PERINATAL JOURNAL

Original Article

Perinatal Journal 2026; 34(2):546-552

https://doi.org/10.57239/prn.26.03420053

Effect of episiotomy repair before placental delivery on postpartum hemorrhage in primiparous women

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Abstract

To evaluate the effect of episiotomy repair performed before placental delivery on postpartum hemorrhage (PPH) in primiparous women. In this randomized study means of sealed envelopes, 102 eligible primiparous women were allocated into two groups: episiotomy repair before placental delivery (n = 51) and after placental delivery (n = 51). The third stage of labor was actively managed in both groups according to WHO and NICE guidelines. Postpartum blood loss was measured objectively using gravimetric methods and V-drape collection. Hemoglobin (Hb) and hematocrit (Hct) levels were recorded at 8 hours postpartum. Continuous variables were analyzed using Student's t-test or Mann–Whitney U test as appropriate, and categorical variables using chi-square or Fisher's exact test. The groups were comparable in terms of sociodemographic, antenatal, and obstetric characteristics ($p > 0.05$). Admission Hb and Hct levels, leukocyte and platelet counts were similar between groups ($p > 0.05$). However, postpartum Hb (11.65 ± 1.54 vs. 10.90 ± 1.41 g/dL; $p = 0.010$) and Hct levels (35.31 ± 4.27% vs. 32.91 ± 3.93%; $p = 0.004$) were significantly higher, and blood loss was significantly lower (115.10 ± 60.45 mL vs. 156.37 ± 107.52 mL; $p = 0.019$) in the group undergoing episiotomy repair before placental delivery. Episiotomy repair performed before placental delivery significantly reduces postpartum blood loss and better preserves maternal hemoglobin levels in primiparous women. Incorporating the timing of episiotomy repair into third-stage labor management protocols may improve maternal outcomes.

Keywords: Postpartum hemorrhage, Episiotomy, Third stage of labor, Placental delivery,Blood loss, Primiparous

Introduction

Postpartum hemorrhage (PPH), defined as blood loss ≥ 500 mL within the first 24 h after delivery, remains among the leading and most preventable causes of maternal mortality in developing countries (1). As such, effective management of the third stage of labor plays a pivotal role in preventing PPH (1,2,3).

Episiotomy can be performed to widen the vagina in the third stage of labor in the presence of maternal–fetal factors such as fetal distress, risk for perineal laceration, and shoulder dystocia (1,4). Moreover, it can lead to adverse outcomes including extension of the incision and hematoma at the end of PPH (1,3,4). The International Federation of Gynecology and Obstetrics (i.e., "FIGO") and World Health Organization (WHO) recommend active management of the third stage of labor, including prophylactic administration of uterotonics, early cord clamping, and controlled cord traction, which has been demonstrated to substantially lower the rates of PPH and maternal mortality (4,5). However, evidence supporting the effect(s) of episiotomy repair timing on postpartum blood loss is limited (2). Accordingly, the present study aimed to determine the effect of episiotomy repair before placental delivery on PPH in primiparous women.

Methods and Materials

Forty-seven of 149 potential participants, evaluated between December 1, 2021, and June 1, 2022, were excluded due to ineligibility. The remaining 102 patients were divided into 2 groups: group 1 (episiotomy repair performed before placental delivery [n=51]); and group 2 (episiotomy repair performed after placental delivery [n=51]). Randomization was ensured for every patient fulfilling the inclusion criteria by having the delivery room secretary provide the conducting research fellow with sealed envelopes containing numbers 1 (repair before placental separation) and 2 (repair after placental separation). This methodology ensured random allocation of patients to both groups (Figure 1). Ethics committee approval was obtained from the Health Sciences University Antalya Training and Research Hospital Ethics Committee (Antalya,

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Received: January 12, 2026 **Accepted:** March 25, 2026

Turkey; reference no. 2021/14/10), and informed written consent was obtained from all participants. The inclusion criteria were as follows: age, 18–35 years; no previous delivery; body mass index (BMI) 18–35 kg/m^2; 37–41 weeks' gestation; single fetal, head presentation; and estimated fetal weight < 4000 g. The exclusion criteria were as follows: gestational hypertension; pre-eclampsia; hemolysis; elevated liver enzyme levels; low platelet count; bleeding disorders; gestational diabetes mellitus; gestational cholestasis; polyhydramnios and estimated fetal weight > 4000 g; multiparity; BMI >35 kg/m^2; use of drugs such as acetylsalicylic acid and low-molecular weight heparin or antidepressants; gestational thrombocytopenia; laceration other than episiotomy; instrumental labor; chorioamnionitis; placenta accreta spectrum; *ablatio placentae*; and multiple pregnancies.

In this study, selective episiotomy was performed with the patients under local anesthesia. Mediolateral episiotomy was standardized, and the incision began within 3 mm of the midline at the posterior fourchette and was angled ≥ 60° laterally from the midline toward the ischial tuberosity (6). All episiotomies were repaired using absorbable sutures, with episiotomy repair times measured in both groups.

The third stage of labor was actively managed in both groups. The active management protocol was based on guidelines established by the WHO and the National Institute for Health and Care Excellence (NICE) (4-8)

According to this procedure, a prophylactic uterotonic agent was administered immediately after the emergence of the fetal shoulder or birth of the entire fetus, followed by rapid cord clamping (early cord clamping). Controlled cord traction is then applied during placental separation to facilitate delivery (4,10,11).

Detailed measurements were performed to determine the extent of postpartum blood loss. First, square gauze and delivery pads used after delivery were collectively weighed, with their dry weights subtracted from the total weight. Furthermore, the volume of blood accumulated in the V-drape cover was calculated and recorded.

In addition to blood loss monitoring, the presence of a retained placenta was verified in both groups using post-procedural pelvic ultrasonography. Participant laboratory values (e.g., hemoglobin [Hb] and hematocrit [Hct]) were recorded at 8 h postpartum.

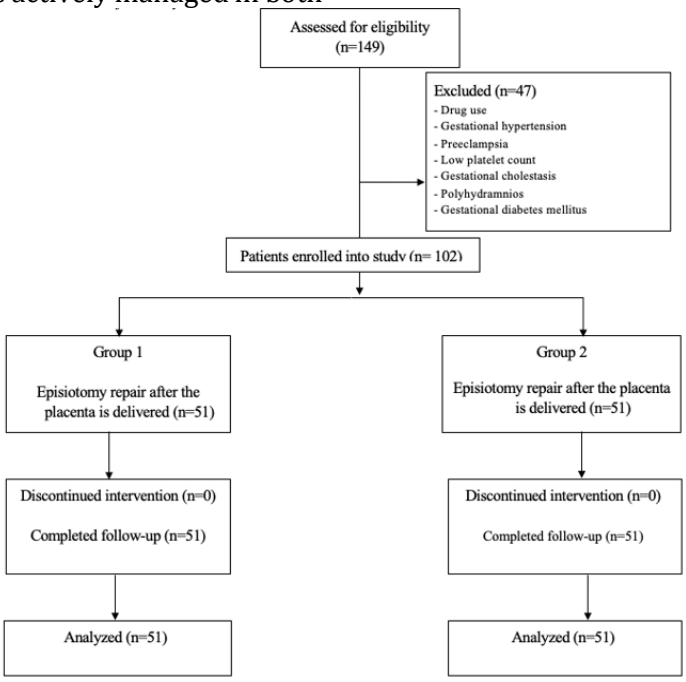

Fig 1. Enrollment and follow up of study participants

Statistical analysis

Data were analyzed using SPSS version 15.0 (SPSS, Chicago, IL, USA) for Windows (Microsoft Corp., Redmond, WA, USA). The Kolmogorov–Smirnov test was used to determine the normality of the distribution of all continuous variables. Normally distributed variables were compared between groups using Student's *t*-test, while the Mann–Whitney U test was applied for non-normally distributed variables. Continuous variables are expressed as mean ± Standard Deviation (SD), and nominal data as count and percentage. Categorical data were compared using Pearson's chi-squared or Fisher's exact test, as appropriate, and are expressed as count and percentage. Differences with $p < 0.05$ were considered to be statistically significant.

A priori power analysis was performed using G*Power software (online Open Source). Based on a significance level of $\alpha = 0.05$ and a statistical power of 80% ($\beta = 0.20$), the minimum required total sample size was calculated to be 84 participants.
Sample size calculation software (DSS Research, Fort Worth, TX, USA) was used to calculate the sample size. A minimum of 50 participants was found to be required for each group to detect differences at $\alpha = 0.05$ and $\beta = 0.20$ (12).

Results

Demographic characteristics of the 2 groups, reported as mean (± SD) unless otherwise indicated, were distributed as follows: maternal age (24.85 ± 3.99 versus [vs.] 24.02 ± 3.99 years); BMI (27.05 ± 2.40 vs. 27.44 ± 2.38 kg/m^2); literacy (illiterate, 3.9% vs. 5.9%); education level (primary, 21.6% vs. 17.6%; high school, 58.8% vs. 56.9%; university, 15.7% vs. 19.6%); economic status (low, 37.3% vs. 31.4%; intermediate, 49.1% vs. 52.9%; high, 13.6% vs. 15.7%); miscarriage rates (9.8% vs. 13.7%); regular antenatal care parameters (combined test, 68.6% vs. 76.5%; triple test, 78.4% vs. 84.3%; fetal anatomical screening, 64.7% vs. 68.6%; oral glucose tolerance test, 76.5% vs. 70.6%), and gestational age at delivery (38.93 ± 1.27 vs. 39.38 ± 1.28 weeks). There was no statistically significant intergroup differences ($p > 0.05$).

Obstetrical characteristics of the 2 groups were distributed as follows: median Bishop scores on admission (4.0 [interquartile range (IQR) 3.0–6.0] vs. 4.0 [IQR 3.0–6.0]); rates of labor induction (39.2% vs. 33.3%); birth time (249.41 ± 114.25 vs. 214.65 ± 129.57 min); birth weight (3134.31 ± 406.15 vs. 3193.43 ± 383.64 g); 1 min and 5 min Apgar scores, retained placenta rates (2% vs. 5.9%); neonatal intensive care unit admission rates (3.9% vs. 5.9%); and median length of hospital stay (1.0 day [IQR 1.0–1.0 day). There were no significant differences in obstetrical outcomes between the groups ($p > 0.05$).

Participant sociodemographic and obstetrical characteristics are summarized in Table 1.

Table 1. Participants' sociodemographic and obstetric characteristics.

		Group 1 (n=51)	Group 2 (n=51)	p
Age (years)		24.85 ± 3.99	24.02 ± 3.99	0.417
BMI (kg/m^2)		27.05 ± 2.40	27.44 ± 2.38	0.408
Education level (%)	Illiterate	3.9%	5.9%	
	Primary education	21.6%	17.6%	
	High school	58.8%	56.9%	
	University	15.7%	19.6%	0.791
Economic status (%)	Lower level	37.3%	31.4%	
	Intermediate level	49.1%	52.9%	

	High level	13.6%	15.7%	0.558
Miscarriage (%)		9.8%	13.7%	0.380
Regular antenatal care (%)	Combined test	68.6%	76.5%	0.253
	Triple test	78.4%	84.3%	0.306
	Fetal anatomic screening	64.7%	68.6%	0.417
	Oral glucose tolerance test	76.5%	70.6%	0.327
Gestationel age at delivery (weeks)		38.93 ± 1.27	39.38 ± 1.28	0.106
Bishop score on admission		4.0 (3.0-6.0)	4.0 (3.0-6.0)	0.483
Induction of labor (%)		39.2%	33.3%	0.340
Birth time (min)		249.41± 114.25	214.65±1 29.57	0.1 54
Birth weight (g)		3134.31±406. 15	3193.43±383.6 4	0.452
Apgar scores	1. min	8.0 (7.0-9.0)	8.0 (7.0-9.0)	0.599
	5. min	9.0 (8.0-10.0)	9.0 (8.0-10.0)	0.719
Placental rest (%)		2%	5.9%	0.6 17
NICU admission (%)		3.9%	5.9%	0.5 01
Hospital stay (days)		1.0 (1.0- 1.0)	1.0 (1.0- 1.0)	0.5 93

Laboratory results are reported in Table 2. Hb and Htc levels on admission, and leukocyte and platelet counts on admission and after delivery, were comparable between the groups ($p > 0.05$). However, there were significant differences between the groups in Hb (11.65 ± 1.54 g/dL vs. 10.90 ± 1.41 g/dL; $p = 0.010$) and Htc (35.31 ± 4.27% vs. 32.91 ± 3.93%; $p = 0.004$) levels after delivery, and volume of blood loss (115.10 ± 60.45 mL vs. 156.37 ± 107.52 mL; $p = 0.019$).

Table 2. Participants' laboratory outcomes.

	Group 1 (n=51)	**Group 2 (n=51)**	**p**
Hb (g/dL) level at admission	12.29±1.34	11.91±1.17	0.136
Hb (g/dL) level after delivery	11.65±1.54	10.90±1.41	0.010*
Htc (%) at admission	36.96±3.19	35.86±2.65	0.101
Htc (%) after delivery	35.31±4.27	32.91±3.93	0.004*
Leukocyte count (10^3) (mcl) at admission	11.92±2.81	13.01±3.63	0.117

Leukocyte count (10^3) (mcl) after delivery	15.96±3.61	17.19±4.14	0.113
Platelet count (10^3) (mcl) at admission	236.72±67.82	245.02±65.15	0.532
Platelet count (10^3) (mcl) after delivery	225.82±62.68	231.05±63.35	0.676
Blood loss (ml)	115.10±60.45	156.37±107.52	0.019*

Financial support: None

Presented at a meeting: None

Acknowledgements: None

Discussion

Results of our study demonstrated that episiotomy repair before placental delivery significantly reduced postpartum blood loss and preserved maternal Hb levels.

The routine use of episiotomy has fallen out of favor in contemporary obstetrical practice due to robust evidence demonstrating increased complications without clear maternal or fetal benefits (13,14). The current literature indicates that routine use does not protect against pelvic floor dysfunction; conversely, midline episiotomy is associated with a nearly fourfold increased risk for severe perineal lacerations compared with restrictive use (15). Consequently, leading authorities, including the WHO, American College of Obstetricians and Gynecologists (ACOG), and Royal College of Obstetricians and Gynaecologists (RCOG), strongly advocate restrictive policies. These guidelines recommend limiting the procedure to specific clinical indications, such as fetal distress or operative vaginal delivery, rather than routine practice (3,4).

When episiotomy is deemed necessary, the timing of repair is crucial because the incision remains at the active site of the hemorrhage during this interval (8,9). There are limited and controversial studies in the literature regarding the management of PPH during the third stage of labor, specifically during episiotomy repair (8,9). Baksu et al. (16) investigated vaginally delivered primiparous women in terms of mediolateral episiotomy repair timing and reported that delayed repair significantly reduced Hb levels compared with early repair at 24 h (1.40 ± 0.55 g/dL vs. 1.01 ± 0.43 g/dL; $p < 0.05$). Similarly, Kelekci et al. (17) evaluated 334 vaginally delivered primiparous women and the timing of episiotomy repair and found that the decrease in Hb levels was significantly more pronounced in those in whom repair was postponed until after placental delivery than early repair at 8 h (11.4 to 10.9 g/dL to 10.8 vs. 9.9 g/dL; $p = 0.006$). These findings support the biological plausibility of leaving a vascular incision open during the wait period for placental separation contributes to cumulative blood loss.

In contrast, Yildirim et al. (18) evaluated 443 primi- and multiparous women who delivered vaginally and the timing of episiotomy and found no statistically significant difference in the incidence of PPH or mean blood loss between the early and late repair groups at 24 h (11.6 ± 1.4 to 10.3 ± 1.4 g/dL vs. 11.9 ± 1.5 to 10.4 ± 1.6 g/dL; $p = 0.12$). These findings could be explained by heterogeneity in the study groups because previous scar tissue in multiparous women can decrease bleeding on the episiotomy side, and analgesics or anesthetics may be added during repair. Similarly, Dundar et al. (19) retrospectively analyzed 172 vaginally delivered primiparous women in terms of early and late repair timing and did not find significant outcomes in the postpartum period at 12 h hemogram levels (12.12 ± 0.13 to 10.95 ± 0.13 g/dL vs. 11.80 ± 0.11 to 10.64 ± 0.15 g/dL; $p = 0.109$). Postpartum blood loss was not measured objectively, such as using collective pads/covers, and laboratory investigations.

Ozdegirmenci et al. (20) investigated 120 vaginally delivered primiparous women in terms of timing of episiotomy repair and found that mean blood loss was slightly lower in the early repair group than late in first-hour Hb levels, although this difference did not reach statistical significance (11.9 ± 1.45 to 10.9

± 1.59 g/dL vs. 12.04 ± 1.32 to 11.0 ± 1.44 g/dL; p = 0.82). This finding could be explained by the early control hemogram time, which did not reflect true hemodynamic stability due to an incomplete compensator mechanism (21).

The present study had several limitations, the first of which was its single-center design, which may limit the generalizability of the findings to other settings. Additionally, although we excluded major risk factors for PPH (3,9,10), unmeasured variables could theoretically influence bleeding. Future multicenter randomized controlled trials with larger sample sizes, therefore, are warranted.

In conclusion, the global incidence of PPH is 1%–3% and is the most common cause of maternal mortality and morbidity (22). In Turkey, the second most common cause of maternal death is cardiovascular disease (23,24). Genital tract lacerations, including episiotomy, contributes to 19% of PPH cases (25). Currently, the Turkish Ministry of Health policy aims to increase vaginal birth and vaginal birth after caesarean delivery and decrease caesarean rates (26). Thus, the increasing trend in vaginal births will prompt the management of the third stage of labor—not only atony but also the timing of episiotomy repair—and will become increasingly important. In this study, we demonstrated the positive effects of early episiotomy repair on PPH. Further studies, nevertheless, are needed to determine the timing of episiotomy repair using objective measurements of blood loss and standardized control of hemogram timing

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