Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Aydın N, Tüten N. Perioperative outcomes, risks and complications associated with placenta previa and placenta accreta spectrum revisited from an anesthesiology perspective. Turk J Womens Health Neonatol 2023; 5(3): 57-62.

Original Article

Perioperative Outcomes, Risks and Complications Associated with Placenta Previa and Placenta Accreta Spectrum Revisited From an Anesthesiology Perspective

Anesteziyoloji Perspektifinden Yeniden Gözden Geçirilen Plasenta Previa ve Plasenta Accrete İle İlişkili Perioperatif Sonuçlar, Riskler ve Komplikasyonlar

Nevin Aydın[1]*, Nevin Tüten[2]

[1] Department of Anaesthesiology and Reanimation, İstanbul Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Türkiye
[2] Department of Gynecolology and Obstetrics, İstanbul Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Türkiye

Abstract

Purpose: Placenta previa (PP) and placenta accreta spectrum are forms of abnormal placentation, and they are associated with significant perinatal morbidity and mortality. The objective of the present study was to juxtapose the baseline data, clinical features, perioperative outcomes, risks, and complications associated with PP and placenta accreta spectrum.

Materials and Methods: This retrospective study was performed using data extracted from the medical files of a total of 300 patients diagnosed with PP (Group I, n=237) and placenta accreta spectrum (Group II, n=63). The information gathered for every patient consisted of baseline descriptives, perinatal data and need for intraoperative or postoperative blood transfusion, pre- and postoperative serum levels of hemoglobin, fibrinogen and C-reactive protein, need and duration for intensive care unit stay, whether hemodialysis and mechanical ventilation were employed.

Results: The body-mass index was remarkably higher in Group II (p=0.002). There was no statistically significant difference between two groups concerning baseline descriptive data and perinatal, perioperative, and postoperative variables.

Conclusion: Results of the present study demonstrated that despite adequate planning and optimal management strategies; the likelihood of significant morbidity and mortality associated with PP and placenta accrete spectrum is still remarkable. Early and close monitoring with careful preparation is momentous for antepartum and intrapartum management. Additional research is essential to determine the predisposing factors as well as ideal methods of diagnosis, treatment, and prevention.

Keywords: Placenta previa; placenta accreta; placenta percreta, placenta increta; obstetric risk factors; complication

Corresponding author *: Department of Anaesthesiology and Reanimation, İstanbul Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Türkiye.
E-mail: nevinaydin4334@gmail.com
ORCID: 0000-0003-0189-5865
DOI: 10.46969/EZH.1320964
Received: 30.06.2023 Accepted: 03.10.2023

Volume 5 Number 3 p: 57-62

Öz

Amaç: Plasenta previa (PP) ve plasenta akreta spektrumu, anormal plasentasyon biçimleridir ve önemli perinatal morbidite ve mortalite ile ilişkilidir. Bu çalışmanın amacı, PP ve plasenta akreta spektrumu ile ilişkili temel verileri, klinik özellikleri, perioperatif sonuçları, riskleri ve komplikasyonları yan yana getirmekti.

Gereç ve Yöntemler: Bu retrospektif çalışma, PP (Grup I, n=237) ve plasenta akreta spektrumu (Grup II, n=63) tanısı alan toplam 300 hastanın tıbbi dosyalarından elde edilen veriler kullanılarak yapıldı. Her hasta için toplanan bilgiler perinatal veriler ve intraoperatif veya postoperatif kan transfüzyonu ihtiyacı, hemoglobin, fibrinojen ve C-reaktif proteinin pre- ve postoperatif serum seviyeleri, yoğun bakımda kalış süresi ve ihtiyacı, hemodiyaliz ve mekanik ventilasyon kullanılıp kullanılmadığından oluşuyordu..

Bulgular: Vücut kitle indeksi Grup II'de oldukça yüksekti (p=0,002). Temel tanımlayıcı veriler ve perinatal, perioperatif ve postoperatif değişkenler açısından iki grup arasında istatistiksel olarak anlamlı bir fark yoktu.

Sonuç: Bu çalışmanın sonuçları, yeterli planlama ve optimal yönetim stratejilerine rağmen; PP ve plasenta accreta spektrumu ile ilişkili önemli morbidite ve mortalite olasılığının hala dikkat çekici olduğu göstermiştir.. Dikkatli bir hazırlık ile erken ve yakın takip, antepartum ve intrapartum yönetim için çok önemlidir. Predispozan faktörlerin yanı sıra ideal tanı, tedavi ve önleme yöntemlerini belirlemek için ek araştırmalar gereklidir.

Anahtar Kelimeler: Plasenta previa; plasenta accreta; plasenta percreta, plasenta increta; obstetrik risk faktorler; komplikasyonlar

1. Introduction

Normal placentation is a consequence of the adherence of the blastocyst to the decidualized endometrium. Abnormal placentation involves placental abruption, placenta previa (PP), cesarean scar ectopic pregnancy, cervical pregnancy, and the placenta accreta spectrum.

Placenta accreta is the abnormal adherence of the placenta to the myometrium, instead of the decidua. This abnormal adherence may lead to severe maternal and neonatal morbidity and mortality. In such a circumstance, the placenta does not separate from the uterus after delivery, resulting in massive hemorrhage, disseminated intravascular coagulation, multiorgan failure and death. In order to correct and treat these hazardous complications, massive transfusion, intensive care unit (ICU) stay, and medical and surgical interventions may be necessary (1).

The association between the increased numbers of cesarean section (C/S) and the risk of placenta accreta spectrum can be due to the misrepair of the endometrium and decidua basalis. In case of subsequent pregnancies, cytotrophoblasts may invade the decidualized endometrium without encountering the spongiosus layer and therefore with no signals to interrupt invasion. In such a setting, trophoblasts continue their abnormal way of invasion (1).

Placenta previa is a serious complication of pregnancy which has recently become a more common entity. Ultrasound is usually used as the primary diagnostic tool for assessment of women under risk for placental disorders. Prenatal magnetic resonance imaging can be used complementary to ultrasound and may provide additional information for the guidance of management (2).

In PP cases, the need for hospitalization and the mode of delivery must be judged on an individualized basis for every patient (6). Placenta previa is a critical obstetric problem which necessitates management by an experienced team. Serious complications associated with PP involve bleeding, sepsis, thrombophlebitis, need for hysterectomy, blood transfusions and abnormal placental adherence. Effective measures must be implemented to reduce the incidence of PP and to avoid these morbidities (6). Prenatal diagnosis of PP, a potentially life-threatening condition, can be useful to decrease the rate of maternal and fetal morbidities which are more frequent in case these circumstances remain undiagnosed until delivery.

Placenta accreta spectrum is a rare placentation disorder linked with high maternal morbidity. It is supposed to be a result of damage to the endometrium-myometrial interface of the uterine wall. Placenta accreta spectrum is categorized in 3 groups: i) placenta creta if the villi simply adhere to the myometrium, ii) placenta increta when the villi invade the myometrium, and iii) placenta percreta where the villi invade the full thickness of the myometrium. For appropriate management of placenta accreta spectrum, correlation of pathological and clinical findings with prenatal imaging is necessary (7).

A comparative analysis of clinical data and morbidities associated with PP and placenta accreta spectrum is lacking. The objective of the present study was to juxtapose the baseline data, clinical features, perioperative outcomes, risks and complications associated with PP and placenta accreta spectrum.

2. Materials and methods

Study design

This retrospective study was performed using data extracted from the medical files of a total of 300 patients diagnosed with PP (PP partialis, PP marginalis, PP totalis, low-lying placenta) and placenta accreta spectrum (placenta accreta, placenta increta and placenta percreta) in the obstetrics and gynaecology department of a tertiary care center. The approval of the local institutional review board had been obtained prior to the study (No:64/Tarih:23.03.2022). The information gathered for every patient consisted of age, body-mass index (BMI), gravidity, parity, gestational weeks, mode of delivery, need for intraoperative or postoperative blood transfusion, pre- and postoperative serum levels of hemoglobin, fibrinogen and C-reactive protein (CRP), need and duration for ICU stay, whether hemodialysis and mechanical ventilation were employed as well as Acute physiology and chronic health evaluation (APACHE II) scores for patients hospitalized in ICU.

Two groups were constituted with respect to diagnosis. Group I (n=237) was comprised of PP patients, whereas patients with placenta accreta spectrum made up Group II (n=63).

Statistical analysis

Descriptive data were expressed as mean ± standard deviation or median (minimum-maximum) for quantitative variables, and as number and percentage for categorical variables. Normality was tested using Shapiro Wilks test. The significance of the difference between 2 means was evaluated with T-test and Mann Whitney u tests. Chi-square test was utilized to compare the categorical variables in 2 groups. Statistical Package for Social Sciences program version 21.0 (SPSS Inc., Chicago, IL, USA) was used for analysis. P value less than 0.05 was considered as significant.

3. Results

An overview of the data collected in this series is presented in Table 1. There was no statistically significant difference between 2 groups with respect to age (p=0.857), comorbid disease (p=0.369), gravidity (p=0.562), parity (p=0.792) and history of re-operation (p=1.000). The BMI was remarkably higher in Group II (p=0.002). Perinatal and operative histories of PP and placenta accreta spectrum seem not to display distinctive features from each other.

In terms of hemodynamic parameters during and after surgery, two groups exhibited similar characteristics. The need for intraoperative (p=0.616) and postoperative blood transfusion (p=0.960), preoperative (p=0.305) and postoperative fibrinogen levels (p=0.264), amount of fibrinogen given during (p=0.745) and after surgery (p=0.210) were not statistically significantly different in 2 groups.

Need for ICU stay (p=0.383) and duration of ICU stay (p=0.231), as well as the use of intraoperative inotropic agents (p=0.588) and anti-hypertensive medications (p=0.588) did not differ between Groups I and II.

APACHE II scores (p=0.128), mortality rate (p=1.000), pre (p=0.389) and postoperative hemoglobin levels (p=0.336), incidence of infection after C/S (p=1.000), serum CRP levels at admission and discharge (p=1.000 for both) were similar in Groups I and II (Table 1).

4. Discussion

Placentation anomalies including PP and placenta accreta spectrum are important causes of perinatal morbidity and mortality for both the mother and newborn. Risks and clinical clues that may aid in the early diagnosis and appropriate management of these problems must be identified timely (1,5,8). The anesthesiologists, as well as obstetricians, must be aware of these hazardous conditions to decrease the morbidity and mortality linked with PP and placenta accreta spectrum. The purpose of the present study was to comparatively evaluate the demographic, clinical and laboratory data of PP and placenta accreta spectrum. Our data yielded that patients with placenta accreta spectrum had significantly higher BMI compared to PP cases. Other than this, clinical and perioperative data as well as laboratory findings were similar in two groups. The identification of predisposing factors and precautions to be taken the incidences of PP and placenta accreta spectrum must be studied in further multicentric trials on larger series.

Attributed to the increased rates of C/S, abnormalities of placental implantation such as PP and placenta accreta spectrum has risen notably in the last two decades (8). In addition to uterine instrumentation and procedures such as C/S, advanced maternal age has been postulated as another predisposing factor for these disorders (9). With the advancement of age, sclerotic changes affecting the vascular supply of myometrium may impair the appropriate placental development (10).

Volume 5 Number 3 p: 57-62

Table 1. Comparison of Group I (placenta previa) and Group II (placenta accreta spectrum: placenta accreta, placenta increta, placenta percreta) with respect to clinical and demographic characteristics.

		Diagnosis		
		Group I (n=237)	Group II (n=63)	p-value
Age		31.81 ± 5.22 32 [20 - 44]	31.95 ± 6.02 33 [19 - 46]	0.857
Body-mass index (kg/m^2)		30.41 ± 3.43 30.48 [22.09 – 41.12]	32.40 ± 4.66 31.64 [22.92 – 51.84]	0.002*
Nationality	Turkish Syrian Other	205 (86.5) 25 (10.5) 7 (3.0)	56 (88.9) 6 (9.5) 1 (1.6)	0.788
Comorbidity	No Yes	219 (92.4) 18 (7.6)	56 (88.9) 7 (11.1)	0.369
Gravidity		3.30 ± 1.78 3 [1 - 11]	3.11 ± 1.63 3 [1 - 7]	0.562
Parity		1.72 ± 1.30 2 [0 - 8]	1.67 ± 1.29 2 [0 - 5]	0.792
Re-operation	No Yes	233 (98.3) 4 (1.7)	62 (98.4) 1 (1.6)	1.000
Intraoperative blood transfusion	No Yes	181 (76.4) 56 (23.6)	50 (79.4) 13 (20.6)	0.616
Postoperative blood transfusion	No Yes	200 (84.4) 37 (15.6)	53 (84.1) 10 (15.9)	0.960
Preoperative serum fibrinogen level		432 [0 - 768]	427 [0 - 894]	0.305
Postoperative serum fibrinogen level		0 [0 - 666]	0 [0 - 432]	0.264
Fibrinogen infused during operation	No Yes	224 (94.5) 13 (5.5)	61 (96.8) 2 (3.2)	0.745
Fibrinogen infused in the ward	No Yes	237 (100.0) 0 (0.0)	62 (98.4) 1 (1.6)	0.210
ICU stay	No Yes	220 (92.8) 17 (7.2)	61 (96.8) 2 (3.2)	0.383
Duration of ICU stay		0.15 ± 0.61 0 [0 - 4]	0.03 ± 0.18 0 [0 - 1]	0.231
Duration of mechanical ventilation (days)	0 1 2	228 (96.2) 6 (2.5) 3 (1.3)	63 (100.0) 0 (0.0) 0 (0.0)	N/A
Hemodialysis	No Yes	237 (100.0) 0 (0.0)	63 (100.0) 0 (0.0)	N/A
Intraoperative inotropic agents	No Yes	232 (97.9) 5 (2.1)	63 (100.0) 0 (0.0)	0.588
	Dopamine Dobutamine Noradrenalin	3 (60.0) 1 (20.0) 1 (20.0)		
Anti hypertensive drugs	No Yes	234 (98.7) 3 (1.3)	63 (100.0) 0 (0.0)	1.000
APACHE II score	0 > 0 Mean	226 (95.4) 11 (4.6) 19.67 ± 14.28	63 (100.0) 0 (0.0) -	0.128
APACHE II score		0.86 ± 4.74 0 [0 - 45]	0	N/A
Survival	Dead Alive	2 (0.08) 235 (98.2)	0 (0.0) 63 (100.0)	1.000
Preoperative Hb (g/dL)		11.26 ± 1.39 11.4 [7.6 – 16.30]	11.34 ± 1.26 11.40 [8 – 15.5]	0.389
Postoperative Hb (g/dL)		9.73 ± 1.57 9.6 [5.5 – 15.3]	9.63 ± 1.40 9.7 [6.80 – 12.70]	0.336
Infection after cesarean section	No Yes	232 (97.9) 5 (2.1)	62 (98.4) 1 (1.6)	1.000
Serum CRP level at admission (mg/L)	0 > 0 Mean	232 (97.9) 5 (2.1) 102.09 ± 66.42	62 (98.4) 1 (1.6) 59.59	1.000
Serum CRP level at discharge (mg/L)	0 > 0 Mean	232 (97.9) 5 (2.1) 8.69 ± 9.67	62 (98.4) 1 (1.6) 5.5	1.000

Abbreviations: PP: placenta previa; ICU: intensive care unit; Hb: hemoglobin; CRP: C-reactive protein; N/A: not applicable; *: statistically significant

The maternal bleeding linked with abnormal location and invasion of placental tissue is more likely to occur in the third trimester in conjunction with the onset of labor. Therefore, complications and adverse outcomes seem to be more severe in such a scenario (11).

Our results indicated that there were no remarkable differences between PP and placenta accreta spectrum in terms of hemodynamic and inflammatory profiles as well as the need for ICU stay, mechanical ventilation and use of inotropic agents and fibrinogen. The clinical course of the diseases and the need for additional medications and interventions were similar in these two groups.

Advanced maternal age, multiparity, smoking, cocaine abuse, history of induced abortions and multiple pregnancies are risk factors associated with PP (3).

Attributed to the increased incidence and serious complications of abnormal placentation, prenatal diagnosis has become a key point in the management. Increased awareness, as well as improved imaging modalities, have provided significant guidance to clinicians including obstetricians and anesthesiologists. Prenatal diagnosis is supposed to improve the outcome significantly and close collaboration and knowledge for how to manage these disorders is crucial for obstetricians and the anesthesiologists particularly working in the high-risk units (2).

Similar to PP, the incidence of placenta accreta spectrum tends to increase. Major risk factors involve a history of C/S, PP, and previous uterine surgery. Antenatal diagnosis can diminish morbidity and mortality, and a multidisciplinary team in a center of excellence can optimize maternal and neonatal outcomes with placenta accreta spectrum. Timing of delivery must be individualized, and a conservative strategy may provide preservation of fertility. On the other hand, risks are still substantial and selection of the ideal management strategy for patients remains to be based on well-established strategies (1).

Owing to diagnostic limitations, PP and placenta accreta spectrum may be recognized just at the time of delivery. Thus, it is of critical importance for not only obstetricians but also other providers of care such as anesthesiologists to be familiar with the epidemiological, diagnostic, therapeutic and clinical features of abnormal placentation. This multidisciplinary and collaborative approach is mandatory to achieve satisfactory outcomes in the management of patients with PP and placenta accreta spectrum. In anesthesiology perspective, a difficult maternal airway, extent of placental invasion, amount of bleeding, duration of surgical procedure, need for blood transfusion and intensive care unit stay are important components of management of patients with PP and placenta accreta spectrum.

Since abnormal placentation seems to be associated with previous C/S, it is important to avoid uterine operations if possible, particularly in order to preserve fertility. Cesarean sections must be performed in case of medical indications rather than maternal requests. The increased risk of placental pathologies in subsequent pregnancies must be mentioned during obtaining informed consent for caesarean section (11). Notably, we observed that patients with placenta accreta spectrum had significantly higher BMI than PP group. The effect of metabolic factors on the development of abnormal placentation needs to be studied in further trials. The serum levels of CRP was similar between two groups; however, further trials are warranted to unveil the inflammatory processes underlying the pathophysiology of PP and placenta accreta spectrum.

Nevertheless, the present study possesses certain limitations such as retrospective design, relatively small sample size, the impacts of social and environmental factors and data confined to the experience of a single center. Hence, associations and interpretations must be made cautiously.

5. Conclusion

Placenta previa and placenta accreta spectrum are linked with substantial maternal and fetal morbidity and mortality. These hazardous events involve emotional distress due to recurrent antepartum hemorrhage and hospitalization to massive bleeding, disseminated intravascular coagulation, surgical complications such as injury to genitourinary system, renal failure, problems due to massive blood transfusion, sepsis and pre-term birth.

In conclusion, the optimal care for placentation anomalies such as PP and placenta accreta spectrum needs to be standardized. A fully-equipped tertiary care center with an experienced surgical team supported with multidisciplinary collaboration including anesthesiologists is mandatory to provide high-standard care for these patients. Currently, despite adequate planning and optimal management strategies; the likelihood of significant morbidity and mortality is still remarkable. Early and close monitoring with careful preparation is momentous for antepartum and intrapartum management. Additional research is essential to determine the predisposing factors as well as the ideal methods of diagnosis, treatment, and prevention.

Author contribution

Study conception and design: NA and NT; data collection: NA and NT; analysis and interpretation of results: NA and NT; draft manuscript preparation: NA and NT. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Istanbul Kanuni Sultan Süleyman Training and Research Hospital Clinical Research Ethics Committee (Protocol no. 64/23.03.2022).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: NA ve NT; veri toplama: NA ve NT; sonuçların analizi ve yorumlanması: NA ve NT; araştırma metnini hazırlama: NA ve NT. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için İstanbul Kanuni Sultan Süleyman Eğitim ve Araştırma Hastanesi Klinik Araştırmalar Etik Kurulu'ndan onay alınmıştır (Karar no: 64/23.03.2022).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Silver RM, Barbour KD. Placenta accreta spectrum: accreta, increta, and percreta. Obstet Gynecol Clin North Am 2015;42:381-402.
2. D'Antonio F, Bhide A. Ultrasound in placental disorders. Best Pract Res Clin Obstet Gynaecol 2014;28:429-442.
3. Faiz AS, Ananth CV. Etiology and risk factors for placenta previa: An overview and meta-analysis of observational studies. J Matern Fetal Neonatal Med 2003;13:175-90.
4. Iyasu S, Saftlas AK, Rowley DL, Koonin LM, Lawson HW, Atrash HK. The epidemiology of placenta previa in the United States, 1979 through 1987. Am J Obstet Gynecol 1993;168:1424-1429.
5. Rao KP, Belogolovkin V, Yankowitz J, Spinnato JA. Abnormal placentation: evidence-based diagnosis and management of placenta previa, placenta accrete, and vasa previa. Obstet Gynecol Surv 2012;67:503-519.
6. Rowe T. Placenta previa. J Obstet Gynaecol Can 2014;36:667-668.
7. Jauniaux E, Collins S, Burton GJ. Placenta accreta spectrum: pathophysiology and evidence-based anatomy for prenatal ultrasound imaging. Am J Obstet Gynecol 2018;218:75-77.
8. 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;28:803-810.
9. Solheim K, Esakoff T, 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;24:1341-1346.
10. Tuzovic L, Djelmis J, Ilijic M. Obstetric risk factors associated with placenta previa development: Case-control study. CMJ 2003;44:728-733.
11. Kollmann M, Gaulhofer J, Lang U, Klaritsch P. Placenta praevia: incidence, risk factors and outcome. J Matern Fetal Neonatal Med 2016;29:1395-1398.