



Tropical Journal of

**Obstetrics &
Gynaecology**

ISSN-Print: 0189-5117
Online: 2543-148X

Official Publication of Society of
Obstetrics & Gynaecology of Nigeria

■ Original Research Article

Assessment of the Maternal Morbidity Profiles Associated with Placenta Praevia Occurring in Pregnancy With Previous Uterine Scar in a South-Western Nigerian Government Hospital

¹Oladiran F. Ayodeji, ²Victoria O. Oladoyin, ³Omotayo A. Oloyede

^{1,3}Department of Obstetrics and Gynaecology, University of Medical Sciences Teaching Hospital, Ondo, Nigeria

²Department of Community Medicine, University of Medical Sciences, Ondo, Nigeria

ABSTRACT

Background: The dual burden of a placenta praevia occurring in a pregnancy with previous caesarean scar carries a greater risk than having each morbidity occurring alone. Evidence of the complications associated with the occurrence of these two risk factors together is scarce in low resource sub-Saharan Africa countries. **Objectives:** This study assessed the maternal morbidity profiles associated with placenta praevia coexisting with previous uterine scar in a government-owned hospital in Nigeria. **Methods:** A two-year review of records of 146 women who had diagnosis of placenta praevia and also delivered the index pregnancy via caesarean section was carried out. The morbidity profiles assessed were duration of index caesarean section, morbidly adherent placenta, estimated blood loss at surgery and length of hospital stay post-delivery. Data was analysed using descriptive and inferential statistics at 5% level of significance. **Results:** The caesarean section rate was 23.3 and prevalence of placenta praevia was 2.4%. Mean age of the respondents was 31 ± 6.0 years. Twenty-two (15.1%) respondents had coexistence of placenta praevia with previous scar, 66.4% delivered via emergency caesarean section and 86.3% of the index caesarean sections lasted < 60 minutes. Two (1.4%) respondents had morbidly adherent placenta, 68.5% had estimated blood loss = 500mls and 78.6% stayed = 3 days in the hospital post-delivery. Longer duration at caesarean section was significantly associated with placenta praevia coexisting with previous scar ($p = 0.045$). **Conclusions:** Caesarean section in placenta praevia coexisting with previous scar lasts longer, hence adequate resources should be made available before commencing such procedures.

Key words: Placenta praevia, previous caesarean scar, morbidities, placenta praevia coexisting with previous scar

Corresponding Author

Dr. Oladiran Frederick Ayodeji
Dept. of Obstetrics and Gynaecology,
Uni. of Med. Sciences Teaching Hosp.,
Ondo, Nigeria. +234-803-308-2718
Email: ladiran54@gmail.com

Introduction

Placenta praevia is a leading cause of antepartum haemorrhage worldwide with significant contributions to maternal and foetal morbidity and mortality.^{1,2} It is defined as an obstetric complication in which the placenta is inserted partially or wholly in the lower uterine segment.³ A major risk factor contributing to the development of this obstetric condition is the presence of a previous caesarean scar^{4,5} and this implies that there is a possibility of having a placenta praevia coexisting with a previous caesarean section.

Given the background knowledge that a history of previous caesarean section on its own is a risk for an index pregnancy,^{6,8} the double burden of having a placenta praevia and a uterine scar from previous caesarean section occurring in the same woman carries a greater risk which is associated with several complications. A number of studies in the United States, the United Kingdom and some Asian countries have looked at these complications arising from the dual burden of a placenta praevia coexisting with a previous caesarean section in the same woman. The complications that have been reported from these countries include morbidly adherent placenta,^{9,12} massive intra operative and postpartum haemorrhage,¹³ peripartum hysterectomy,¹³ and prolonged intensive care unit stay.⁹ Evidence of the complications associated with the occurrence of these two risk factors in a single woman in low resource sub-Saharan Africa countries like Nigeria is scarce.

The need to determine the complications peculiar to a country like Nigeria where the maternal mortality rate is high,¹⁴ where the caesarean section rate is on the increase^{15,16} and where there is dearth of skilled medical specialists¹⁷ is very important. Having such information in a country like Nigeria will help to assist obstetricians devise better management paradigm for these two serious obstetric problems.

In this study, we determined the prevalence of placenta praevia coexisting with previous uterine scars and also assessed the maternal morbidity profiles associated with placenta praevia occurring in pregnancies with previous uterine scar in a

government hospital located in a south-western city in Nigeria.

Material and Methods

- *Study setting*

This study was conducted at the Mother and Child Hospital, Ondo, Ondo State. This government-owned hospital in South-Western Nigeria was founded in November 2013 to mitigate the high maternal mortality at that time in the state. From inception of the hospital in 2013 to 2015, free maternity care was provided for clients. However, from 2016, fee paying was introduced. Between January 2014 and December 2015, access to obstetric care by women was relatively uniform and the obstetric workload in the hospital was very high. In 2018, the Mother and Child Hospital, Ondo, Nigeria was merged with some other government-owned hospitals to establish the University of Medical Sciences Teaching Hospital.

- *Study instrument and data collection*

The operating theatre records from January 2014 to December 2015 was used to identify records of women reviewed. Included in the study were records of all women who had clinical, ultrasound and incidental diagnosis of placenta praevia and who also delivered the index pregnancy via caesarean section in the hospital between January 2014 and December 2015.

A review of record checklist was used to obtain information on the patients' demographic, obstetric and surgical history. Records reviewed were the operating theatre records, surgical notes, microfilm records of the patients' case files and postnatal records. Data were extracted from the records by the research team.

- *Data analysis*

The data was analysed using Statistical Package for Social Sciences (SPSS) software version 23. The data was cleaned before

commencement of the analysis.

Coexistence of placenta praevia with previous scar was “present” if a woman has had a caesarean section prior to the index caesarean section. Coexistence of placenta praevia with previous scar was “absent” if a woman has never had a caesarean section prior to the index caesarean section. The maternal morbidity profiles assessed in this study were duration of index caesarean section, morbidly adherent placenta, estimated blood loss at operation and length of hospital stay post-delivery. Duration of index caesarean section was categorized as either “less than 60 minutes” or greater than or equal to 60 minutes”. Morbidly adherent placenta was determined using three clinical findings recorded in the patient's surgical note. A morbidly adherent placenta was “present” if there was documentation of presence of difficulty removing the placenta; or piecemeal removal of the placenta; or definite absence of a cleavage plane between the placenta and the underlying uterus; or a combination of any or all of the above findings. A morbidly adherent placenta was “absent” if there was no documentation of any of the above findings. Estimated blood loss was categorized as either “less than 500 millilitres” or “greater than or equal to 500 millilitres”. Hospital stay was categorized as either “less than or equal to three days” or “greater than three days”. The index caesarean section was categorized as either “elective” or “emergency”.

Categorical variables were analysed using descriptive statistics such as frequencies and percentages. Numerical variables were summarized using descriptive statistics such as mean, standard deviation, median and interquartile range. Mean and standard deviation were used to describe normally distributed data while the median and interquartile range were used to describe skewed data. Bivariate analysis was done to test the association between the dependent variable and the independent categorical

variables. Level of statistical significance was set at 5% for all analysis.

- **Ethical consideration**

Ethical approval was obtained from the Ethics Board of the state Ministry of Health before the commencement of the study. Approval to conduct the study was also obtained from the Chief Medical Director of the hospital before reviewing the patients' records.

Results

Six thousand and sixty-six deliveries were recorded during the two-year review period. One thousand, four hundred and fourteen (23.3%) of these deliveries were via caesarean section and 147 (2.4%) of the total women who delivered during the review period had placenta praevia. (Table 1) All the 147 case notes of women with placenta praevia were reviewed. The records of one of these women did not have enough information for analysis and was therefore discarded.

Ninety-eight (67.1%) women were less than 35 years old with a mean age of 31 ± 6.0 years. Most, 124 (91.9%) of the women had four or less births. Twenty-two (15.1%) respondents had placenta praevia coexisting with previous scar. (Table 2).

About two-thirds, 97 (66.4%) of the women delivered via an emergency caesarean section during the index pregnancy. A consultant performed the index caesarean section in 82 (56.2%) of the placenta praevia cases reviewed and most, 126 (86.3%) of the index caesarean sections lasted less than 60 minutes. Morbidly adherent placenta was present in only two (1.4%) of the placenta praevia cases reviewed. The estimated blood loss was 500 millilitres or more in 100 (68.5%) of the cases while incidental procedure was performed in about a quarter, 35 (24.0%) of the cases. The hospital stay was less than or equal to three days in 103 (78.6%) of the cases. (Table 2)

On bivariate analysis, the only morbidity significantly associated with placenta praevia occurring in pregnancies with previous caesarean section was duration of index caesarean section.

(Tables 3) A longer duration at caesarean section was significantly associated with a placenta praevia coexisting with a previous scar when compared to a placenta occurring in pregnancies without a previous scar ($p = 0.045$). (Table 3)

Covariates significantly associated with the duration of index caesarean section was the type of index caesarean section. A longer duration at caesarean section was significantly associated with

an emergency caesarean section when compared to an elective caesarean section ($p = 0.016$). (Table 4)

Although not statistically significant ($p = 0.256$), a higher percentage (50.0%) of morbidly adherent placenta praevia cases was associated with longer duration of caesarean section when compared with those without morbidly adherent placenta praevia (13.2%). (Table 4).

Table 1. Caesarean section rate and prevalence of placenta praevia

Variables	Frequency (N=6066)	Percent
Mode of delivery		
Vaginal delivery	4652	76.7
Caesarean section	1414	23.3
Placenta praevia		
Present	147	2.4
Absent	5919	97.6

Table 2. Demographic, obstetric and surgical history of respondents

Variables	Frequency (N=6066)	Percent
Age (in years)		
<35	98	67.1
=35	48	32.9
Age (in years): Mean \pm S.D *	31 \pm 6.0	
Parity (n=135)		
0-4	124	91.9
>4	11	8.1
Coexistence of placenta praevia with previous scar		
Present	22	15.1
Absent	124	84.9
Index caesarean section		
Elective	49	33.6
Emergency	97	66.4
Designation of surgeon at index caesarean section		
Resident doctor	64	43.8
Consultant surgeon	82	56.2
Duration of index caesarean section		
<60 minutes	126	86.3
=60 minutes	20	13.7
Duration of index caesarean section (in minutes):		
Median (IQR \dagger)	40 (15-160)	

Morbidly adherent placenta		
Present	2	1.4
Absent	144	98.6
Estimated blood loss		
<500 mls‡	46	31.5
=500 mls	100	68.5
Estimated blood loss (in mls): Median (IQR)	600 (150-2500)	
Performance of incidental procedure		
Yes	35	24.0
No	111	76.0
Type of incidental procedure performed (n=35)		
Bilateral Tubal Ligation (BTL)	22	62.9
Underrunning lower segment	3	8.6
Return to theatre	2	5.7
Underrunning and packing	2	5.7
BTL and underrunning	4	11.4
BTL and uterine packing	2	5.7
Hospital stay (n=131)		
=3 days	103	78.6
>3 days	28	21.4

* Standard deviation; † Interquartile range; ‡ Millilitres

Table 3. Morbidities associated with placenta praevia coexisting with a previous scar

Variables	Morbidity		P-Value*
	Duration of index caesarean section		
	< 60 minutes	≥ 60 minutes	
Coexistence of placenta praevia with previous scar			
Present	16 (72.7)	6 (27.3)	
Absent	110 (88.7)	14 (11.3)	0.045‡
	Morbidly adherent placenta		
	Present	Absent	
Coexistence of placenta praevia with previous scar			
Present	1 (4.5)	21 (95.5)	
Absent	1 (0.8)	123 (99.2)	0.280†
	Estimated blood loss		
	< 500 mls	≥ 500 mls	
Coexistence of placenta praevia with previous scar			
Present	6 (27.3)	16 (72.7)	
Absent	40 (32.3)	84 (67.7)	0.643
	Hospital stay		
	= 3days	> 3days	
Coexistence of placenta praevia with previous scar			
Present	16 (88.9)	2 (11.1)	
Absent	87 (77.0)	26 (23.0)	0.253

* P-value in Chi-Square test; † P-value in Fisher's Exact test; ‡ Significant value

Table 4. Covariates associated with duration of index caesarean section

Variables	Duration of index caesarean section		P-Value*
	<60 minutes	≥60 minutes	
Age (in years)			
<35	88 (89.8)	10 (10.2)	0.079
=35	38 (79.2)	10 (20.8)	
Parity			
0-4	106 (85.5)	18 (14.5)	0.175
>4	11 (100.0)	0 (0.0)	
Index caesarean section			
Elective	47 (95.9)	2 (4.1)	0.016‡
Emergency	79 (81.4)	18 (18.6)	
Designation of surgeon at index caesarean section			
Resident doctor	56 (87.5)	8 (12.5)	0.710
Consultant surgeon	70 (85.4)	12 (14.6)	
Morbidly adherent placenta			
Present	1 (50.0)	1 (50.0)	0.256†
Absent	125 (86.8)	19 (13.2)	
Performance of incidental procedure			
Yes	28 (80.0)	7 (20.0)	0.214
No	98 (88.3)	13 (11.7)	

* P-value in Chi-Square test; † P-value in Fisher's Exact test; ‡ Significant value

Discussion

In this study, the prevalence of placenta praevia coexisting with previous scar is low relative to existing literature and caesarean delivery takes a significantly longer time to be completed in women who had placenta praevia coexisting with a previous caesarean section scar.

The institutional caesarean section rate found in this study is at variance with what exists in the Nigerian literature. The finding from this study was lower than the 40.1% reported in another south-western city in Nigeria,¹⁸ similar to the 21.4% and 27.6% reported in the north-central and south-eastern parts of the country respectively,^{19,20} and higher than the 11.3% and 7.3% reported by researchers from the north-western and south-southern parts of Nigeria respectively.^{16,21} At the population level this variability in caesarean rate was also reported for the different geopolitical regions in Nigeria.²² Irrespective of what the

indications are for caesarean sections in the different geopolitical regions of Nigeria, worthy of emphasis is the fact that caesarean section still remains a risk for subsequent pregnancies.^{6,8} Therefore, indication for this life-saving obstetric surgery should be for pregnancies which puts the life of the mother and/or baby at risk. Institutions with high caesarean section rates, like ours, should limit their caesarean section to only the medical indications necessitating the surgery. Social indications for caesarean sections should be discouraged. Patients should be well informed about the demerits of a caesarean section when opting for it in situations where it is not medically indicated.

Varying prevalence of placenta praevia have also been documented by other researchers in Nigeria.^{23,24} Several reasons may be adduced for the variability in the prevalence of placenta praevia reported by these Nigerian researchers. These

include the risk factors for placenta praevia peculiar to each study setting and location; and the gestational age at which the placenta praevia reported in each study was diagnosed. Research has shown that quite a number of low-lying placenta diagnosed during pregnancy migrate to the normal location at term.²⁵ Therefore, studies reporting the prevalence of placenta praevia using early ultrasound findings alone are more likely to report a higher prevalence. A nationally representative sample with clear cut operational definitions may be useful in determining what the true picture of placenta praevia is in Nigeria.

The prevalence of placenta praevia coexisting with previous scars in our study is lower than that found in previous studies.^{13,26} This could be due to the higher caesarean section rates in the settings where these other studies were conducted. The caesarean section rates reported by Parikh and colleague¹³ and that reported by Kavitha and colleague²⁶ were 51.0% and 30.0% respectively. These rates are relatively higher compared to that found in our study. It is therefore not unexpected that Parikh and colleague¹³ as well as Kavitha and colleague²⁶ reported a higher prevalence of placenta praevia coexisting with previous scars because caesarean section has been documented in previous literature as a risk factor for developing a placenta praevia.^{4,5}

It was not surprising to find that caesarean delivery for women who had placenta praevia coexisting with a previous caesarean section scar took significantly longer time to be completed in this study. This can be explained partly by the fact that there is a high probability of having a morbidly adherent placenta praevia, and its attendant complications, in a scarred uterus compared to an unscarred uterus.^{27,29} This explanation is further buttressed by the findings of this study which, although not statistically significant, showed that more respondents with morbidly adherent placenta praevia, had prolonged surgery time compared to respondents without morbidly adherent placenta praevia. Another possible explanation for the longer duration of caesarean delivery for women who had placenta praevia

coexisting with a previous caesarean section scar, as buttressed by our study finding, is the presentation of patients with such condition as emergency cases. In this part of the country, surgery is a dreaded procedure. So, anecdotally, patients who have been slated for elective procedures seek alternatives for their ailments. It is only when such alternatives fail that they present back in the hospital. In some instances, such presentations might be late resulting in emergency caesarean section which lasts longer than elective caesarean section as shown in this study. The implication of our study findings for clinical practice is that obstetricians should be well prepared for caesarean sections in women who have placenta praevia coexisting with a previous caesarean section scar because the surgery may last longer than expected. All necessary resources should be available before the surgery starts.

A limitation to this study which must be acknowledged is the small sample size of patients with placenta praevia in this study. Rare morbidities like morbidly adherent placenta were few due to the small sample size. Also, because of the small sample size, we were unable to run a logistic regression to rule out the effect of other covariates in the association between duration of caesarean section and placenta praevia occurring in a pregnancy with a previous scar. Further studies utilizing a larger sample size and a multivariate analysis to determine the effect of covariates in the association between duration of caesarean section and a placenta praevia occurring in a pregnancy with previous caesarean section is suggested. Another limitation which must be acknowledged in this study was that data used for the study was based on review of documented records which may be incomplete. The accuracy and reliability of the information gotten was however ensured by reviewing multiple sources of records. Despite these limitations, this study was able to add to the existing body of knowledge on placenta praevia in Nigeria.

Conclusion

This study demonstrated a relatively low

prevalence of placenta praevia coexisting with previous uterine scar and a longer duration of surgery in placenta praevia occurring in a pregnancy with previous caesarean scar. Based on these findings, obstetricians should endeavour to reduce proactively the caesarean section at their facility level to mitigate the risk associated with

subsequent pregnancies which includes the development of a placenta praevia. Secondly, obstetricians should have sufficient resources on ground when preparing for a caesarean section in a woman with placenta praevia coexisting with previous uterine scar as the surgery may last longer than expected.

References

1. Gibbins KJ, Einerson BD, Varner MW, Silver RM. Placenta previa and maternal hemorrhagic morbidity. *J Matern Fetal Neonatal Med.* 2018; 31(4):494-499.
2. Senkoro EE, Mwanamsangu AH, Chuwa FS, Msuya SE, Mnali OP, Brown BG, et al. Frequency, risk factors, and adverse fetomaternal outcomes of placenta previa in Northern Tanzania. *J Pregnancy.* 2017;2017.
3. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, et al. Obstetrical hemorrhage. In: Williams Obstetrics. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, et al., eds. 24th ed: McGraw-Hill Education; 2014. pp. 780-828.
4. Hu HT, Xu JJ, Lin J, Li C, Wu YT, Sheng JZ, et al. Association between first caesarean delivery and adverse outcomes in subsequent pregnancy: a retrospective cohort study. *BMC Pregnancy Childbirth.* 2018;18(1):273.
5. 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 Fetal Neonatal Med.* 2011;24(11):1341-1346.
6. Betrán AP, Torloni MR, Zhang J-J, Gülmezoglu A, Aleem H, Althabe F, et al. WHO statement on caesarean section rates. *BJOG.* 2016;123(5):667-670.
7. Iyoke CA, Ugwu GO, Ezugwu FO, Lawani OL, Onah HE. Risks associated with subsequent pregnancy after one caesarean section: A prospective cohort study in a Nigerian obstetric population. *Niger J Clin Pract.* 2014;17(4):442-448.
8. Keag OE, Norman JE, Stock SJ. Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. *PLoS Med.* 2018;15(1):e1002494.
9. Baqai S, Noor N, Siraj A. A comparison of morbidity associated with placenta praevia with and without previous caesarean sections. *Pak Armed Forces Med J.* 2018;68(1):50-53.
10. Cheng K, Lee M. Rising incidence of morbidly adherent placenta and its association with previous caesarean section: a 15-year analysis in a tertiary hospital in Hong Kong. *Hong Kong Med J.* 2015;21(6):511-517.
11. 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.
12. Jauniaux E, Jurkovic D. Placenta accreta: pathogenesis of a 20th century iatrogenic uterine disease. *Placenta.* 2012;33(4):244-251.
13. Parikh PM, Makwana S, Shah S, Vithalani V. Fetomaternal outcome in placenta previa in scarred uterus vs non scarred uterus. *IOSR Journal of Dental and Medical Sciences.* 2016;15(1):69-73.
14. National Population Commission [Nigeria], ICF. Nigeria Demographic and Health Survey 2018. 2019. Available from: <https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf>
15. Eleje G, Udigwe G, Akabuike J, Eke A, Eke N, Umeobika J. The rate of Caesarean section in Nnewi, Nigeria: A 10-year Review. *Afrimed Journal.* 2010; 1(1):11-14.
16. Osonwa OK, Eko JE, Ekeng PE. Trends in cesarean section at Calabar Teaching Hospital, Cross River State, Nigeria. *European Journal of Biology and Medical Science Research.* 2016;4(1):1-5.
17. World Health Organization. The world health report 2006: working together for health. World Health Organization, 2006 9241563176. Available from: <https://books.google.com.ng/books?hl=en&lr=&id=taYsDwAAQBAJ&oi=fnd&pg=PR13&dq=World+Health+Organization.+The+World+Health+Report+2006%E2%80%94working+together+for>

- +health.+Geneva:+World+Health+Organization%3B+2006&ots=9em9-pAeC2&sig=zmEVIJ6xZQAudnrcli-nYmXmsoQ&redir_esc=y#v=onepage&q=World%20Health%20Organization.%20The%20World%20Health%20Report%202006%E2%80%94working%20together%20for%20health.%20Geneva%3A%20World%20Health%20Organization%3B%202006&f=false
18. Akinola OI, Fabamwo AO, Tayo AO, Rabiou KA, Oshodi YA, Alokha ME. Caesarean section appraisal of some predictive factors in Lagos Nigeria. *BMC Pregnancy Childbirth*. 2014; 14(1): 217.
 19. Isah AD, Adewole N, Zaman J. A five-year survey of cesarean delivery at a Nigerian tertiary hospital. *Trop J Obstet Gynaecol*. 2018;35(1):14-17.
 20. Ugwu E, Obioha K, Okezie O, Ugwu A. A five-year survey of cesarean delivery at a Nigerian tertiary hospital. *Ann Med Health Sci Res*. 2011;1(1):77-84.
 21. Daniel C, Singh S. Caesarean delivery: An experience from a tertiary institution in north western Nigeria. *Niger J Clin Pract*. 2016;19(1):18-24.
 22. Adewuyi EO, Auta A, Khanal V, Tapshak SJ, Zhao Y. Caesarean delivery in Nigeria: prevalence and associated factors—a population-based cross-sectional study. *BMJ Open*. 2019;9(6):e027273.
 23. Omokanye L, Olatinwo A, Salaudeen A, Ajiboye A, Durowade K. A 5-year review of pattern of placenta previa in Ilorin, Nigeria. *Int J Health Sci*. 2017;11(2):35.
 24. Takai IU, Sayyadi BM, Galadanci HS. Antepartum hemorrhage: A retrospective analysis from a Northern Nigerian teaching hospital. *Int J Appl Basic Med Res*. 2017;7(2):112.
 25. Feng Y, Li XY, Xiao J, Li W, Liu J, Zeng X, et al. Relationship between placenta location and resolution of second trimester placenta previa. *J Huazhong Univ Sci Technology Med Sci*. 2017;37(3):390-394.
 26. Kavitha B, Hota BM. Clinical study of placenta previa in scarred and unscarred uterus. *Journal of Dr NTR University of Health Sciences*. 2018; 7(1): 13.
 27. Balayla J, Bondarenko HD. Placenta accreta and the risk of adverse maternal and neonatal outcomes. *J Perinat Med*. 2013;41(2):141-149.
 28. Farquhar CM, Li Z, Lensen S, McLintock C, Pollock W, Peek MJ, et al. Incidence, risk factors and perinatal outcomes for placenta accreta in Australia and New Zealand: a case control study. *BMJ Open*. 2017;7(10):e017713.
 29. Silver RM, Barbour KD. Placenta accreta spectrum: accreta, increta, and percreta. *Obstet Gynecol Clin North Am* 2015;42(2):381-402.