Aegean Journal of Obstetrics and Gynecology

Original Article

Evaluation of maternal and neonatal outcomes of emergency cesarean deliveries in cases of placenta previa uncomplicated with placenta acreata spectrum

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ABSTRACT

Objective: The management and surgery of placenta previa describe a challenging process that requires experience. It is important to decide on the timing of planned cesarean section in women with placenta previa, taking into account the balance between possible maternal severe bleeding and possible neonatal morbidities.

Material and methods: In the present study, the data of 349 singleton pregnant women with a diagnosis of placenta previa uncomplicated by placenta accreta spectrum were analyzed. Patients who underwent planned (68%, n=236) or emergency cesarean section (32%, n=113) were divided into two groups. In this study, maternal demographic and clinical information, surgical procedures and maternal/neonatal outcomes were studied.

Results: The proportion of patients who underwent uterine compression suture and Bakri balloon was found to be significantly higher in the emergency cesarean section group compared to the planned cesarean deliveries group ($p<0.001$). The operation time, hospital stay, urinary tract infection rate, decrease in hemoglobin and need for blood transfusion were found to be significantly higher in the emergency cesarean section group compared to the planned cesarean section group ($p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, respectively). In addition, a significant association was detected between emergency cesarean section and prematurity, low birth weight, low APGAR score, increased neonatal intensive care unit hospitalization and neonatal mortality.

Conclusion: Cases of placenta previa are at risk of emergency cesarean delivery, which can be complicated by poor maternal and neonatal outcomes. Equipped centers and experienced teams are of great importance in reducing fetomaternal morbidity and mortality caused by placenta previa.

Keywords: placenta previa; emergency cesarean delivery; bleeding; planned cesarean delivery

ARTICLE INFO

Doi: 10.46328/aejog.v5i2.159

Article history:

Received: 17 May 2023

Revision received: 11 June 2023

Accepted: 03 July 2023

Introduction

Placenta previa (PP) is a condition in which the placenta implants in the lower uterine segment and completely or partially covers the endocervical os and complicates 3 to 10 per thousand deliveries [1, 2, 3]. PP may coexist with maternal morbidities such as antenatal bleeding, peripartum bleeding, peripartum hysterectomy, postpartum transfusion, sepsis, thrombophlebitis, and long hospital stay. In addition, it can coexist poor neonatal outcomes such as prematurity, intrauterine growth retardation, neonatal anemia, respiratory distress syndrome, low APGAR score and increased need for neonatal intensive care. PP is associated with an increased risk of maternal and fetal death [4, 5, 6]. Although the pathogenesis is not clear, increasing cesarean delivery, advanced age pregnancies, smoking-cocaine use and increasing use of assisted reproductive techniques enhance the incidence of PP [3]. Risk factors include previous previa, previous uterine surgery, multiparity, multiple pregnancy, recurrent pregnancy loss that may damage the decidua and myometrium, curettage or manual removal of the placenta [1, 2, 3]. Diagnosis of PP can be made after 16 weeks of gestation, preferably by transvaginal ultrasound examination. It is diagnostic when the placenta completely covers the cervical os or if the distance between the placental border and the cervical os is less than 20 mm [7].

Placental accreta spectrum (PAS) refers to placenta accreta, increta, and percreta, which occur as a result of abnormal invasion of placental villi past the decidua base into the myometrium and it can be complicated by devastating bleeding, multiple complications, and even death. There is an increased risk of PAS in pregnant women with placenta previa [1, 8].

It is important to decide on the timing of the planned cesarean section in women with PP, to ensure the balance between possible severe postpartum hemorrhage and possible neonatal morbidities. In stable PP, planned cesarean delivery should be accomplished at 36-37 weeks of pregnancy [9, 10, 11]. However, approximately 40% of PP patients have preterm delivery before the planned cesarean delivery date can be reached [12].

In the current study, it was aimed to compare the emergency cesarean deliveries (ECD) performed in PP cases uncomplicated with PAS with planned cesarean deliveries (PCD) in terms of poor maternal and neonatal outcomes.

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Material and methods

In this retrospective study, the data of 349 singleton pregnant women having cesarean section with the diagnosis of PP between January 1, 2017 and January 1, 2022 at Health Sciences University Izmir Tepecik Training and Research Hospital were included. Ethical approvals comply with the principles of the Declaration of Helsinki and have been approved by the medical ethics committee (decision no. 15/02/2022-43).

Pregnant women with PAS diagnosis, multiple pregnancies, pre-eclamptic and diabetic pregnant women that may be complicated with emergency delivery, pregnant women with bleeding or coagulation disorders or using anticoagulant drugs were excluded from the present study. The diagnosis of PP was done when the placenta completely covered the cervical os or was closer than 20 mm to there in the second trimester ultrasound examination [7]. Patients with a diagnosis of PP were followed up in our perinatology clinic and operated by the same team. After sterilization, 16-18 Fr foley urinary catheter was applied to the pregnant women on the operating table. Preoperatively, the hemoglobin value of the patients was ensured to be >10g/dl and 4 units of erythrocyte suspension were reserved for all planned cesarean sections. While 2 grams (3 grams in pregnant women over 120 kg) of cefazolin antibiotic prophylaxis [13] was administered 60 minutes before cesarean section, was continued for no longer than 24 hours in surgeries lasting longer than 4 hours and in which blood loss of more than 1500 ml. The shape of the skin incision was decided according to the condition of the patient and the surgical team. The PAS clinical diagnosis was made intraoperatively based on the FIGO guidelines [14]. According to the severity of bleeding during cesarean section, uterine compression sutures (Hayman, B-Lynch), Bakri balloon application, uterine artery ligation, internal iliac artery ligation and hysterectomy procedures were performed when necessary. Pregnant women who underwent emergency cesarean delivery (ECD) due to some reasons such as fetal or maternal life-threatening bleeding, PPROM, and unreliable fetal heart tracing in cardiotocography constituted the study group, while pregnant women who underwent uncomplicated scheduled cesarean delivery (PCD) formed the control group. Groups based on maternal age, obstetric history, placental location, additional surgical/non-surgical procedures performed, operation and hospitalization times, changes in maternal hemoglobin values, blood transfusion, postoperative wound infection, birth week and weight of the newborn, APGAR score and intensive care unit were compared.

Statistical analysis

Data were analyzed using R statistical computing software (version 4.1.1, https://www.r-project.org/) and The Statistical Package for the Social Sciences (SPSS), Version 26.0 (SPSS Inc., Chicago, IL). Shapiro-Wilk test is used to test normality and Levene's test is used to test equality of variances for the continuous variables. The ones violating the normality assumption were compared based on Mann-Whitney U tests (Wilcoxon rank-sum test). For the categorical variables, chi-squared tests or Fisher exact tests were conducted, where appropriate. Pairwise comparisons for categorical variables were conducted via two-sided test of equality for column proportions with Bonferroni correction. The descriptive statistics are given as mean ± standard deviation and median (interquartile range) for the continuous variables, frequency (percentage) for the categorical variables. The two-tailed significance level is set to 0.05.

Results

Our study included 349 pregnant women who were not complicated with PAS, 68% (n=236) were made PCD and 32% (n=113) were made ECD (Table 1). The mean age for all pregnant women was calculated as 30.8 ± 5.9 years.

Table 1. Demographic and Clinical Characteristics

	Planed CD (n=236)	Emergency CD (n=113)	p
Age, year	31.16 ± 5.31	30.15 ± 6.91	0.363[w]
Gravida	2.70 ± 1.30	3.03 ± 1.84	0.373[w]
Parity	1.50 ± 0.96	1.80 ± 1.63	0.388[w]
Spontaneous abortion	0.17 ± 0.51	0.31 ± 0.87	0.177[w]
Curettage	0.03 ± 0.17	0.03 ± 0.16	0.872[w]
Previous cesarean section	1.08 ± 0.75	1.03 ± 0.88	0.413[w]
ART	5 (2.12%)	1 (0.88%)	0.668[f]
History of hemorrhage	199 (84.32%)	104 (92.04%)	0.068[c]
Placental localization			0.094[f]
Lateral	11 (4.66%)	5 (4.42%)	
Anterior	52 (22.30%)	39 (34.51%)	
Posterior	173 (73.31%)	69 (61.06%)	

Data are presented as mean ± sd and median (interquartile range) for continuous variables and frequency (percentage) for categorical variables. w, f and c represent Wilcoxon rank-sum test, Fisher exact test and Chi-squared test, respectively.

Throughout this study, 87% (n=303) of the pregnant women were complicated with antenatal bleeding. The mean operation time for all patients was 81 ± 31 min., hospital stay was 7.2 ± 5.7 days. Bakri balloon 6.9% (n=24), uterine compression suturing in 11% (n=39), internal iliac artery ligation in 10% (n=35) and hysterectomy in 2.9% of the patients (n=10; 6 of them during re-operation) was performed.

Table 2. Surgical Procedure and Maternal Outcomes

	Planed CD (n=236)	Emergency CD (n=113)	p
Vertical skin incision	18 (7.63%)	7 (6.19%)	0.792[c]
Uterine compression suture	20 (8.47%)	19 (16.81%)	0.033[c]
Bakri balloon	4 (1.69%)	20 (17.7%)	<0.001[c]
İnternal iliac artery lig.	22 (9.32%)	13 (11.5%)	0.657[c]
Hysterectomy	4(1.69%)	6 (5.31%)	0.083[f]
Re-operated	2 (0.85%)	4 (3.54%)	0.089[f]
Blood transfusion	30 (12.71%)	89 (78.76%)	<0.001[c]
Wound infection	4 (1.69%)	5 (4.42%)	0.156[f]
Urinary tract infection	29 (12.29%)	48 (42.48%)	<0.001[c]
Length of stay. days	2.8 ± 0.6	3.4 ± 0.8	<0.001[w]
Operation time. min.	63.90±23.38	115.58 ± 8.34	<0.001[w]
Hemoglobin preoperative	10.97 ± 1.42	11.29 ± 1.21	0.024[w]
Hemoglobin postoperative	7.75 ± 0.77	7.13 ± 0.42	<0.001[w]
Hemoglobin change	3.22 ± 1.61	4.16 ± 1.27	<0.001[w]

Data are presented as mean ± sd and median (interquartile range) for continuous variables and frequency (percentage) for categorical variables. w, f and c represent Wilcoxon rank-sum test. Fisher exact test and Chi-squared tes, respectively.

While blood transfusion was applied in 34% (n=119) of the patients, re-operation was required in 1.7% (n=6) of patients due to refractory bleeding to medical treatment. Hysterectomy was performed on all re-operated patients. There were no maternal deaths due to PP during this study. The surgical procedures and maternal outcomes are summarized in Table 2. There was no significant difference between the groups in terms of skin incision type, per-op iliac artery ligation and hysterectomy, re-operation, and postoperative wound infection. The proportion of patients who were subjected to uterine compression sutures in the ECD group (16.81%) was found significantly higher than in the PCD group (8.47%, p=0.033). Bakri balloon application was found significantly higher in the ECD group compared to the PCD group (17.7%; 1.69%, respectively). Longer operative time (115.58 ± 8.34 min; 63.90 ± 23.38 min. p<0.001, respectively), longer hospital stays (3.4 ± 0.8 days; 2.8 ± 0.6 days respectively, p<0.001) and higher rate of urinary tract infection (42.48%; 12.29%, p<0.001, respectively) in the ECD group compared to the PCD group. Also, higher rate of decrease in hemogram (4.16 ± 1.27; 3.22 ± 1.61, p<0.001) and higher need for transfusion (78.76%; 12.71%, p<0.001, respectively) were detected in the ECD group compared to the PCD group (Table 2).

Neonatal outcomes are summarized in Table 3. Compared to the PCD group, the newborns in the ECD group had earlier birth weeks (36.12 ± 0.89 vs 31.45 ± 4.68 p<0.001, respectively), lower birth weight (2666.83 ± 659.79gr vs 1938.10 ± 766.86 p<0.001, respectively), lower 1st and 5th minute APGAR scores (7.89 ± 0.44 vs. 5.03 ± 0.51 p<0.001 and 8.00 ± 1.16 vs 6.89 ± 0.72 p<0.001, respectively) and higher neonatal intensive care admission rates (63.56% vs. 94.69% p<0.001, respectively). The mortality rate was found significantly higher in newborns in the ECD group compared to the PCD group (Table 3).

Table 3. Neonatal Results of participants

	Planed CD (n=236)	Emergency CD (n=113)	P value
Gestational week	36.12 ± 0.89	31.45 ± 4.68	<0.001[w]
	36.00 (35.00- 37.00)	32.00 (29.0- 34.0)	
Birth weight	2666.83 ± 659.79	1938.10 ± 766.86	<0.001[w]
	2777.50 (2300-3092.5)	1860 (1445- 2535)	
1. min. APGAR	7.89 ± 0.44	5.03 ± 0.51	<0.001[w]
	8.00 (8.00- 8.00)	5.00 (5.00- 5.00)	
5. min. APGAR	8.00 ± 1.16	6.89 ± 0.72	<0.001[w]
	8.00 (8.00- 9.00)	7.00 (7.00- 7.00)	
NICU	n=150 (63.56%)	107 (94.69%)	<0.001[c]
Neonatal mortality	n=10 (8.8%)	n=1 (0.4%)	<0.001[c]

Data are presented as mean ± sd and median (interquartile range) for continuous variables and frequency (percentage) for categorical variables. w and c represent Wilcoxon rank-sum test and Chi-squared test, respectively.

Discussion

PP is associated with increased maternal and neonatal morbidity and mortality. Women with PP are at risk of bleeding throughout pregnancy, especially in the third trimester. These patients also have an increased risk for peripartum hysterectomy, blood transfusion, postpartum hemorrhage, sepsis, and poor neonatal outcomes [4, 15, 16, 17]. In this study, maternal and neonatal outcomes of pregnancies with PP uncomplicated with PAS that were subjected to by planned or emergency cesarean section were compared. Also, longer operation and hospitalization times, more frequent urinary tract infections, more hemorrhage and need for transfusion were found in the ECD group compared to the PCD group. Compared to the PCD group, the newborns of the ECD group pregnants were associated with increased prematurity, low birth weight, low APGAR scores and intensive care hospitalization risk.

In the previous studies, it was observed that maternal age, gravida, parity, spontaneous abortion history, number of ART pregnancies and dominant placental localization parameters were not associated with emergency or planned cesarean section in pregnant women with PP [1, 2, 3]. On the contrary, Morlando et al. found a significant association between increased parity and the risk of emergency cesarean section [18]. Ozköse found a significant relationship between antepartum hemorrhages and ECD. Morlando, on the other hand, reported antepartum hemorrhages as the only parameter with significant predictive value for ECD risk [1, 18]. In this study, no significant relationship was found between maternal age, obstetric history (gravida, parity, spontaneous abortion, curettage, previous cesarean section and ART), predominant placental localization, antepartum bleeding history and emergency cesarean section risk.

Erfani and Morlando reported that there was no significant difference between patients who underwent ECD or PCD due to PP in terms of estimated blood loss and blood product transfusion requirement [3, 18]. Ozköse reported lower hemoglobin values in the ECD group both at first admission and at discharge compared to the PCD group,but did not compare the groups in terms of hemoglobin decreased [1]. Durukan reported that ECD was significantly associated with lower preoperative hemoglobin values, increased blood loss and transfusion need when compared to PCD [2]. In this study, preoperative and postoperative hemogram values were detected significantly lower in ECD patients compared to the PCD group. The lack of time for preoperative planned transfusion can be interpreted as the reason for the preoperative low hemoglobin values in the ECD group. In addition, a significant decrease in hemoglobin value and a significant increase in the need for blood transfusion were found in the ECD group. It can be said that the ECD procedure is associated with a significant increase in total blood loss.

In PP cases, peroperative interventions such as skin incision type or compression suture, balloon application, arterial ligation and even hysterectomy may vary depending on the patient's condition and the practice of the team. Fan et al. reported that vertical skin incision was used significantly more in the ECD group [5]. Ozköse did not report a significant difference between the groups in terms of uterine compression suture, balloon tamponade, internal iliac artery ligation and hysterectomy procedures applied during cesarean section for hemorrhage control [1]. Durukan found a significant increase in the rate of intraoperative intervention in addition to cesarean section in the ECD group. While they reported a significant increase in the rate of hysterectomy, it was found that there was no significant difference between the groups when the Bakri balloon, uterine compression suture, iliac artery ligation, abdominal packing and re-operation procedures were compared alone [2]. In the present study, no significant difference was found between the groups in terms of vertical skin incision. Compared to the PCD group, there was a significant increase in procedures with relatively lower morbidity, such as uterine compression suture and Bakri balloon application, in the ECD group. In addition, there was no important difference in the application of high morbidity procedures such as internal iliac artery suturing, hysterectomy and re-operation. It is thought that the adequate facilities and experienced human resources in patient follow-up in the

postpartum period allow more conservative interventions during cesarean section.

Studies have reported that longer hospital stays were observed in the ECD group compared to the PCD group [1, 2, 3]. Increased rates of postoperative maternal morbidity (fever, wound infection, sepsis, organ failure, intensive care hospitalization) have been reported in patients in the ECD group [1, 5, 18]. In this study, prolonged hospitalization and increased urinary tract infection rate were found in ECD group patients. It has been reported that prolonged urinary catheterization is a facilitating factor in urinary tract infection [19].

Poor neonatal outcomes in pregnant women who underwent ECD due to PP are not surprising. There are many studies stating that newborns of ECD group pregnant women are complicated with prematurity, low birth weight, low APGAR score, increased neonatal intensive care hospitalization rates and neonatal mortality compared to PCD group [1, 2, 5]. On the other hand, Morlando et al. reported that low birth weight increased in newborns in the ECD group, but no significant difference was found between the groups in terms of APGAR scores and neonatal intensive care unit (NICU) admissions [18]. In this study, a significant association was found between ECD and prematurity, low birth weight, low APGAR score, NICU hospitalizations and mortality, similar to the literature. It has been revealed that the main cause of poor neonatal outcomes is prematurity, even does not have time for steroid administration for fetal lung maturation in most cases.

Being retrospective constitutes the weakness of our study. There were deficiencies in accessing medical records related to the antenatal process. On the other hand, the strength way of the current study is the higher number of patients compared to other similarly designed studies in the literature. It is also found that performing the surgery by the same team provides standardization and increases the reliability of our results.

PP cases have a risk of ECD, which causes poor maternal and neonatal outcomes. Compared to the PCD group, patients in the ECD group had a significant increase in poor maternal outcomes such as bleeding, blood transfusion, additional per-operative interventions (compression suture and Bakri balloon), prolonged hospital stay, and urinary tract infection. In addition, newborns in the ECD group were significantly associated with poor neonatal outcomes such as prematurity, low birth weight, low APGAR score, and intensive care admission.

Disclosure

Authors have no potential conflicts of interest to disclose.

References

[1] Gedik Özköse Z, Oğlak SC, Ölmez F. The comparison of maternal and neonatal outcomes between planned and emergency cesarean deliveries in placenta previa patients without placenta accreata spectrum. Ginekol Pol. 2022. doi: 10.5603/GP.a2021.0160. Epub ahead of print.

[2] Durukan H, Durukan ÖB, Yazıcı FG. Planned versus urgent deliveries in placenta previa: maternal, surgical and neonatal results. Arch Gynecol Obstet. 2019;300(6):1541-1549. doi: 10.1007/s00404-019-05349-9. Epub 2019 Oct 26.

[3] Erfani H, Kassir E, Fox KA, Clark SL, Karbasian N, Salmanian B, et al. Placenta previa without morbidly adherent placenta: comparison of characteristics and outcomes between planned and emergent deliveries in a tertiary center. J Matern Fetal Neonatal Med. 2019;32(6):906-909. doi: 10.1080/14767058.2017.1395014. Epub 2017 Nov 5.

[4] Oglak SC, Obut M, Tahaoglu AE, Demirel NU, Kahveci B, Bagli I. A prospective cohort study of shock index as a reliable marker to predict the patient's need for blood transfusion due to postpartum hemorrhage. Pak J Med Sci. 2021;37(3):863-868. doi: 10.12669/pjms.37.3.3444.

[5] Fan D, Zhang H, Rao J, Lin D, Wu S, Li P, et al. Maternal and neonatal outcomes in transverse and vertical skin incision for placenta previa: Skin incision for placenta previa. BMC Pregnancy Childbirth. 2021;21(1):441. doi: 10.1186/s12884-021-03923-1.

[6] Lal AK, Hibbard JU. Placenta previa: an outcome-based cohort study in a contemporary obstetric population. Arch Gynecol Obstet. 2015;292(2):299-305. doi: 10.1007/s00404-015-3628-y. Epub 2015 Feb 1.

[7] Jauniaux E, Alfirevic Z, Bhide AG, Belfort MA, Burton GJ, Collins SL,et al. Placenta Praevia and Placenta Accreta: Diagnosis and Management: Green-top Guideline No. 27a. BJOG. 2019;126(1):e1-e48. doi: 10.1111/1471-0528.15306. Epub 2018 Sep 27.

[8] Donovan BM, Shainker SA. Placenta Accreta Spectrum. Neoreviews. 2021;22(11):e722-e733. doi: 10.1542/neo.22-11-e722.

[9] Blackwell SC. Timing of delivery for women with stable placenta previa. Semin Perinatol. 2011;35(5):249-51. doi: 10.1053/j.semperi.2011.05.004.

[10] American College of Obstetricians and Gynecologists' Committee on Obstetric Practice, Society for Maternal-Fetal Medicine. Medically Indicated Late-Preterm and Early-Term Deliveries: ACOG Committee Opinion, Number 831. Obstet Gynecol. 2021;138(1):e35-e39. doi: 10.1097/AOG.0000000000004447.

[11] Society for Maternal-Fetal Medicine (SMFM). Electronic address: pubs@smfm.org, Gyamfi-Bannerman C. Society for Maternal-Fetal Medicine (SMFM) Consult Series #44: Management of bleeding in the late preterm period. Am J Obstet Gynecol. 2018;218(1):B2-B8. doi: 10.1016/j.ajog.2017.10.019. Epub 2017 Oct 25.

[12] Ruiter L, Eschbach SJ, Burgers M, Rengerink KO, van Pampus MG, Goes BY, et al. Predictors for Emergency Cesarean Delivery in Women with Placenta Previa. Am J Perinatol. 2016;33(14):1407-1414. doi: 10.1055/s-0036-1584148.

[13] Costa ACD, Santa-Cruz F, Ferraz ÁAB. WHAT'S NEW IN INFECTION ON SURGICAL SITE AND ANTIBIOTICOPROPHYLAXIS IN SURGERY? Arq Bras Cir Dig. 2021;33(4):e1558. doi: 10.1590/0102-672020200004e1558.

[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):20-24. doi: 10.1002/ijgo.12761.

[15] Oğlak S, Obut M. Does keeping the Bakri balloon in place for longer than 12 hours provide favourable clinical outcomes in the treatment of uterine atony? Ege Tıp Dergisi. 2020; 59(3): 209–214

[16] Oğlak SC, Tunç Ş, Obut M, Şeker E, Behram M, Tahaoğlu AE. Maternal near-miss patients and maternal mortality cases in a Turkish tertiary referral hospital. Ginekol Pol. 2021;92(4):300-305. doi: 10.5603/GP.a2020.0187. Epub 2021 Mar 10.

[17] Vahanian SA, Lavery JA, Ananth CV, Vintzileos A. Placental implantation abnormalities and risk of preterm delivery: a systematic review and metaanalysis. Am J Obstet Gynecol. 2015;213(4):S78-90. doi: 10.1016/j.ajog.2015.05.058.

[18] Morlando M, Schwickert A, Stefanovic V, Gziri MM, Pateisky P, Chalubinski KM, et al. Maternal and neonatal outcomes in planned versus emergency cesarean delivery for placenta accreta spectrum: A multinational database study. Acta Obstet Gynecol Scand. 2021;100 (1):41-49. doi: 10.1111/aogs.14120. Epub 2021 Mar 12.

[19] Gauron G, Bigand T. Implementation of evidence-based strategies to reduce catheter-associated urinary tract infections among hospitalized, post-surgical adults. Am J Infect Control. 2021;49(6):843-845. doi: 10.1016/j.ajic.2020.11.016. Epub 2020 Nov 20.