

# Pregnancies Complicated by Placental Abruption Occured at <34 weeks Compared with ≥34 weeks

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## ABSTRACT

Our aim was to compare perinatal outcomes of pregnancies complicated by placental abruption in preterm with near-term and term period.

A retrospective case-control study was conducted in singleton pregnancies complicated by placental abruption after 20 weeks of gestation. Information extracted from the obstetric records included demographic information, obstetric history, gestational age, major risk factors for placental abruption, perinatal outcomes, and macroscopic and microscopic histologic analysis of the placenta and results compared between groups.

Of the 74 cases of placental abruption, 46 cases (62%) occurred at preterm period (<34 weeks of gestation) and 28 cases (38%) at near term or term period (≥34 weeks of gestation). There was no significant difference between groups in terms of obstetric history, risk factors for placental abruption and perinatal outcomes ( $p>0.05$ ). Macroscopically, the incidence of couvleaire uterus was significantly higher after 34 weeks of gestation ( $p<0.05$ ), while that extent of placental separation was similar between groups ( $p>0.05$ ). The incidence of histological chorioamnionitis and/or deciduitis in the preterm group was significantly higher than that in the near term and term group ( $p<0.05$ ), while that of placental thrombosis, infarction and necrosis were similar between groups ( $p>0.05$ ).

The present results suggest that the possible processes leading to placental abruption in preterm deliveries are different from those in near-term and term deliveries.

**Keywords:** Placental abruption, near term, term, preterm, placental pathology

## Introduction

Placental abruption refers to the partial or complete premature detachment of the placenta from the decidua at any time after the 20th week of gestation and is one of the most important causes of both maternal and neonatal morbidity and mortality, especially when it occurs prematurely (1).

The overall incidence of placental abruption is about 1 in 100 pregnancies, but is associated with up to one-third of all perinatal deaths (2, 3). Approximately 60 percent of abruption occurs at term (defined as ≥37 weeks of gestation) gestations and 25 percent between 32 to 36 weeks, while only about 14 percent of abruption occurs before 32 weeks of gestation.

The overall mortality rates in preterm infants correlate inversely with birth weight (BW) and gestational week (GW). Therefore, infants in the lowest BW and GW categories have the largest impact on overall infant mortality rates because of having the greatest risk of death. Mortality rates

according to GW in the United States in 2019 were ranges from 5.72 to 8.21 per 1000 live births after 34 weeks GW, while those dramatically higher below 34 weeks of gestation (19.21 to 180.40 per 1000 live births) (4).

The pathophysiology of abruption includes both acute and chronic processes and the interaction between these two processes (5, 6). Chronic processes that promote abruption include thrombosis, inflammation, infection, and decidual and uteroplacental vasculopathy. Acute processes leading to abruption are largely the result of mechanical forces acting on the abdomen and may be triggered by rapid decompression of the uterine cavity after amniotomy. In some cases of abruption, there is extravasation of blood into the myometrium, termed uteroplacental apoplexy or Couvleaire uterus. This condition is not usually seen sonographically but can be detected by direct external inspection of the uterus during cesarean delivery. Placental abruption appears to be a multifactorial disease process with different causes in preterm and term deliveries. Macroscopic and

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microscopic examination of the plasenta can help clarify the underlying pathophysiology.

Given these infant mortality rates, we aimed to compare the outcomes by setting 34 weeks of gestation (GW) as the cutoff, rather than the placental abruptions that occurred in preterm births compared with term births reported in the literature (7, 8). Because discussing placental abruption in pregnancies in the early preterm (up to 33 6/7 weeks' gestation) and near-term (after 34 0/7 weeks' gestation) phases may provide a new perspective on the risk factors and outcomes of placental abruption, we wanted to compare these groups in this manuscript.

## Materials and Methods

This case-control study was conducted between September 2019 and February 2021 at Ankara Bilkent City Hospital. Data were retrospectively obtained from the hospital database, which included pregnancies complicated by placental abruption and referred to our perinatology department. Ethics approval was obtained from the institutional review board. The study was conducted in accordance with the Declaration of Helsinki (9). In addition, informed consent for retrospective database analysis was obtained from each subject during their first hospital visit.

We reviewed the obstetric records of 97 singleton deliveries complicated by placental abruption, defined as complete or partial detachment of a normally implanted placenta indicated by signs of retro-placental hemorrhage at 20 weeks of gestation. The diagnosis of placental abruption was based on criteria listed in Williams Obstetrics 24Ed, and a formal diagnosis was made if postpartum examination of the placenta showed blood clots or indentations on the maternal face. In this study, we excluded the cases without pathologic examination of the placenta. Consequently, 74 singleton deliveries were included in the final analysis. Information extracted from the records included demographic information, obstetric history, gestational age, major risk factors for placental abruption, perinatal outcomes, and macroscopic and microscopic histologic analysis of the placenta.

Statistical analyzes were performed using the SPSS package program (IBM SPSS Statistics 24). Frequency tables and descriptive statistics were used to interpret the results. Chi-square analysis was used for analysis of categorical variables, independent-samples t test for normally

distributed continuous variables, and Mann-Whitney U test for nonnormally distributed variables. Statistical significance was assumed at a p value of less than 0.05.

## Results

Of the 74 cases of placental abruption, 46 cases (62%) occurred at preterm period (<34 weeks of gestation) and a total of 28 cases  $\geq$ 34 weeks of gestation (n=16 at near-term, n=12 at term). Table 1. shows the comparison of pregnancies complicated by placental abruption occurred before and after 34 weeks of gestation. There was no significant difference between groups in terms of obstetric history, risk factors for placental abruption and perinatal outcomes ( $p>0.05$ ).

Table 2. shows the comparison of macroscopic findings and microscopic histological analysis of the placentas complicated by placental abruption occurred at <34 weeks and  $\geq$ 34 weeks. Macroscopically, the rate of couvelaire uterus was significantly higher after 34 weeks of gestation ( $p<0.05$ ), while that extent of placental separation was similar between groups ( $p>0.05$ ). The incidence of histological chorioamnionitis and/or deciduitis in the preterm group was significantly higher than that in the near term and term group ( $p<0.05$ ), while that of placental thrombosis, infarction and necrosis were similar between groups ( $p>0.05$ ).

## Discussion

In the present study, we compared the baseline characteristics and perinatal outcomes of placental abruption among preterm and term periods. The first major finding of the current study is the incidence of histological chorioamnionitis and/or deciduitis in placental abruption at early preterm was significantly higher than that at near-term and term, while the perinatal outcomes of placental abruption at early preterm (<34 GW) were not different from those at near-term and term period ( $\geq$ 34 GW). In addition, the current results suggest that the incidence of couvelaire uterus was significantly higher after 34 weeks of gestation.

Approximately half of abruptions occur at term gestations (10, 11), when preterm delivery has less impact on neonatal outcomes. Therefore, the management of preterm abruption has received relatively less attention than term abruption in the obstetric literature. Contrary to literature, in our study preterm abruption was more common than

**Table 1.** Comparison of pregnancies complicated by placental abruption occurred at <34 weeks and at ≥34 weeks

Variables	<34 GW (n=46)	≥34 GW (n=28)	p
Maternal age (years) (mean ± SD)	29.82 ± 6.13	29.78 ± 5.80	0.978
Gravidity (median; min-max)	2 (1-9)	2 (1-5)	0.245
Parity (median; min-max)	1 (0-5)	1 (0-3)	0.980
Previous miscarriage (median; min-max)	0 (0-5)	0 (0-2)	0.092
Living child (mean ± SD)	1 (0-5)	1 (0-3)	0.978
Multiparity (n, %)	26/46 (56.5%)	16/28 (57.1%)	0.959
Smoking status (n, %)	5 (10.8%)	3 (10.7%)	0.980
Gestational hypertensive disorder (n, %)	10/46 (21.7%)	4/28 (14.2%)	0.318
Thrombophilia	3/46 (6.5%)	0	-
PROM	6/46 (13%)	0	-
Gestational age at delivery (week) (median; min-max)	27.5 (20-33)	36 (34-41)	-
Neonatal Birth Weight (gram) (mean ± SD)	1147.36±511	2568.57±569	-
Apgar 1. Minute (median; min-max)	4 (0-8)	5 (0-8)	0.676
Apgar 5. Minute (median; min-max)	6 (0-9)	7.5 (0-9)	0.879

SD, standard deviation; GW, gestational week; PROM, premature rupture of membranes

**Table 2.** Comparison of Macroscopic and Microscopic Histological Analysis of The Placentas Complicated By Placental Abruption Occured at <34 weeks and ≥34 weeks

Variables	<34 GW (n=46)	≥34 GW (n=28)	p
Macroscopic findings			
Extent (%) of separation (mean ± SD, median)	33.4±22.7, 30	34.6±28.8, 30	0.848
>%40 separation (n, %)	17/46 (37%)	11/28 (39.3%)	0.841
Couvelaire uterus (n, %)	1/34 (2.2%)	4/28 (14.3%)	0.044*
Microscopic findings			
Congestion and/or hematoma (n, %) (without inflammation or necrosis or infarction)	20/46 (43.5%)	20/28 (71.4%)	0.094
Chorioamnionitis and/or deciduitis (n, %)	17/46 (37%)	4/28 (14.3%)	0.037*
Necrosis (n, %)	4/46 (8.7%)	1/28 (3.6%)	0.083
Thrombosis and/or infarction (n, %)	5/46 (10.9%)	3/28 (10.7%)	0.980

SD, standard deviation; GW, gestational week

term (62% versus 38%), although the near-term abruptions (defined as the late preterm period from 34 0/7 to 36 6/7 weeks of gestation) were considered as term abruption group. Actually, we already know that, "late preterm" has replaced "near-term" to describe this group of infants, since the latter incorrectly implies that these infants are "close enough" to term and require only routine neonatal care (12). However, we included near-term abruptions in the term group since they are truly "close enough" to term and require only routine neonatal care in our clinical practice.

As mentioned earlier, placental abruption appears to be a multifactorial disease process with different causative patterns at preterm and at term gestations. In this study, histological chorioamnionitis and/or deciduitis of the placenta was present in 28% of all abruption cases, significantly higher in preterms (37% vs. 14.3%), while placental hematomas (without inflammation or necrosis or infarction) was more common in near-term and terms (71.4% vs 43.5%), although not statistically significant. Thus, the current results seem to support previous reports (13-15) and suggest the increased risks of prematurity associated with the presence of chorioamnionitis and/or deciduitis even in cases of placental

abruption. That is, histological chorioamnionitis and/or deciduitis in preterms, defined as inflammation of the extraplacental membrane and uterine endometrium, and placental hematomas without chorioamnionitis or deciduitis in terms revealed that conditions associated with acute processes are more prevalent at near-term and term gestations, whereas chronic clinical processes are more prevalent in preterm period.

In addition, we compared the groups regarding the most important risk factors for placental abruption and our results revealed that there were no significant differences in the incidence of smoking status, multiparity, hypertensive disorder, PROM and thrombophilia between pregnancies with placental abruption at early preterm and those at term and near-term. However, despite the most important one is the history of abruption in previous pregnancies (10- to 25-fold increased risk), unfortunately, we did not examine this factor due to retrospective nature of this study. Inconsistently, in a previous study, multiparity observed to be an independent factor associated with the incidence of preterm placental abruption compared with the incidence of term placental abruption (7). Therefore, further large prospective studies are needed to clarify this contradiction.

The main limitations of the present study are the relatively small sample size and the retrospective design. Another important limitation of this study was the lack of a healthy control group, especially for comparison of microscopic findings of the placenta. Larger randomized controlled trials are needed to better understand the results of this study.

In conclusion, the current findings suggest that placental abruption appears to represent a final common clinical event caused by a variety of different causative pathways and that the possible processes leading to placental abruption in preterm are different from those at near-term and term births. It is likely that a better understanding of these pathways will identify points of intervention that may lend themselves to targeted prevention strategies. Besides, timely and appropriate neonatal management and treatment strategies can be determined through the different causative pathways.

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