and ≥3 previous caesarean sections. Patients with placenta percreta had a significantly higher risk of ICU admission and blood transfusion (p=0.018).

Table 3: Maternal outcomes and association with type of MAP.

Outcome	Accreta (n=31), N (%)	Increta (n=13), N (%)	Percreta (n=6), N (%)	P value
Mean EBL (ml)	1750±320	2050±410	2350±480	0.021
Blood transfusion	22 (71)	12 (92)	6 (100)	0.032
Caesarean hysterectomy	8 (26)	6 (46)	5 (83)	0.009
ICU admission	12 (39)	8 (62)	6 (100)	0.018
Maternal mortality	0	0	2 (33)	0.001

Of the 50 women, 40% had planned caesarean deliveries, while 60% underwent emergency surgery. Planned deliveries were associated with significantly lower blood loss (mean 1650 mL vs 2150 mL) and fewer ICU admissions (40% vs 67%), highlighting the importance of multidisciplinary preoperative planning.

DISCUSSION

The present study underscores that morbidly adherent placenta is an increasingly important cause of obstetric morbidity and mortality, closely associated with previous caesarean sections and placenta previa. The mean maternal age (29.4 years) and parity distribution observed in this study are consistent with findings by Silver et al and Eller et al, reaffirming that MAP predominantly affects multiparous women with a history of uterine surgery.[9,10]

The distribution of placenta accreta (62%), increta (26%), and percreta (12%) parallels observations by Bowman et al and Fitzpatrick et al.[11,12] Multiple caesarean sections are known to disrupt the decidual interface, thereby increasing susceptibility to abnormal placentation.[13]

The mean estimated blood loss of 1950 mL in our cohort mirrors the 1800-2500 mL range reported by Jauniaux et al.[14] Caesarean hysterectomy was required in 38% of cases, comparable to Silver et al, whereas 62% of patients were successfully managed with conservative techniques such as balloon tamponade or stepwise devascularization, reflecting contemporary trends toward fertility preservation.[15,16]

Planned delivery under multidisciplinary supervision significantly improved outcomes in this study. Similar benefits of coordinated preoperative planning such as reduced blood loss, lower transfusion requirements, and decreased morbidity were reported by Warshak et al and Bowman et al.[17,18]

The maternal mortality rate of 4% in our study corresponds with the 2-7% range noted in large series by Belfort et al, with haemorrhagic shock and disseminated intravascular coagulation being the leading contributors.[19]

Overall, our findings reinforce that antenatal diagnosis, scheduled delivery at a tertiary care centre, and readiness for massive transfusion and surgical intervention are critical to optimizing maternal outcomes. Establishing regional MAP protocols and dedicated multidisciplinary teams is essential to reducing morbidity in high-risk pregnancies.[20]

This study has few limitations. The present study was conducted in a single tertiary care centre with a limited sample size of 50 patients, which may not reflect population-level variations. Long-term maternal and neonatal outcomes were not evaluated. Furthermore, the study did not include detailed cost analysis or interventional comparisons between conservative and radical management approaches. Multicentric studies with larger cohorts are needed to validate these findings and strengthen the evidence base for optimal management of morbidly adherent placenta.

CONCLUSION

Morbidly adherent placenta remains a major cause of obstetric haemorrhage and maternal mortality, particularly in women with prior caesarean deliveries and placenta previa. Antenatal detection through ultrasound and timely referral to tertiary care centres enables multidisciplinary management, significantly reducing blood loss and complications. Planned delivery, availability of blood products, and readiness for caesarean hysterectomy or conservative interventions are crucial for improving outcomes.

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REFERENCES

1. Jauniaux E, Collins S, Burton GJ. Placenta accreta spectrum: pathophysiology and evidence-based anatomy for prenatal ultrasound imaging. Am J Obstetr Gynecol. 2018;218(1):75-87.
2. Silver RM. Abnormal placentation: placenta previa, vasa previa, and placenta accreta. Obstet Gynecol. 2015;126(3):654-68.
3. Bowman ZS, Eller AG, Kennedy AM, Richards DS, Winter TC 3rd, Woodward PJ, et al. Accuracy of ultrasound for the prediction of placenta accreta. Am J Obstet Gynecol. 2014;211(2):177.e1-7.
4. Wu S, Kocherginsky M, Hibbard JU. Abnormal placentation: twenty-year analysis. Am J Obstet Gynecol. 2005;192(5):1458-61.
5. Eshkoli T, Weintraub AY, Sergienko R, Sheiner E. Placenta accreta: risk factors, perinatal outcomes, and consequences for subsequent births. Am J Obstet Gynecol. 2013;208(3):219.e1-7.
6. Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. Incidence and risk factors for placenta accreta/increta/percreta in the UK: a national case-control study. PLoS One. 2012;7(12):e52893.
7. Morel O, van Beekhuizen HJ, Braun T, Collins S, Pateisky P, Calda P, et al. International Society for Placenta Accreta Spectrum (IS-PAS). Performance of antenatal imaging to predict placenta accreta spectrum degree of severity. Acta Obstet Gynecol Scand. 2021;100 Suppl 1(Suppl 1):21-8.
8. Jauniaux E, Bhide A, Kennedy A, Woodward P, Hubinont C, Collins S; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: Prenatal diagnosis and screening. Int J Gynaecol Obstet. 2018;140(3):274-80.
9. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstetr Gynecol. 2006;107(6):1226-32.
10. Eller AG, Bennett MA, Sharshiner M, Masheter C, Soisson AP, Dodson M, et al. Maternal morbidity in cases of placenta accreta managed by a Multidisciplinary Care Team compared with standard obstetric care. Obstetr Anesthes Digest. 2012;32(1):41-2.
11. Einerson BD. Conservative management for placenta accreta spectrum: questions and barriers remain but are surmountable. Am J Obstet Gynecol MFM. 20236;5(3):100859.
12. Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. The management and outcomes of placenta accreta, increta, and percreta in the UK: a population-based descriptive study. BJOG. 2014;121(1):62-70.
13. Society of Gynecologic Oncology; American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine; Cahill AG, Beigi R, Heine RP, Silver RM, Wax JR. Placenta Accreta Spectrum. Am J Obstet Gynecol. 2018;219(6):B2-B16.
14. Jauniaux E, Ayres-de-Campos D, Langhoff-Roos J, Fox KA, Collins S; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO classification for the clinical diagnosis of placenta accreta spectrum disorders. Int J Gynaecol Obstet. 2019;146(1):20-4.
15. Silver RM, Fox KA, Barton JR, Abuhamad AZ, Simhan H, Huls CK, et al. Center of excellence for placenta accreta. Am J Obstet Gynecol. 2015;212(5):561-8.
16. Elkhouly NI, Solyman AE, Anter ME, Sanad ZF, El Ghazaly AN, Ellakwa HE. A new conservative surgical approach for placenta accreta spectrum in a low-resource setting. J Matern Fetal Neonatal Med. 2022;35(16):3076-82.
17. Warshak CR, Ramos GA, Eskander R, Benirschke K, Saenz CC, Kelly TF, et al. Effect of predelivery diagnosis in 99 consecutive cases of placenta accreta. Obstet Gynecol. 2010;115(1):65-9.
18. Erfani H, Fox KA, Clark SL, Rac M, Rocky Hui SK, Rezaei A, et al. Maternal outcomes in unexpected placenta accreta spectrum disorders: single-center experience with a multidisciplinary team. Am J Obstet Gynecol. 2019;221(4):337.e1-337.e5.
19. BE Porkodi, Suchaita MS, Namratha KN and Dwarakanath L. Optimising fetomaternal outcome in placenta accreta spectrum in previous c-section delivery - A clinical study with review of current guidelines. Int. J. Contraception Gynaecol. Obstet. 2025;7(1):19-25.
20. Sentilhes L, Kayem G, Chandraharan E, Palacios-Jaraquemada J, Jauniaux E; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: Conservative management. Int J Gynaecol Obstet. 2018;140(3):291-8.

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