Article

PAMJ One Health

Research

Adverse maternal and fetal outcomes among pregnant women with uterine scar and placenta previa in the third trimester: a cross-sectional study at Zonal referral hospital

Samweli Boaz Mkama, John Lugata, Glory Mangi, Raziya Gaffur, Bariki Mchome, Eusebious Maro, Joseph Mlay

Corresponding author: John Lugata, Department of Obstetrics and Gynecology, Kilimanjaro Christian Medical Centre, Moshi, Tanzania. lugataj06@gmail.com

Received: 30 Apr 2024 - **Accepted:** 02 Sep 2024 - **Published:** 18 Oct 2024

Keywords: Placenta previa, uterine scar, maternal outcomes, fetal outcomes

Cite this article: Samweli Boaz Mkama et al. Adverse maternal and fetal outcomes among pregnant women with uterine scar and placenta previa in the third trimester: a cross-sectional study at zonal referral hospital. PAMJ-One Health. 2024;15(13). 10.11604/pamj-oh.2024.15.13.43813

Available online at: https://www.one-health.panafrican-med-journal.com/content/article/15/13/full

Adverse maternal and fetal outcomes among pregnant women with uterine scar and placenta previa in the third trimester: a cross-sectional study at Zonal referral hospital

Samweli Boaz Mkama[1,2], John Lugata[1,2,&], Glory Mangi[1,2], Raziya Gaffur[1,2], Bariki Mchome[1,2], Eusebious Maro[2], Joseph Mlay[1,2]

[1]Department of Obstetrics and Gynecology, Kilimanjaro Christian Medical Centre, Moshi, Tanzania, [2]Faculty of Medicine, Kilimanjaro Christian Medical University College, Moshi, Tanzania

[&]Corresponding author

John Lugata, Department of Obstetrics and Gynecology, Kilimanjaro Christian Medical Centre, Moshi, Tanzania

Abstract

Introduction: *placenta previa is a significant cause of maternal and fetal morbidity and mortality in developing countries. Women with a uterine scar are at an increased risk of adverse outcomes when presenting with placenta previa in the third trimester. Understanding the adverse maternal and fetal outcomes in pregnant women with a uterine scar and placenta previa in the third trimester is vital for intervention strategies to improve maternal and fetal health.* ***Methods:*** *using medical birth registry data between 2011 and 2022, a total of 159 pregnant women with a uterine scar and placenta previa in the third trimester were included in the study. Relevant demographic, clinical, and obstetric factors were collected. Maternal outcomes assessed included postpartum hemorrhage, antepartum hemorrhage, and blood transfusion. Fetal outcomes evaluated included prematurity, stillbirth, low birth weight, low Agar scores, admission to the Neonatal Intensive Care Unit, and early neonatal death. Data analysis was conducted with the help of Stata 18.* ***Results:*** *the average age of the women was 30.2 years, with the majority falling into the age group of 25-34. Among the maternal outcomes, 7.5% experienced postpartum hemorrhage, 15.7% had antepartum hemorrhage, and 30.2% required a blood transfusion. The majority of women underwent a caesarean section for delivery, and approximately one-third stayed in the hospital for more than 4 days. Among the fetuses, 42.8% were born prematurely, 3.1% resulted in stillbirth, and various adverse outcomes were observed in live births, such as low birth weight, low Agar scores, admission to the Neonatal Intensive Care Unit, and early neonatal death.* ***Conclusion:*** *this study provides highlights and substantial maternal and fetal risks associated with placenta previa in the presence of a uterine scar during the third trimester. The findings underscore the urgent need for targeted interventions to improve outcomes for mothers and babies in this vulnerable population, emphasizing the importance of proactive management strategies to mitigate adverse events and enhance maternal-fetal health.*

Introduction

Placenta previa is one of the causes of antepartum hemorrhage contributes to almost half of the causes of obstetric hemorrhages [1]. Obstetric hemorrhage contributes to potential maternal-fetal morbidity and mortality [2]. Placenta previa can be defined as when the placenta implants at the lower uterine segment, which can be partially or completely cover the internal cervical os [2]. Currently, placenta previa accounts for 0.5%, and it is diagnosed after excluding other causes of antepartum hemorrhage (APH) such as abruption placenta, vasa previa, trauma to the genital tract, and malignancies [3]. The commonest risk for placenta previa is a previous history of uterine scar and other risk factors include advanced maternal age, multiparty, history of previous abortion, and cigarette smoking [4-6]. Women with two previous histories of uterine scar had a twofold increased risk for placenta previa and the risk increases as the number of previous scars increases [7]. Clinically, uterine scars can also result from a previous myomectomy and evacuation of the retained product of conception by dilatation and curettage [8]. The rate of caesarean section in Tanzania is found to be increasing, the prevalence increased from 2% in 1996 to 6% in 2015 - 2016 while the total number of deliveries increased by 60% [9]. Currently, abnormal placentation rather than uterine atony is a contributing factor for a life-threatening hemorrhage during pregnancy, and it is becoming a common indication for peripartum hysterectomy due to morbidity adherence of placenta [10,11]

Most women with placenta previa and a previous history of uterine scar are observed to deliver at a lower gestation age due to fear of obstetric hemorrhage that can occur at any time during pregnancy, the delivery requires preparation, and it requires an experienced obstetrician because it may sometimes end up with subtotal

hysterectomy especially when bleeding becomes uncontrollable. This may be accompanied by the increasing need for blood transfusion, intensive unit care admission, and prolonged hospital stay [12,13]. Half of the perinatal deaths occurring due to placenta previa are due to preterm deliveries by preterm caesarean sections, which are mainly accompanied by severe maternal hemorrhage and fetal hypoxia [14]. During pregnancy, increasing episodes and amount of vaginal bleeding are factors that may necessitate an emergency caesarean section [15-17]. Inadequate preconception and antenatal care, widespread anaemia, delayed obstetric care, and infrastructure challenges contribute to high case fatality rates in developing countries [2,18]. At Muhimbili National Hospital in Tanzania, delayed obstetric care-seeking is a significant contributor to adverse outcomes among women with placenta previa [19].

Although currently, the government is working hard at ensuring comprehensive emergency obstetric care in each district and ward, there are still challenges in accessing blood products, equipment, and emergency drugs for resuscitation [20]. Other challenges include delays in referral, inadequate skills and preparedness for emergencies were the main factors that contributed to morbidity and mortality [20]. Of the adverse outcomes, the worst are hypovolemic shock secondary to severe hemorrhage, acute kidney injury, preterm labor, disseminated intravascular coagulopathy, primary post-partum hemorrhage, and maternal deaths [8,21]. Of fetal adverse outcomes, fetal hypoxia, prematurity, low birth weight, birth asphyxia, and stillbirths are feared complications [22-24]. This retrospective study aims to model the adverse maternal and fetal outcomes among women with uterine scars presenting with placenta previa in the third trimester at KCMC. It will focus mainly on identifying predictors that will help clinicians in the department of obstetrics and gynecology to early intervene and prevent these adverse obstetric outcomes hence preventing maternal and fetal morbidity and mortality at Zonal referral hospital in Tanzania a case of Kilimanjaro Christina Medical Center (KCMC).

Methods

Exposure: pregnant women with a singleton pregnancy of gestational age 28 weeks and above who were diagnosed with placenta previa in the presence of a uterine scar. Hence, the exposure variable is the presence of placenta previa in combination with a uterine scar.

Outcomes: both maternal and fetal outcome variables were assessed in this study. There are three maternal outcome variables, they are as follows: a) the presence or absence of a post-partum hemorrhage; b) the presence or absence of antepartum hemorrhage; c) the use or not of a blood transfusion.

Fetal outcome measures: a) prematurity of the infant; b) whether the infant is stillborn; c) whether the infant has a low birth weight; d) whether the infant has a low APGAR score; e) whether the infant is admitted to the Neonatal Intensive Care Unit (NICU); f) whether the infant dies, and it is defined as an early neonatal death.

Covariates: whilst this study aims to analyse the relationship between placenta previa in the presence of a uterine scar and poor maternal and fetal outcomes, several covariates must be considered. Examples: age, parity, medical history, presence of anaemia, engagement with antenatal care, type of incision and scar, BMI.

Study design and settings: this research adopts a cross-sectional hospital-based approach, utilizing prospective hospital-linked maternal data obtained from the birth registry spanning twelve years (2011-2022). The study was conducted at Kilimanjaro Christian Medical Center (KCMC) in Moshi, Kilimanjaro. Patients presenting with placenta previa at Kilimanjaro Christian Medical Center (KCMC) receive comprehensive care in a multidisciplinary setting. As a referral center for

northern Tanzania, KCMC caters to approximately 15 million people and boasts 630 beds and 90 wards, functioning as both a teaching hospital and a training ground for around 2000 students with a staff complement of 1500. The management of patients with placenta previa involves collaboration between the Department of Obstetrics and Gynecology and the Neonatal Ward, ensuring a holistic approach to care. Data collected from January 2011 to December 2022 provides valuable insights into predictors of adverse obstetric outcomes among women with uterine scar presenting with placenta previa in the third trimester at KCMC, aiding in refining clinical practices and improving patient outcomes.

Study population: the study population comprised singleton pregnant women with a gestational age of 28 weeks and above, presenting with placenta previa and a uterine scar, as recorded in the birth registry at KCMC from January 2011 to December 2022. Cases with missing or incomplete data in the birth registry were excluded from the study. This criterion aimed to ensure the reliability and validity of the findings by only including cases with comprehensive and accurate information.

Sample size and power calculation: based on data from the birth registry at KCMC over the study period, a total of 159 pregnant women meeting the inclusion criteria were included, ensuring adequacy for identifying predictors of adverse maternal and fetal outcomes. To assess the power of the study to justify the sample size for detecting predictors of adverse obstetric outcomes among women with uterine scar presenting with placenta previa in the third trimester at KCMC, the following assumptions were considered.

Effect size: the effect size represents the magnitude of the difference or relationship being studied. While you mentioned an effect size of 0.5, it's typically measured based on statistical tests or from previous research findings. Given the context of this study, where the predictors of adverse obstetric outcomes are being investigated, it's reasonable to assume a moderate effect size. For instance, an odds' ratio of 1.5 or higher for significant predictors could be considered a moderate effect size in this context.

Significance level (α): the significance level, often set at 0.05, represents the threshold for determining statistical significance. It indicates the probability of incorrectly rejecting the null hypothesis (Type I error).

Variability: variability or dispersion in the data can influence the power of the study. Lower variability generally increases power. In this study, variability in outcomes such as maternal age, maternal outcomes (e.g. postpartum hemorrhage, blood transfusion), fetal outcomes (e.g. prematurity, stillbirth), and other factors mentioned can impact the variability in the data. To calculate the power of the study, we can utilize statistical software or formulas based on these parameters. Unfortunately, without specific statistical tests or estimates of effect sizes from previous research, it's challenging to provide an exact power calculation. However, we can provide a hypothetical illustration. From: significance level (α) = 0.05; effect size = 1.5 (moderate effect size); sample size = 159. Using statistical software (online calculator-OpenEpi), gives a power of 0.80 or 80%. This suggests that there's an 80% chance of detecting a significant effect if it truly exists in the population.

Data collection methods, tool and procedure: the researcher will visit the KCMC administration to request for permission to utilize data within the birth registry. Then later will visit the Department of Obstetrics and Gynecology. After obtaining permission from authorities at KCMC together with the records department, researcher will review all data in the birth registry from January 2010 to December 2020. All files of patients who delivered singleton babies were assembled, then within these files, all files of women who delivered singleton but with a previous uterine scar and who had placenta previa were included in this study. Only files with complete information was considered in this study, those with missing

information was excluded. All particulars of interest such as demographic characteristics and complete history and physical examination was considered. Number of uterine scars was also documented; gestation age was recalculated based on the first day of the last normal menstrual period (Naegele's rule). Maternal vital signs (BP, PR, OR, TEMP, MAP, SI) on admission was documented, any chronic or underlying condition was documented, hemoglobin level ad platelet count was documents. Mode of delivery, birth weight, APGAR score, any traumatic injury and in the end maternal and fetal adverse outcome was documented.

Variable definition and measurement

Maternal outcome measures: primary postpartum hemorrhage (PPH) was regarded as blood loss of greater than or equal to 500 MLS or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours from delivery time. The hypovolemic shock was persistent severe hypotension documented by systolic blood pressure less than 90 mmHg with a pulse rate of more than 110 per minute. Acute kidney injury (AKI) was oliguria (urine output is less than 30mls/hour for 6 hours or less than 500mls/24 hrs) non-responsive to fluids.

Fetal outcome measures: APGAR score is the measure of newborn infant physical condition obtained by adding points (0,1 or 2) for respiratory effort, pulse rate, muscle tone, response to stimulation and skin color, an APGAR score of 10 will present best possible condition, less than 7 at 5^{th} minute was regarded as poor. Body weight of newborn was recorded; low birth weight was regarded as delivery birth weight of less than 2.5 kilograms. Preterm delivery, when neonate delivered at gestation age less than 37 weeks.

Data analysis plan: data analysis was performed using Stata version 18. Descriptive statistics were employed to summarize numerical and categorical variables. The mean and standard deviation (SD) was employed to provide a measure of central tendency and variability. Furthermore, for the categorical variables, frequency and percentage was calculated to summarize the distribution of each category. Logistic regression analysis was utilized to investigate predictors of adverse maternal and fetal outcomes, adjusting for confounding factors. Statistical significance was assessed at a 95% confidence interval. The statistical significance of the predictors was assessed using a 95% confidence interval. This interval provided a range of values within which we can be 95% confident that the true population effect lies.

Ethical considerations: ethical approval to conduct the study was obtained from Kilimanjaro Christian Medical University Ethical Review Committee after presentation and submitting this research report. The permission to carry out the study was obtained from the Director of the Hospital and the Head of the Department. The obtained information was kept confidential and participant codes were used instead of names.

Results

Enrollment of the study cases: a total of 30,177 deliveries occurred at KCMC in the defined period (2011 through 2022). Of this, 23,835 were singleton pregnancies for which 1,642 had a history of uterine scar. Of those who had uterine scars, 159 (9.7%) presented with placenta previa (Figure 1).

Background characteristics of women included in the study: among 159 pregnant women with singletons with a uterine scar presenting with placenta previa in the third trimester analyzed, the average age of the studied women was 30.2 years with a standard deviation of 6.1. Most women fell into the age group of 25-34 (54.1%), followed by those aged 35 and above (25.2%) and those below 25 (20.8%). Most participants were married (81.8%) and had at least a secondary education (50.9%). Most women were unemployed (79.9%) and lived in rural areas (59.1%). In terms of

gravidity, 89.9% were multigravida. Regarding parity, 82.4% were multiparous. Body mass index (BMI) distribution showed that 35.2% had a normal weight, 33.3% were overweight, and 28.9% were obese. Approximately half of the participants had made four or more antenatal care visits (50.9%) (Table 1).

The adverse maternal outcomes among pregnant women with uterine scar presenting with placenta previa: of 159 pregnant women singletons with a uterine scar presenting with placenta previa in the third trimester, about 12 (7.5%) experienced postpartum hemorrhage (PPH), 25 (15.7%) experienced antepartum hemorrhage (APH). Additionally, 48 (30.2%) of the women required a blood transfusion. The mode of delivery showed that 123 (77.4%) underwent a caesarian section, while 22.6% had a vaginal birth. In terms of hospital stay, duration 68.6% were discharged within 4 days post-delivery. There was on hysterectomy or maternal death observed among these studied cases (Table 2).

The adverse fetal outcomes: among 159 fetuses whose mothers had uterine scars and presented with placenta previa in the third trimester, several adverse fetal outcomes were found. It was revealed that 68(42.8%) were born prematurely, while 5(3.1%) resulted in stillbirth. Additionally, for those live births (n=154), about 31(20.1%) had low birth weight, 15(9.7%) had a low Agar score at 1 minute, 19(11.9%) had a low Agar score at 5 minutes, and 12(7.8%) had a low Agar score at 10 minutes. Furthermore, 25(16.2%) of the total live births were admitted to the Neonatal Intensive Care Unit (NICU), and 10(6.5%) of total live births succumbed to early neonatal death (Table 3).

The predictors of adverse maternal-fetal outcomes among pregnant women with uterine scar presenting with placenta previa in the third trimester. Table 4 indicates significant predictors of adverse maternal and fetal outcomes among pregnant women with a uterine scar presenting with placenta previa in the third trimester. There was no significant association between age group categories and postpartum hemorrhage, caesarean delivery or prolonged hospital stay being unemployed showed a trend towards an increased risk of postpartum hemorrhage (OR = 5.48, 95% CI: 0.46-64.78) but did not significantly affect the risk of postpartum hemorrhage, CS delivery or prolonged hospital stay. Women living in urban areas had a significantly higher risk of postpartum hemorrhage (OR = 4.00, 95% CI: 1.72-9.32) compared to those in rural areas. However, residence did not significantly affect the risk of CS delivery or prolonged hospital stay. Multiparous women had a higher risk of postpartum hemorrhage and prolonged hospital stay, although the associations were not statistically significant (OR = 1.94, 95% CI: 0.51-7.31, and OR = 1.47, 95% CI: 0.54-3.94, respectively). Parity did not significantly affect the risk of CS delivery. The number of antenatal care (ANC) visits did not significantly impact the risk of postpartum hemorrhage, CS delivery, or prolonged hospital stay. Being overweight or obese did not significantly affect the risk of postpartum hemorrhage or CS delivery. However, women without overweight or obesity had a lower risk of prolonged hospital stay compared to those with overweight or obesity (OR = 2.11, 95% CI: 1.07-4.17). Women with a previous CS had a significantly higher risk of CS delivery (OR = 3.29, 95% CI: 1.46-7.44) compared to those with a previous vaginal delivery. The previous mode of delivery did not significantly affect the risk of prolonged hospital stay (Table 4).

Discussion

The key findings regarding adverse maternal outcomes revealed in this study, include postpartum hemorrhage, antepartum hemorrhage, high rate of caesarean section delivery, blood transfusion, and prolonged hospital stay; no maternal deaths or hysterectomy was found. The key contributors for maternal adverse outcomes were urban residence and multiparity. For fetuses, the majority of premature delivery was observed while other adverse

outcomes such as stillbirth, and among live births, low birth weight, low Agar scores, NICU admission, and early neonatal death were found. Factors influencing fetal outcomes included advanced maternal age, antenatal care visits, unemployment, antepartum hemorrhage, and mode of delivery. Placenta previa is a condition where the placenta partially or completely covers the opening of the cervix, and it can be more challenging when the woman has a previous uterine scar, such as from a previous cesarean section. The presence of a uterine scar increases the risk of complications in pregnancy and delivery, including adverse maternal outcomes. The current findings align with the previous studies [12,13] which have shown that pregnant women with uterine scar presenting with placenta previa are at a higher risk of experiencing various complications compared to those without a scar. In the current findings, some common adverse maternal outcomes observed in these cases include postpartum hemorrhage (PPH) and antepartum hemorrhage (APH). Furthermore, a significant proportion of these women required blood transfusion, with approximately thirty percent needing one. This indicates the severity of bleeding and the need for interventions to manage the condition effectively.

Regarding the mode of delivery, the majority of women with uterine scar and placenta previa undergo a Caesarean section (CS). In this study, more than three-quarter of these women underwent a caesarean section delivery. The decision on the mode of delivery depends on various factors, including the severity of placenta previa, the location of the placenta, the presence of bleeding, and the overall condition of the mother and baby. The duration of hospital stay can also vary in these cases. In this study, about thirty percent of women had prolonged hospital stays (stayed for more than 4 days) post-delivery. The length of hospital stay depends on multiple factors, such as the severity of complications, the need for further monitoring or interventions, and the recovery of the mother. It is important to note that the findings may vary across different studies due to variations in the study population, sample size, geographical location, and other factors. However, the consensus is that pregnant women with a uterine scar presenting with placenta previa are at an increased risk of adverse maternal outcomes, emphasizing the need for appropriate management and care during pregnancy and delivery.

The current study found that about forty-three of infants were born prematurely. This finding aligns with the previous studies, which also identified preterm labor as a potential adverse outcome [8,21]. Similar to the study by Saquib *et al*. (2020) and Lokhande *et al*. (2021) which examined the outcome of placenta previa in women with a previous uterine scar [12,13]. The study found that these women had a higher likelihood of delivering at an earlier gestational age compared to women with placenta previa but no previous uterine scar. The fear of obstetric hemorrhage was identified as one of the primary reasons for early delivery in these cases while prematurity can increase the risk of various complications for the newborn. The current study reported a stillbirth rate of about three percent among infants whose mothers had a uterine scar and placenta previa. While the previous studies did not specifically mention stillbirth as a separate adverse outcome, they highlighted fetal hypoxia and stillbirth as feared complications [22-24]. Fetal hypoxia can occur as a result of placenta previa and may contribute to stillbirth. The current study found that two in every ten women with uterine scar and placenta previa experience low birth weight. This finding corresponds with the previous studies, which identified low birth weight as a potential adverse outcome a study by Jharaik *et al*. 2019 and Patil *et al*. 2020 [23,24]. Low birth weight infants may experience various health challenges and have an increased risk of long-term health issues.

The current study reported that a significant percentage of infants had low apgar scores at 1, 5, and 10 minutes after birth. This finding suggests

potential birth asphyxia or difficulty in transitioning to life outside the womb. The previous studies did not specifically mention Apgar scores, but they highlighted birth asphyxia as a feared complication by Patil *et al*. 2020 [24]. The current study found that 16.2% of live births required admission to the NICU. This finding emphasizes the need for specialized care for infants with adverse outcomes. The previous studies did not provide specific data on NICU admissions but mentioned complications such as disseminated intravascular coagulopathy and acute kidney injury that may require intensive care in a study by Kiondo *et al*. 2008; Mishra and Misram *et al*. 2019 [8,21]. The current study reported a 6.5% rate of early neonatal death among total live births. While the previous studies did not mention early neonatal death explicitly, they highlighted maternal deaths as severe adverse outcomes associated with uterine scar and placenta previa by Kiondo *et al*. 2008 and Mishra and Misra *et al*. 2019) [8,21]. Maternal complications can indirectly affect neonatal outcomes.

The current study's findings reinforce the increased risks of adverse fetal outcomes in pregnancies where the mother has a uterine scar and presents with placenta previa. These adverse outcomes include prematurity, stillbirth, low birth weight, birth asphyxia, and the need for NICU admission. The implications of these findings highlight the importance of comprehensive prenatal care, close monitoring, and appropriate interventions to improve fetal outcomes. Timely interventions and specialized obstetric management can help mitigate adverse outcomes associated with uterine scar and placenta previa, reducing the risks faced by both mothers and infants. In the current study, women aged 25-34 had a slightly higher risk of cesarean section (CS) delivery compared to those under 25, while women aged 35 or older had a higher risk of CS delivery. However, these associations were not statistically significant. This finding is consistent with a previous study conducted in Japan, which also identified advanced maternal age as a predictor of adverse outcomes among women with placenta previa and a history of previous cesarean section [25]. However, in contrast to the current study, the previous study found that smoking during pregnancy and a history of more than two previous cesarean sections were also predictors of adverse outcomes.

Being unemployed in the current study showed a trend towards an increased risk of postpartum hemorrhage, although it did not significantly affect the risk of CS delivery or prolonged hospital stay. This finding is in contrast to the study conducted in Saudi Arabia, which found that women with a history of previous uterine scar presenting with placenta previa were highly associated with massive bleeding and placenta accreta syndrome after delivery [26]. The Saudi Arabian study also reported higher blood loss and transfusion requirements compared to the current study. Residence did not significantly affect the risk of CS delivery or prolonged hospital stay in the current study, although women living in urban areas had a significantly higher risk of postpartum hemorrhage compared to those in rural areas. This finding contrasts with the study conducted in the Netherlands, which identified antepartum bleeding, excessive blood loss, and the need for blood transfusion as predictors of adverse outcomes by Ruiter *et al*. 2016 [16]. The difference in findings could be attributed to variations in healthcare systems, access to care, or population characteristics. Multiparous women in the current study had a higher risk of postpartum hemorrhage and prolonged hospital stay, although these associations were not statistically significant. This finding is similar to the study conducted in Burkina Faso, which observed a high rate of obstetric hemorrhage and admissions to the intensive care unit among women with placenta previa and a history of previous uterine scar Lankoande *et al*. 2017 [22]. However, the current study did not report any maternal deaths, whereas the Burkina Faso study reported six maternal deaths. The number of antenatal care (ANC) visits did not

significantly impact the risk of postpartum hemorrhage, CS delivery, or prolonged hospital stay in the current study. This finding is consistent with the study conducted in China, which found that specific ultrasound findings (vascular lacunae, loss of normal hypoechoic retroplacental zone, and central placenta previa) were strong predictors of adverse outcomes [27]. The Chinese study focused on ultrasound findings as predictors, whereas the current study examined the impact of ANC visits.

Women with a previous cesarean section in the current study had a significantly higher risk of CS delivery compared to those with a previous vaginal delivery. This finding is consistent with previous studies from China and Israel, which also identified a history of previous cesarean section as a predictor of adverse outcomes [27,28]. However, the Chinese study specifically associated a history of previous cesarean section with emergency cesarean section, peripartum hysterectomy, and increasing blood loss above 1000 ml. The findings highlight the importance of advanced maternal age, antenatal care visits, unemployment, antepartum hemorrhage, and the mode of delivery in determining fetal outcomes in this population. However, further research is needed to better understand the complex interplay between these factors and develop appropriate interventions to reduce the risk of adverse maternal outcomes.

Conclusion

This study provides valuable insights into the predictors of adverse maternal and fetal outcomes among pregnant women with a uterine scar presenting with placenta previa in the third trimester. The results underline the spectrum of complications including postpartum hemorrhage, antepartum hemorrhage, blood transfusion, premature birth, stillbirth, low birth weight, low Apgar scores, NICU admission, and early neonatal death. Notably, advanced maternal age, frequency of antenatal care visits, employment status, antepartum hemorrhage, mode of delivery, urban residence, and multiparity emerged as significant predictors of these outcomes. To further enhance maternal and fetal well-being in this high-risk population, it's imperative to integrate these findings into clinical practice and public health initiatives. Adequate antenatal care is paramount; therefore, ensuring regular and comprehensive prenatal visits for these women is imperative. By closely monitoring their pregnancies, healthcare providers can promptly detect and manage complications, thereby reducing adverse outcomes.

What is known about this topic

- *There is limited data on the predictors of adverse outcomes among women with uterine scar presenting with placenta previa in the third trimester.*

What this study adds

- *This study adds valuable knowledge by elucidating the combined impact of uterine scars and placenta previa on maternal and fetal outcomes specifically in the third trimester;*
- *This study provides highlights and substantial maternal and fetal risks associated with placenta previa in the presence of a uterine scar during the third trimester.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Samweli Boaz Mkama and John Lugata: initiated and developed the core concepts of the study, conducted the formal data analysis and interpretation, and drafted the initial manuscript. Samweli Boaz Mkama, Raziya Gaffur, Glory Mangi and Bariki Mchome: provided oversight and

guidance throughout the research project, review manuscripts, significantly contributed to assuring its factual correctness and overall quality of the manuscript. Eusebious Maro: actively participated in the formal analysis, and reviewed manuscript. Joseph Mlay: made substantial contributions through the meticulous review and editing of the manuscript, assuring its factual correctness of the manuscript. All authors read and approved the final manuscript.

Acknowledgments

I would like to thank my supervisors Bariki Mchome, Joseph Mlay, Raziya Gaffur, Glory Mangi and Eusebious Maro for their great contributions in developing this proposal. Special thanks are sent to John Lugata, for their great assistance without hesitance. I would also like to thank my colleagues' residents for their inputs during the preparation of my research proposal.

Tables and figure

Table 1: background characteristics of women included in the study (N=159)

Table 2: the adverse maternal outcomes among pregnant women with uterine scar presenting with Placenta Previa in the third trimester (N=159)

Table 3: the adverse fetal outcomes among fetal whose mothers had uterine scar presenting with placenta Previa in the third trimester (N=159)

Table 4: the predictors of adverse maternal fetal outcomes among pregnant women with uterine scar presenting following placenta previa in the third trimester (N=159)

Figure 1: enrollment of the study cases

References

1. Dolea C, AbouZahr C, Stein C. Global burden of maternal haemorrhage in the year 2000. Evid Inf Policy (EIP), World Health Organization. 2003;1-16. **Google Scholar**
2. Wasnik SK, Naiknaware SV. Antepartum haemorrhage: causes & its effects on mother and child: an evaluation. Obstet Gynecol Int J. 2015;3(1): 00072. **Google Scholar**
3. Berhan Y. Predictors of perinatal mortality associated with placenta previa and placental abruption: An experience from a low income country. J Pregnancy. 2014;2014: 307043. **PubMed**| **Google Scholar**
4. Ananth CV, Smulian JC, Vintzileos AM. The effect of placenta previa on neonatal mortality: A population-based study in the United States, 1989 through 1997. Am J Obstet Gynecol. 2003;188(5): 1299-304. **PubMed**| **Google Scholar**
5. Long SY, Yang Q, Chi R, Luo L, Xiong X, Chen ZQ. Maternal and neonatal outcomes resulting from antepartum hemorrhage in women with placenta previa and its associated risk factors: A single-center retrospective study. Ther Clin Risk Manag. 2021;17: 31-8. **PubMed**| **Google Scholar**
6. Yang JI, Lim YK, Kim HS, Chang KH, Lee JP, Ryu HS. Sonographic findings of placental lacunae and the prediction of adherent placenta in women with placenta previa totalis and prior Cesarean section. Ultrasound Obstet Gynecol. 2006;28(2): 178-82. **PubMed**| **Google Scholar**
7. Getahun D, Oyelese Y, Salihu HM, Ananth C V. Previous cesarean delivery and risks of placenta previa and placental abruption. Obstet Gynecol. 2006;107(4): 771-8. **PubMed**| **Google Scholar**

8. Kiondo P, Wandabwa J, Doyle P. Risk factors for placenta praevia presenting with severe vaginal bleeding in Mulago hospital, Kampala, Uganda. African health sciences. 2008 Sep 10;8(1): 44-9. **PubMed**| **Google Scholar**
9. Cavallaro FL, Pembe AB, Campbell O, Hanson C, Tripathi V, Wong KL *et al*. Caesarean section provision and readiness in Tanzania: analysis of cross-sectional surveys of women and health facilities over time. BMJ open. 2018 Sep 1;8(9): e024216. **PubMed**| **Google Scholar**
10. Adekanle D, Adeyemi A, Fadero F. Ante-partum haemorrhage and pregnancy outcome in LAUTECH Teaching Hospital, southwestern Nigeria. J Med Med Sci. 2011;2(12): 1243-7.
11. Solheim KN, Esakoff TF, Little SE, Cheng YW, Sparks TN, Caughey AB. The effect of cesarean delivery rates on the future incidence of placenta previa, placenta accreta, and maternal mortality. J Matern Neonatal Med. 2011;24(11): 1341-6. **PubMed**| **Google Scholar**
12. Saquib S, Khalid L, Azza H, Faiza A. Prevalence and Its Feto-Maternal Outcome in Placental Abruption: A Retrospective Study for 5 Years from Dubai Hospital. Dubai jMedical ournal. 2020;3(1): 26-31. **Google Scholar**
13. Lokhande V, Jadhav K, Kadam M, Rawte S. Study of Maternal and Foetal Outcome in Abruptio Placentae. Int J Med Sci Clin Invent. 2021;8(01): 5208-13. **Google Scholar**
14. Zlatnik MG, Cheng YW, Norton ME, Thiet M, Caughey AB. Placenta previa and the risk of preterm delivery. J Matern Neonatal Med. 2007;20(October): 719-23. **PubMed**| **Google Scholar**
15. Elkafrawi D, Sisti G, Araji S, Khoury A, Miller J, Echevarria BR. Risk factors for neonatal/maternal morbidity and mortality in African American women with placental abruption. Med. 2020 Apr 13;56(4): 174. **PubMed**| **Google Scholar**
16. Ruiter L, Eschbach SJ, Burgers M, Oude K, Pampus MG Van, Goes BY Van Der *et al*. Predictors for Emergency Cesarean Delivery in Women with Placenta Previa. Am J Perinatol. 2016 Dec;33(14): 1407-1414. **PubMed**| **Google Scholar**
17. Coskun B, Akkurt I, Dur R, Akkurt MO, Ergani SY, Turan OT *et al*. Prediction of maternal near-miss in placenta previa: a retrospective analysis from a tertiary center in Ankara, Turkey. J Matern Neonatal Med. 2018;31(3): 370-5. **PubMed**| **Google Scholar**
18. Cresswell JA, Ronsmans C, Calvert C, Filippi V. Prevalence of placenta praevia by world region: A systematic review and meta-analysis. Trop Med Int Heal. 2013;18(6): 712-24. **PubMed**| **Google Scholar**
19. Pembe AB, Paulo C, D´mello BS, van Roosmalen J. Maternal mortality at Muhimbili National Hospital in Dar-es-Salaam, Tanzania in the year 2011. BMC Pregnancy Childbirth. 2014 Sep 13: 14: 320. **PubMed**| **Google Scholar**
20. Nassoro MM, Chiwanga E, Lilungulu A, Bintabara D. Maternal Deaths due to Obstetric Haemorrhage in Dodoma Regional Referral Hospital, Tanzania. Obstet Gynecol Int. 2020 Nov 12: 2020: 8854498. **PubMed**| **Google Scholar**
21. Mishra R, Misra AP. Abruptio placenta and its maternal and fetal outcome. Int J Reprod Contraception, Obstet Gynecol. 2019;8(8): 3323. **Google Scholar**

22. Lankoande M, Bonkoungou P, Ouandaogo S, Dayamba M, Ouedraogo A, Veyckmans F *et al*. Incidence and outcome of severe ante-partum hemorrhage at the Teaching Hospital Yalgado Ouédraogo in Burkina Faso. BMC Emerg Med. 2017;17(1): 1-7. **PubMed**| **Google Scholar**
23. Jharaik H, Dhiman B, Verma SK, Sharma A. Consequences of antepartum hemorrhage and its maternal and perinatal outcome. Int J Reprod Contraception, Obstet Gynecol. 2019;8(4): 1480. **Google Scholar**
24. Patil Y, Patil S, Jaiswani R, Kalburgi P. A study of maternal and fetal outcome in antepartum hemorrhage. J Crit Rev. 2020;7(6): 922-4. **Google Scholar**
25. Hasegawa J, Matsuoka R, Ichizuka K, Mimura T, Sekizawa A, Farina A *et al*. Predisposing factors for massive hemorrhage during Cesarean section in patients with placenta previa. Ultrasound Obstet Gynecol. 2009 Jul;34(1): 80-4. **PubMed**| **Google Scholar**
26. Kassem GA, Alzahrani AK. Maternal and neonatal outcomes of placenta previa and placenta accreta: three years of experience with a two-consultant approach. Int J Womens Health. 2013 Nov 28;5: 803-10. **PubMed**| **Google Scholar**
27. Liu B, Deng S, Lin M, Chen Y, Cai J, Yang J *et al*. Prediction of cesarean hysterectomy in placenta previa complicated with prior cesarean: a retrospective study. BMC Pregnancy Childbirth. 2020 Feb 7;20(1): 81. **PubMed**| **Google Scholar**
28. Levin G, Rottenstreich A, Ilan H, Cahan T, Tsur A, Meyer R. Predictors of adverse neonatal outcome in pregnancies complicated by placenta previa. Placenta. 2021 Jan 15;104: 119-123. **PubMed**| **Google Scholar**

Table 1: background characteristics of women included in the study (N=159)		
Characteristics	**Number**	**Percentage (%)**
Age in years, mean (SD)	[30.2(6.1)]	
Age group(years)		
<25	33	20.8
25-34	86	54.1
≥35	40	25.2
Marital status		
Married	130	81.8
Unmarried	29	18.2
Education		
Below secondary	78	49.1
Secondary/above	81	50.9
Occupation		
Employed	32	20.1
Unemployed	127	79.9
Residence		
Rural	94	59.1
Urban	65	40.9
Gravidity		
Primigravida	16	10.1
Multigravida	143	89.9
Parity		
Primiparous	28	17.6
Multiparous	131	82.4
Number of ANC visit		
4+	81	50.9
<4	78	49.1
SD = standard deviation; < less than; ≥more than or equal; ANC; antenatal clinic		

Table 2: the adverse maternal outcomes among pregnant women with uterine scar presenting with Placenta Previa in the third trimester (N=159)		
Adverse outcome	**Frequency**	**Percentage**
Postpartum hemorrhage		
No	147	92.5
Yes	12	7.5
Antepartum hemorrhage		
No	134	84.3
Yes	25	15.7
Blood transfusion		
No	111	69.8
Yes	48	30.2
Mode of delivery		
Vaginal birth	36	22.6
Caesarean section	123	77.4
Duration of hospital stay		
≤4 days	109	68.6
> 4 days	50	31.4

Table 3: the adverse fetal outcomes among fetal whose mothers had uterine scars presenting with placenta previa in the third trimester (N=159)		
Adverse outcome	**Frequency**	**Percentage**
Premature		
No	91	57.2
Yes	68	42.8
Stillbirth		
No	154	96.9
Yes	5	3.1
Low birth weight (n=154)		
No	123	79.9
Yes	31	20.1
Low agar score at 1 minute (n=154)		
No	139	90.3
Yes	15	9.7
Low agar score at 5 minutes (n=154)		
No	140	88.1
Yes	19	11.9
Low agar score at 10 minutes (n=154)		
No	142	92.2
Yes	12	7.8
Admission to NICU (n=154)		
No	129	83.8
Yes	25	16.2
Early neonatal death (n=154)		
No	144	93.5
Yes	10	6.5
NICU: neonatal intensive care unit		

Table 4: the predictors of adverse maternal fetal outcomes among pregnant women with uterine scar presenting following placenta previa in the third trimester (N=159)

Variables	PPH		CS delivery		Prolonged hospital stay	
	n (%)	OR (95%CI)	n (%)	OR (95%CI)	n (%)	OR (95%CI)
Age group(years)						
<25	7(21.21)	1	24(72.73)	1	12(36.36)	1
25-34	19(22.09)	1.05(0.39-2.88)	66(76.74)	1.23(0.51-2.98)	20(23.26)	0.53(0.22-1.26)
≥35	10(25.00)	1.24(0.41-3.75)	33(82.50)	1.77(0.56-5.63)	18(45.00)	1.43(0.59-3.48)
Occupation						
Employed	2(6.25)	1	27(84.38)	1	9(28.12)	1
Unemployed	34(26.77)	5.48(0.46-64.78)	96(75.59)	0.57(0.18-1.85)	41(32.28)	1.22(0.50-2.94)
Residence						
Rural	12(12.77)	1	71(75.53)	1	29(30.85)	1
Urban	24(36.92)	4(1.72-9.32)	52(80.00)	1.30(0.59-2.85)	21(32.31)	1.07(0.54-2.12)
Parity						
Primiparous	4(14.29)	1	20(71.43)	1	7(25.00)	1
Multiparous	32(24.43)	1.94(0.51-7.31)	103(78.63)	1.47(0.61-3.53)	43(32.82)	1.47(0.54-3.94)
Number of ANC visit						
4+	18(22.22)	1	64(79.01)	1	24(29.63)	1
<4	18(23.08)	1.05(0.50-2.22)	59(75.64)	0.82(0.39-1.75)	26(33.33)	1.19(0.60-2.33)
Overweight						
No	14(23.33)	1.07(0.50-2.29)	46(76.67)	0.94(0.44-2.02)	25(41.67)	2.11(1.07-4.17)
Yes	22(22.22)	1	77(77.78)	1	25(25.25)	1
Previous mode of delivery						
Vaginal	27(40.91)	1	43(65.15)	1	25(37.88)	1
CS	9(9.68)	0.15(0.06-0.42)	80(86.02)	3.29(1.46-7.44)	25(26.88)	0.60(0.31-1.19)

OR: crude odds ratio; CI: confidence interval; PPH: post-partum hemorrhage; ANC: antenatal care

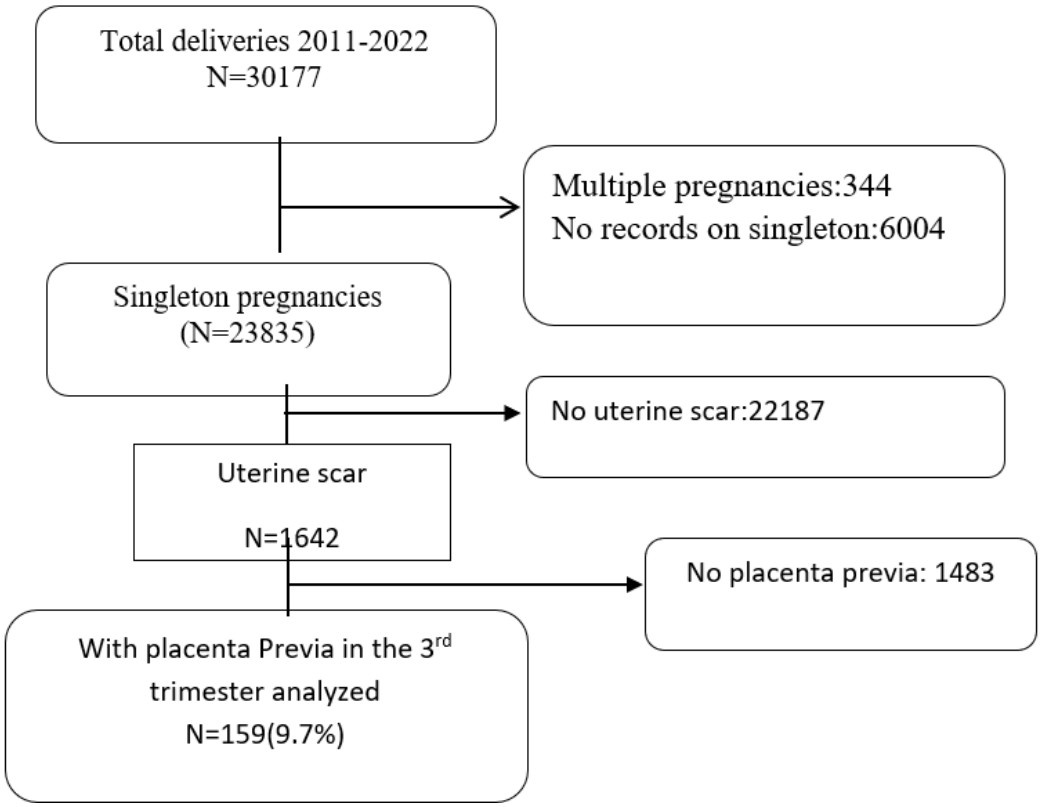

Figure 1: enrollment of the study cases