Placenta Previa and its associated Factors among Women Admitted with Antepartum Haemorrhage in Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia

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Abstract

Background: Placenta previa is one of the causes of antepartum hemorrhage. It contributes to maternal death. Hence, this study assessed the magnitude of placenta previa and its associated factors among women admitted with antepartum hemorrhage at Hawassa University comprehensive specialized hospital.

Methods: A facility-based retrospective cross-sectional study was conducted among 300 pregnant women admitted with antepartum hemorrhage at Hawassa University comprehensive specialized hospital. A simple random sample technique was used to select a woman's charts. Data were collected using a pre-tested checklist. Data were analyzed using statistical software. Bivariable and multivariable logistic regression analyses were done to identify the factors associated with placenta previa. A P-value of less than 0.05 was considered as statistically significant.

Results: The prevalence of placenta previa among mothers with antepartum hemorrhage was 60.3% (95% CI: 57.8, 62.4). The major adverse maternal outcomes identified were cesarean delivery 175 (96.4%), hypovolemic shock 82(45.3%), and blood transfusion 92(50.8%). Those mothers with gravidity of 2-4 (AOR=3.40; 95% CI: 1.39,8.31) and >5 (AOR=5.67; 95% CI: 2.11,15.20), gestational age of 28-33 weeks (AOR=3.83; 95% CI: 1.77, 4.65), 34-36 weeks (AOR=2.45; 95% CI: 1.30, 4.56), having previous caesarean section scar (AOR=3.27; 95% CI: 1.26, 8.50), and having a male fetus gestation (AOR=3.49; 95% CI: 1.26, 8.50) had a more likelihood of developing placenta previa than their counterparts.

Conclusion: About two-thirds of the cases admitted with the diagnosis of antepartum hemorrhage were caused by placenta previa. Previous cesarean section, gravidity, male sex, and gestational age were the factors identified for placenta previa. Efforts should be made to reduce the rate of pregnancy and cesarean delivery through improving the provision of family planning to decrease the magnitude of placenta previa.

Keywords: *Hawassa, placenta previa, Southern Ethiopia*

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Introduction

Placenta previa when the placenta is implanted in the lower uterine segment (Walfish *et al*., 2009; Cunningham *et al.*, 2014*;* Sakornbut *et al*., 2007; Oyelese and Smulian, 2006). It can be associated with massive blood loss at delivery thereby which increase the risk of antepartum, intrapartum, and postpartum hemorrhage. It can also result in significant loss of intravascular volume which can lead to hemodynamic instability, decreased oxygen perfusion, cellular hypoxia, and organ damage (Sachayta *et al*, 2019; Sarojini *et al*, 2016).

Studies have also proved that placenta previa is the main cause of antepartum hemorrhage and a contributing factor to maternal morbidity and mortality worldwide (Chufamo *et al*., 2015; Berhan, 2014; Wasnik and Naiknaware, 2015; Anzaku and Musa, 2010; Raees *et al*., 2015). About 0.03 to 1% maternal deaths were contributed by placenta previa in the previous studies (Sachayta *et al*, 2019; Bose *et al*, 2011). It is believed that diagnosis and active peripartum management can reduce morbidity and mortality related to placenta previa (Walfish *et al*., 2009; Cunningham *et al.*, 2014). Antepartum haemorrhage complicates 2-5% of pregnancies and it is mainly caused by placenta previa (Sakornbut *et al*., 2007;

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Ahmed *et al*., 2015). About 51.6% of antepartum hemorrhage is caused by placenta Previa (Fan *et al*., 2017). Similarly, it is found to be the major cause antepartum hemorrhage in the previous studies conducted in different parts of Ethiopia: Jimma (26.7%), Addis Ababa (0.7%) and Hawassa (58.6%) (Chufamo *et al*., 2015; Berhan, 2014; Adere *et al*., 2020). It is believed that diagnosis and active peri-partum management can reduce morbidity and mortality related to placenta previa (Walfish *et al*., 2009; Cunningham *et al*., 2014).

Different factors were identified related to placental Previa. Some factors such as advanced maternal age, multiparty, and history of caesarean delivery were identified to be associated with placenta Previa (Adere *et al*., 2020*;* Sarojini *et al*., 2016).

Many previous studies have reported placenta previa as a major factor of obstetric hemorrhage and its associated factor including from Ethiopia (Chufamo *et al*., 2015; Berhan, 2014; Adere *et al*., 2020). However, they did not provide conclusive evidence. Even, there is no documented report about the magnitude and associated factors of placenta previa in Hawassa. Therefore, this study assessed placenta previa and its associated factors among women admitted with antepartum hemorrhage to the obstetric ward of Hawassa University Comprehensive Specialized Hospital.

Materials and Methods

Study setting

A facility-based retrospective cross-sectional study was conducted among women admitted with the diagnosis of antepartum hemorrhage to obstetric ward of Hawassa University Comprehensive Specialized Hospital (HUCSH) from June 1-15, 2017. Hawassa is the capital city of the Southern Nation, Nationality, and People Region (SNNPR). It is located 273 Km from Addis Ababa. Hawassa University Comprehensive Specialized Hospital is the referral hospital in the region, serving as a teaching hospital for the College of Medicine and Health Sciences, with a catchment population of 18 million. It has seven departments Gynaecology and obstetrics is one of the departments where labouring mothers are admitted, followed, and managed accordingly. There are 73 beds in the gynaecology and obstetrics department (53 in gynecology and obstetrics ward, 13 in postnatal and 7 in labour ward) and 4 delivery coaches.

Population

All the mothers who gave birth after 28 weeks of gestation and who had antepartum hemorrhage were the study population. Maternal medical record/charts that were lost or incomplete and mothers died on arrival were excluded from the study. In addition, the women having any co-morbidity such as cardiac problems, hypertension, renal diseases, diabetes mellitus, systemic lupus erythematous, and goiter were also excluded.

Sample size determination and sampling procedure

The sample size was determined using single population proportion formula by using proportion (p) 26.7% from the previous study (Chufamo *et al*., 2015), 95% confidence level, 5% margin of error, and 10 % non-response rate. The final sample size was 300. The registration numbers of all the mothers who had atepartum hemorrhages and gave birth at HUCSH for five years (January 1, 2012, to December 30, 2016) were traced from the hospital's delivery log book registry and then listed down to form a sampling frame. Among the total of 435 mothers who were diagnosed to have APH during the study period, data of 428 mothers were found to be eligible for the study, and each chart was numbered. Then, by simple random sample technique (using a computer-generated random number), 300 charts were selected.

Data collection method

Data were collected using a pre-tested checklist prepared in English by an integrated emergency surgical officer. The checklist consists of socio-demographic variables, obstetric history, medical history, and maternal outcome after the management of placenta previa.

Data quality control

The checklist was pre-tested on 30 charts at Yergalem General Hospital before assessing for clarity, flow, and construction. Questions that were found unclear or confusing were modified, reconstructed, or discarded. Intensive training was given to the data collectors and supervisor on how to conduct the data collection. The collected data were checked daily for completeness by the supervisor.

Data analysis

The data were entered into Epi info and exported to SPSS Version 20 for analysis. Frequencies and cross-tabulations were used to summarize descriptive statistics. Bivariable and multivariable logistic regression analyses were done to identify factors associated with placenta previa. Variables with $p < 0.25$ in the bivariate analysis were entered into the multivariable analysis. In multivariable analysis, those variables with $P < 0.05$ at 95% confidence interval were considered as significantly associated factors with placenta previa.

Ethical consideration

Ethical clearance was obtained from the Institutional Review Board of the College of Medicine and Health Science, Hawassa University with an ethical number of IRB/008/2017. Permission from hospital administrators of HUCSH was obtained through a formal letter from the University. Then, the purpose and objective of the study were introduced to the head of the gynaecology and obstetrics department and the hospital medical director. Confidentiality information was kept like the patient's name was not included in the checklist. After finishing the data collection, the patients' charts were returned to the card room. Information obtained during data collection was only used for this study purpose.

Results

Socio-demographic characteristics

The mean age of the study participants was 28.2(±5.9) years. The youngest and oldest mothers were 18 and 40 years, respectively. One-hundred eighty (60%) mothers were from rural areas.

Obstetric history of the mothers

A total of 125 (41.7%) study participants with APH were grandmultipara (gave birth more than five times). Forty-seven (15.7%) of the study participants had an abortion. Most of the study participants developed APH in the gestational age of 28-34 weeks. Many of the study participants 238(79.3%) had antenatal care follow up. Cesarean section was the most common route of delivery, 252(84%). Similarly, 45(15%) of the study participants had previous caesarean section scar and 147(49%) of them had a male fetus gestation (Table 1).

Table 1: Obstetric history of study participants at Hawassa University Comprehensive Specialized Hospital, January 1, 2012, to December 30, 2016 (n=300).

Variables	Frequency	Percent (%)
Gravidity		
Primigravida	45	15
2-4	130	43.3
≥5	125	41.7
Abortion		
Yes	47	15.7
No	253	84.3
Gestational age		
28-33	101	33.7
34-36	72	24
≥37	127	42.3
Antenatal care		
Yes	238	79.3
No	62	20.7
Previous cesarean section scar		
Yes	45	15
No	255	85
Previous placenta previa		
Yes	9	3
No	291	97
Sex of pregnancy		
Male	147	49
Female	153	51
Number of gestation		
Singleton	290	96.7
Multiple	10	3.3

Prevalence and types of placenta previa

During the five years of the study period, 9,123 patients gave birth in HUCSH. Out of these, 300 mothers with APH included in the current study. The commonest cause of APH was placenta previa 181 (60.3%) (95% CI: 57.8, 62.4) and abruption placenta, 98 (32.7%). Moreover, about 21(7%) of them were caused by the bloody show, uterine rupture, cervical lesions, or unknown causes. Placenta previa totalis was the most common type of placenta previa 11(65.9%) in relation to cervical os. With respect to presenting part of the fetus, posterior placenta previa was the prevalent one 92(51.1%), followed by anterior type 76(41.7%), and lateral placenta previa, 13 (7.2%).

Adverse maternal outcome

In this study, 175(96.4%) of the placenta previa cases were undergone cesarean delivery while 6(3.6%) of them gave birth spontaneously. About 82(45.3%) of them developed hypovolemic shock. On the other hand, 92(50.8%) of them were transfused with blood; and 8(4.4%) of them were done peripartum hysterectomy. Among those undergone peripartum hysterectomy, 5(2.8%) of them were for an indication of placenta accerta. Likewise, respiratory failure was also reported in 5(2.8%) of the women (Table 2).

Table 2: Adverse maternal outcome of subjects with placenta previa at Hawassa University Comprehensive Specialized Hospital, January 1, 2012, to December 30, 2016(n=181).

Variables	Frequency	Percent (%)
Aspiration pneumonia	1	0.55
Hospital-acquired pneumonia	1	0.55
Sepsis	1	0.55
Intensive care unit admission	3	1.7
Placenta accerta	5	2.8
Respiratory failure	5	2.8
Acute kidney injury	6	3.3
Puerperal sepsis	7	3.5
Peripartum hysterectomy	8	4.4
Postpartum haemorrhage	11	6.1
Malpresentation	14	7.7
Expectant management	32	17.7
Hypovolemic shock	82	45.3
Blood transfusion	92	50.8
Death	1	0.6

Factors associated with placenta previa

In the bivariate analysis, age, gravidity, history of abortion, history of previous cesarean section scar, history of previous placenta previa, gestational age, sex of pregnancy, and the number of gestation were candidates for multivariable analysis. In multivariable analysis, gravidity, gestational age of the pregnancy, previous cesarean section scar, and sex fetus remained associated with placenta previa in multivariable analysis. Accordingly, mothers with gravidity of ≥5 almost 6 times (AOR=5.67; 95% CI: 2.11, 15.20) and 2-4 more than 3 times (AOR=3.40; 95% CI: 1.39, 8.31) more likely to develop placenta previa as compared to those with prim gravidity.

Furthermore, the women with the gestational age of 28-33 were almost 4 times (AOR=3.83; 95% CI: 1.77, 4.65) and 34-36 more than 2 times (AOR=2.45; 95% CI: 1.30, 4.56) more likely to develop placenta previa as compared to the women with the gestational age of ≥37 weeks. Those mothers having previous cesarean section scar were three times more likely to develop placenta previa than their counterpart (AOR=3.27; 95% CI: 1.26, 8.50). Moreover, the mothers with a male fetus gestation were found to be four times more likely to have placenta previa as compared to those mothers having a female gestation (AOR=3.68; 95% CI: 2.07, 6.52) (Table 3).

Table 3: Associated factors of placenta previa, HUCSH, January 1, 2012, to December 30, 2016 (n=300).

Variables	Placenta previa		COR (95% CI)	AOR (95%CI)
	Yes No (%)	No No (%)		
Age				
≤20	13(4.3)	24(8)	1	1
21-34	61(20.3)	15(5)	7.50(3.11-18.10)	3.46(0.17-10.26)
≥35	107(35.7)	80(26.7)	2.47(1.18-5.15)	2.00(0.84-4.80)
Gravidity				
Primigravida	9(3)	36(12)	1	1
2-4	76(25.3)	54(18)	5.63(2.50-12.65)	**3.40(1.39-8.31) ***
≥5	96(32)	29(9.7)	13.24(5.72-30.68)	**5.67(2.11-15.20) ***
Abortion				
Yes	36(12)	11(3.7)	2.44(1.18-5.00)	1.30(0.56-2.96)
No	145(48.3)	108(36)	1	1
Gestational age				
28-33	70(23.3)	31(10.3)	3.05(1.76-5.29)	**3.83(1.77-4.65) ***
34-36	57(19)	15(5)	5.14(2.63-10.02)	**2.45(1.30-4.56)***
≥37	54(18)	73(24.3)	1	1
Previous cesarean section scar				
Yes	35(11.7)	10(3.3)	2.62(1.24-5.50	**3.27(1.26 -8.50) ***
No	146(48.7)	109(36.3)	1	1
Sex of fetus				
Male	116(38.7)	31(10.3)	5.07(3.04-8.43)	**3.68(2.07- 6.52)***
Female	65(21.7)	88(29.3)	1	1

***: Significant in backward stepwise logistic regression; **COR**: Crude Odd Ratio; **AOR**: Adjusted Odd Ratio; **CI**: Confidence interval*

Discussion

The prevalence of placenta previa among mothers with antepartum hemorrhage was 60.3% (95% CI: 57.8, 62.4). Gravidity, gestational age of the pregnancy, previous cesarean section scar, and sex fetus were the factors identified for placenta previa. In this study, adverse maternal outcomes such as blood transfusion, postpartum hemorrhage, hypovolemic shock, peripartum hysterectomy, acute kidney injury, respiratory failure, sepsis, admission to intensive care unit, and deaths were identified. An adverse maternal outcome identified in the present study is in line with the existing literatures of developing countries (Wasnik and Naiknaware, 2015;Anzakuand Musa, 2010;Raees *et al*., 2015; Adere*et al.,* 2020;Singhal *et al*., 2008;Crane *et al*.,2000).

The prevalence of placenta previa among mothers with APH in the last five years of the study period was 60.3%. This finding is comparable with the previous finding in Ethiopia (58.6%) (Berhan, 2014). Those mothers with a high number of gravidity were more likely to develop placenta previa as compared with mothers with less number of gravidity. This is in agreement with different study findings (Anzaku and Musa, 2010; Faiz and Ananth, 2003; Kedar *et al.*, 2016; Burodo and Shehu, 2013; Eniola, 2002; Parijchatt and Tongswatwong, 2009; Senkoro *et al.*, 2017). This might be because as the number of pregnancy increases, the probability of the occurrence of placenta previa's risk factor such as uterine scar and abortion might also increase the occurrence placenta previa's (Wasnik and Naiknaware, 2015; Adere *et al*., 2020; Parijchatt and Tongswatwong, 2009; Senkoro *et al*., 2017; Majeed *et al*., 2015).

Early gestational age is also found to be an important factor of placenta previa. As gestational age increases, the occurrence of placenta previa decreases. This finding is consistent with previous study findings (Anzaku and Musa, 2010; Ananth*et al*., 2003). This might be due to the physiological migration of the placenta which could be explained by the devel-

opment of the lower uterine segment in late gestational age. This means a woman who is claimed to have placenta previa at earlier gestation age might not have placenta previa at late gestation (Strong and Brar, 1989; Neilson, 2003).

Those mothers having previous cesarean section scar had a more likely to develop placenta previa than those mothers without cesarean section scar. This is comparable with studies conducted in India, and Nigeria (Wasnik and Naiknaware, 2015; Anzaku and Musa, 2010). The Cesarean section might cause damage to endothelial lining (decidual layer) and result in scarring of the uterus. The attraction and adherence of the placenta to the cesarean section scar can also be a reason for the lower implantation of the placenta in subsequent pregnancies (Oya *et al*., 2008).

This study also found that male sex fetus was an associated factor of placenta previa. The pathophysiologic mechanism explaining the association between placenta previa and male sex gestations is unknown. However, it might be because early and late insemination during the menstrual cycle may cause an increase in male conception and also cause to change the site of implantation (Faiz and Ananth, 2003; Demissie, 1999).

The source of the data for this study was a record review. Thus, some socio economic-related factors cannot be assessed and some charts were also incomplete. In addition, those variables significantly associated with placenta previa need to be cautiously interpreted as the data were a record review with a potential lack of other relevant factors.

Conclusion

About two-thirds of the cases admitted with the diagnosis of antepartum hemorrhage were caused by placenta previa. Those women with a previous increased number of gravidity, earlier gestational age, cesarean section scar, having a male sex fetus were factors identified to be associated with the occurrence of placenta previa. Pregnant mothers should receive antenatal care follow up at early gestational age to identify the exact location of placenta previa. Efforts should be made to reduce the rate of pregnancy and cesarean deliveries by improving the provision of family planning to decrease the magnitude of placenta previa.

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Conflict of interest

The authors declare that they have no competing interests

Authors' contributions

SE: Conceived, designed the study, analyzed the data, and wrote up the manuscript. AA and NW: Supervised, assisted in designed and wrote up of the manuscript. All authors read and approved the final manuscript

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