

# Relaparotomy After Cesarean Section: A Tertiary Center Experience

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**Keywords:** Cesarean section; hypogastric artery ligation; intraperitoneal bleeding; relaparotomy; uterine atony.



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## ABSTRACT

**Objective:** We aimed to contribute to the literature by studying the risk factors for post-cesarean relaparotomy, the morbidities that occur, and the practices performed during relaparotomy.

**Methods:** This retrospective study included cases of relaparotomy after cesarean section performed at a training and research hospital between January 2014 and January 2021. All cases who underwent relaparotomy within 60 days after cesarean section within a 7-year period were included in the study. We divided all cases into three groups with regard to the timing of relaparotomy after cesarean section: within the first 24 hours, between day 1 and day 10, and after day 10.

**Results:** A total of 24,293 cesarean sections were performed in our hospital. The relaparotomy rate after cesarean section was 0.18% in our clinic. Emergency cesarean sections accounted for 60.8% of our study group. The most common indication for relaparotomy was postpartum hemorrhage due to uterine atony with 41.3%. Uterine atony was followed by peritoneal bleeding with 28.2%. Hypogastric artery ligation was performed in 18 (39.1%) patients. Relaparotomy after cesarean section was most performed within the first 24 hours. Maternal mortality was not observed after relaparotomy.

**Conclusion:** Post-cesarean relaparotomy is becoming increasingly important due to the increasing number of cesarean sections. The most common reasons for relaparotomy are uterine atony and intraperitoneal bleeding. Most relaparotomies are performed within the first 24 hours after cesarean section. The complication rate increases as the interval between cesarean section and relaparotomy increases.

## INTRODUCTION

Cesarean section is the most common obstetric procedure in daily practice. Recently, there has been a significant increase in cesarean section rates in many countries. [1] Although cesarean sections are effective in saving the lives of mothers and babies when needed for obstetrically indicated reasons, at the population level, cesarean section rates above 10% are not associated with reductions in maternal and neonatal mortality. [2] Despite recent advances in surgical techniques and blood transfusion facilities that have increased the safety of cesarean sections, the procedure still carries significantly higher maternal and fetal risks compared with vaginal delivery. [3,4]

Relaparotomy refers to surgeries performed within 60 days of the initial surgery. It is a rare but serious complication that may lead to prolonged hospital stay, wound infection, blood transfusion, near-miss, hysterectomy, and even maternal death. [5] This situation can be life-threatening and is one of the most serious and feared events in the post-cesarean period. [6] The main conditions leading to relaparotomy include uterine atony, intra-retroperitoneal bleeding, pelvic abscess, rectus hematoma, and bowel and bladder injury. [7-10] Although relaparotomy is sometimes necessary to prevent near misses, it should be noted that it itself increases maternal mortality and morbidity. [7]

There are very few studies on relaparotomy after cesarean section. [4,11] Relaparotomy cases remain one of the most

feared and deadly cases for obstetricians. This study aims to contribute to the literature by examining the risk factors for post-cesarean relaparotomy, the morbidities that occur, and the practices performed during relaparotomy.

## MATERIALS AND METHODS

This retrospective study included cases of relaparotomy after cesarean section performed at a training and research hospital between January 2014 and January 2021. Prior to the initiation of this study, approval was obtained from the Human Research Ethics Committee of our institution (Registry number: 160 and Date: September 22, 2021). The Helsinki Declaration principles were adhered to throughout our study. Hospital electronic records and patient charts were reviewed for all data. Maternal age, gravida, parity, gestational week, and history of cesarean section were recorded. Indications for cesarean section, indications for relaparotomy, and procedures performed during relaparotomy were recorded separately. The mean amounts of erythrocyte suspension, fresh frozen plasma, cryoprecipitate, random platelet, and fibrinogen transfused to the cases were also recorded.

All cases who underwent relaparotomy within 60 days after cesarean section within a 7-year period were included in the study. We divided all cases into three groups with regard to the timing of relaparotomy after cesarean section: within the first 24 hours, between day 1 and day 10, and after day 10.

### Statistical Analysis

Statistical analyses were performed with SPSS (Statistical Package for Social Sciences) for Windows 15.0 (SPSS, Inc., Chicago, IL, USA), Epi Info, and Excel programs. Descriptive statistics included median with minimum and maximum, and count (%) as appropriate.

## RESULTS

From January 2014 to January 2021, a total of 24,293 cesarean sections were performed in our hospital. The demographic data of the patients revealed that the mean age was  $32 \pm 6.6$  (18–47) years, gravidity was  $2.7 \pm 1.58$  (1–6), parity was  $2 \pm 1.03$  (1–5), and gestational age was  $35.6 \pm 3.3$  (29–42) weeks. The most common indications for cesarean section among patients who underwent relaparotomy were a history of previous cesarean section and severe preeclampsia and HELLP syndrome.

In our study cohort of 24,293 patients who underwent cesarean sections, 46 patients (0.18%) underwent relaparotomy. Notably, emergency cesarean sections constituted 60.8% of the cases in this group. In our clinic, 42 patients underwent relaparotomy through a Pfannenstiel incision and 4 through a vertical incision. The most common indication for relaparotomy was postpartum hemorrhage due to uterine atony (41.3%), followed by peritoneal bleeding (28.2%). Uterine atony patients received uterine massage

**Table 1.** Indications for relaparotomy

Indication	n=46	Ratio
Uterine atony	19	41.3%
Intraperitoneal bleeding	13	28.2%
Rectus hematoma	5	10.9%
Pelvic abscess	4	8.7%
Retroperitoneal bleeding	2	4.3%
Bladder injury	1	2.2%
Ileus	1	2.2%
Evisceration	1	2.2%

**Table 2.** Procedures performed in relaparotomy

Procedure	n=46	Ratio
Hypogastric artery ligation + B-lynch suture	9	19.5%
Hematoma evacuation (aspiration-irrigation)	8	17.5%
Uterine artery ligation + B-lynch suture	6	13%
Hypogastric artery ligation	4	8.7%
Abscess drainage	4	8.7%
Hypogastric artery ligation + Uterine artery ligation	3	6.5%
Uterine incision repair	3	6.5%
Hypogastric artery ligation + Uterine artery ligation + B-lynch suture	2	4.3%
Hysterectomy	2	4.3%
Inferior epigastric artery ligation + B-lynch suture	2	4.3%
Fascia repair	1	2.2%
Bladder repair	1	2.2%
Bowel repair	1	2.2%

and medical treatments before relaparotomy. In 8.7% of cases, relaparotomy was performed secondary to pelvic abscess (Table 1).

Hysterectomy was performed in 2 of the 46 cases of relaparotomy. Hypogastric artery ligation was performed in 18 patients (39.1%). In 8 patients (17.3%), aspiration and irrigation were performed after peritoneal hematoma drainage (Table 2). No active bleeding site was observed in these cases, and no additional surgical procedures were performed.

Relaparotomy after cesarean section was most frequently performed within the first 24 hours (Table 3). The most common indications within the first 24 hours were postpartum hemorrhage due to peritoneal bleeding and atony. The median number of erythrocyte suspension units transfused was 4 (0–14). Similarly, fresh frozen plasma was administered with a median of 4 units (0–13). Cryoprecip-

**Table 3.** Timing of relaparotomy after cesarean section

	n=46	Ratio
In the first 24 hours		
Postpartum hemorrhage	15	32.6%
Peritoneal bleeding	14	30.4%
1st to 10th day		
Rectus hematoma	5	10.8%
Postpartum hemorrhage	4	8.7%
Pelvic abscess	2	4.3%
Peritoneal bleeding	1	2.2%
Ileus	1	2.2%
>10th day		
Pelvic abscess	2	4.3%
Evisceration	1	2.2%
Bladder injury	1	2.2%

itate and random platelet transfusions had medians of 1 unit each (0–5/0–16). Fibrinogen was given with a median dose of 2 grams (0–13). No maternal mortality was observed after relaparotomy.

## DISCUSSION

This study analyzed patients who underwent relaparotomy after cesarean section. Most cases of relaparotomy after cesarean section were associated with previous lower segment cesarean section or severe preeclampsia-HELLP syndrome. The majority of relaparotomy cases were caused by uterine atony or intraperitoneal bleeding.

Previous studies reported the incidence of relaparotomy after cesarean section to be 0.07–0.72%.<sup>[7,10,11]</sup> In our study, we found an incidence of 0.18%, consistent with the literature. The most common indication for cesarean section before relaparotomy was a history of previous cesarean section, similar to other studies.<sup>[11–13]</sup> The most common causes of relaparotomy were atony and intraperitoneal bleeding.

The literature indicates that factors such as surgeon experience, duration of operation, type of anesthesia, complications during cesarean section, high postoperative pulse rate, and cesarean section performed outside working hours are risk factors for relaparotomy.<sup>[4,11,14–16]</sup> These factors explain the variation in relaparotomy rates between hospitals.

Although some clinics do not report maternal mortality in post-cesarean relaparotomy cases, other studies report maternal mortality rates as high as 9–25%. No maternal mortality was observed in our study group. We believe that differences in case numbers, cesarean section rates, surgical experience, hospital characteristics (such as blood bank and surgical equipment), and rapid intervention in cases contribute to these differences.

The incidence of hysterectomy in relaparotomy also varies widely among clinics. Our hysterectomy rate was 4.3%, lower than reported in some other studies. In the 2017 study by Elkhateeb et al.,<sup>[16]</sup> the rate of hysterectomy during relaparotomy was observed to be the highest at 46.9%. In two other studies conducted in 2013 and 2020, the rate of hysterectomy during relaparotomy was similarly reported as 26% and 26.1%, respectively.<sup>[11,17]</sup> The rate closest to our study and the lowest reported in the literature was observed in the 2021 study by Weissmann-Brenner et al.<sup>[18]</sup> at 6.3%.

Studies have shown that emergency indications for cesarean delivery are significant factors contributing to relaparotomy.<sup>[17]</sup> Emergency cesarean delivery has higher morbidity and mortality rates than elective cesarean delivery.<sup>[19]</sup> In our study group, 60.8% of relaparotomy cases occurred after emergency cesarean delivery.

The study has some limitations, including its retrospective nature and the lack of concrete data on the amount of bleeding during cesarean section and the difference in the doctors performing the cesarean section. However, the strength of the study lies in the large number of cases and the management of these cases in a tertiary clinic by an experienced multidisciplinary team.

## Conclusion

Post-cesarean relaparotomy is becoming increasingly important due to the rising number of cesarean sections. The most common reasons for relaparotomy are uterine atony and intraperitoneal bleeding. Most relaparotomies are performed within the first 24 hours after cesarean section. The complication rate increases as the interval between cesarean section and relaparotomy increases.

We believe that increased surgical experience, close monitoring of vital signs, and careful observation of vaginal bleeding in the first 24 hours will allow early intervention and reduce maternal mortality and morbidity.

## Ethics Committee Approval

The study was approved by the Zeynep Kamil Gynecology and Pediatrics Training and Research Hospital Ethics Committee (Date: 22.09.2021, Decision No: 160).

## Informed Consent

Retrospective study.

## Peer-review

Externally peer-reviewed.

## Authorship Contributions

Concept: A.Ö.; Design: A.B.A.D., A.Ö.; Supervision: A.Ö., A.E.; Fundings: A.B.A.D., A.E.; Materials: A.B.A.D., A.E.; Data collection &/or processing: A.B.A.D.; Analysis and/or interpretation: A.Ö.; Literature search: A.Ö., A.B.A.D.; Writing: A.Ö.; Critical review: A.B.A.D.

## Conflict of Interest

None declared.

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## Sezaryen Sonrası Relaparotomi: Tersiyer Merkez Deneyimi

**Amaç:** Sezaryen sonrası relaparotomilerin risk faktörlerini, meydana gelen morbiditeleri ve işlem sırasında uygulanan yöntemleri inceleyerek literatüre katkıda bulunmayı amaçladık.

**Gereç ve Yöntem:** Bu retrospektif çalışma; Ocak 2014 ile Ocak 2021 tarihleri arasında bir eğitim ve araştırma hastanesinde gerçekleştirilen sezaryen sonrası relaparotomi vakalarını içermektedir. Bu 7 yıllık dönem içinde sezaryen sonrası 60 gün içinde relaparotomi olan tüm vakalar çalışmaya dahil edildi. Vakalar sezaryen sonrası relaparotomi zamanlaması açısından üç gruba ayrıldı; ilk 24 saat içinde, 1. gün ile 10. gün arasında ve 10. günden sonra.

**Bulgular:** Hastanemizde toplamda 24,293 sezaryen gerçekleştirildi. Sezaryen sonrası relaparotomi oranı kliniğimizde %0.18 olarak kaydedildi. Acil sezaryenler, çalışma grubumuzun %60.8’ini oluşturdu. Relaparotomi için en sık endikasyon, %41.3 ile uterin atoniye bağlı postpartum kanamaydı. Uterin atoniye %28.2 ile intraperitoneal kanama takip etti. Hipogastrik arter ligasyonu, hastaların %39.1’inde uygulandı. Sezaryen sonrası relaparotomi, çoğunlukla ilk 24 saatte gerçekleştirildi. Relaparotomi sonrası maternal mortalite gözlemlenmedi.

**Sonuç:** Sezaryen sayısının artması sonucu sezaryen sonrası relaparotomi giderek daha önemli hale gelmektedir. Relaparotominin en yaygın nedenleri uterin atoni ve intraperitoneal kanamadır. Çoğu relaparotomi, sezaryen sonrası ilk 24 saat içinde gerçekleştirilir. Sezaryen ile relaparotomi arasındaki süre arttıkça komplikasyon oranı da artmaktadır.

**Anahtar Sözcükler:** Hipogastrik arter; intraperitoneal kanama; relaparotomi; sezaryen; uterin atoni.