Journal of Carcinogenesis
Covering Genesis to Therapeutics

Journal of Carcinogenesis, ISSN: 1477-3163
2025; Vol 24: Issue 3s, https://carcinogenesis.com/

Relaparotomy After Cesarean Delivery: A Comprehensive Narrative Review

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ABSTRACT

Background: Relaparotomy after cesarean delivery (CD) is rare but high-impact. Incidence ranges from ~0.16% to ~1.04% and most re-operations occur within 24 hours, typically for bleeding (Amikam et al., 2024; Mandal et al., 2021; Raagab et al., 2014). Objective: To synthesize contemporary evidence on epidemiology, timing, risk factors, indications, operative strategies, outcomes, and prevention. Sources: Retrospective case–control and cohort studies, prospective series, and supportive literature on postpartum hemorrhage (PPH), infection, and wound complications (Levin et al., 2012; Lurie, 2007; Kessous et al., 2012; Shinar et al., 2013; Pencolé et al., 2021). Conclusions: Bleeding is the leading indication. Independent risks span pregnancy (placenta previa/abruption, hypertensive disorders, multiples, fibroids, Müllerian anomalies, ART conception) and intrapartum/intraoperative factors (emergency or second-stage CD, prolonged/complicated surgery, heavy bleeding). Timely escalation—uterotonics, compression sutures/balloon, stepwise devascularization, and when necessary hysterectomy—can reduce morbidity (Amikam et al., 2024; Raagab et al., 2014; Mandal et al., 2021; Peker et al., 2020).

Keywords: *Relaparotomy; Cesarean Delivery; Postpartum Hemorrhage; Maternal Morbidity; Hysterectomy; Risk Factors*

Subject area*: Obstetrics, Gynecology & Reproductive Medicine → Maternal Health → Surgical Complications*

How to Cite: Arijit Ganguly, (2025) Relaparotomy After Cesarean Delivery: A Comprehensive Narrative Review, *Journal of Carcinogenesis, Vol.24, No.3s,* 43-46.

1. INTRODUCTION

Cesarean delivery is among the most common operations globally and has increased substantially over the past two decades (Amikam et al., 2024). Although generally safe, CD carries higher severe maternal morbidity than vaginal birth, and a small subset require relaparotomy—defined as re-entry through the skin into the peritoneal cavity after the index operation—to control hemorrhage, address infection, or repair injury (Amikam et al., 2024; Levin et al., 2012). The clinical burden includes blood transfusion, ICU care, possible hysterectomy, and separation from the neonate (Lurie, 2007; Kessous et al., 2012).

2. METHODS

This narrative review integrates findings from a large single-center case–control cohort (2013–2023) (Amikam et al., 2024), a two-year Indian series (Mandal et al., 2021), and a prospective Egyptian case–control study (Raagab et al., 2014). We also cross-reference older and complementary studies on relaparotomy incidence, risk factors, and management (Levin et al., 2012; Lurie, 2007; Seal et al., 2007; Kessous et al., 2012; Shinar et al., 2013; Huras et al., 2018; Pencolé et al., 2021; Levitt et al., 2016; Akkurt et al., 2020; Peker et al., 2020; Gedikbasi et al., 2008; Opøien et al., 2007; Hasegawa et al., 2012; Badejoko et al., 2012; Seffah, 2005; Ramshorst et al., 2010; Hadar et al., 2011; Nyfløt et al., 2017; Wang et al., 2023; Gui et al., 2020; Ganer Herman et al., 2021; Wertheimer et al., 2022; Ragab et al., 2015; Sak et al., 2012; Levitt et al., 2016).

3. EPIDEMIOLOGY AND TIMING

Reported incidence varies by setting and methodology: 0.46% (130/28,280 CDs) at a large tertiary center (Amikam et al., 2024); 0.16% (37/22,192) in a two-year Indian cohort (Mandal et al., 2021); and 1.04% (26/2,500) in a prospective Egyptian series (Raagab et al., 2014). Earlier observational reports describe ranges from ~0.2% to ~0.9% (Levin et al.,

2012; Lurie, 2007; Seal et al., 2007; Kessous et al., 2012; Shinar et al., 2013; Huras et al., 2018). Timing is front-loaded: 59% occur within 24 hours, 33% within the first week, and ~8% between 7 days and 6 weeks (Amikam et al., 2024). Sepsis-related re-operations generally present later than bleeding, often several days after CD (Raagab et al., 2014; Hadar et al., 2011).

4. INDICATIONS FOR RELAPAROTOM

Hemorrhage dominates across series. Within 24 hours, suspected intra-abdominal bleeding is the leading indication (Amikam et al., 2024). Prospective and retrospective cohorts consistently identify intra-abdominal bleeding, rectus sheath hematoma, and uncontrolled PPH as primary drivers, with infection/sepsis and wound complications less frequent but clinically important (Raagab et al., 2014; Mandal et al., 2021; Levin et al., 2012; Seal et al., 2007; Kessous et al., 2012; Shinar et al., 2013). Targeted analyses of hemorrhage-related relaparotomy underscore technical and patient factors contributing to bleeding (Pencolé et al., 2021; Akkurt et al., 2020; Peker et al., 2020). Surgical site infection rates and risk factors after CD provide context for late re-operation due to abscess or dehiscence (Opøien et al., 2007; Ramshorst et al., 2010).

5. RISK FACTORS

Pregnancy-associated factors: Multivariable models demonstrate independent associations with Müllerian anomalies, uterine fibroids, multiple pregnancy, and hypertensive disorders of pregnancy (Amikam et al., 2024). Placental disorders (placenta previa and abruption) are repeatedly linked to relaparotomy risk in multiple cohorts (Levin et al., 2012; Kessous et al., 2012; Raagab et al., 2014; Sak et al., 2012). ART conception may confer heightened risk of abnormal placentation and third-stage complications, indirectly increasing relaparotomy risk (Gui et al., 2020; Ganer Herman et al., 2021; Wertheimer et al., 2022). Müllerian anomalies are also associated with adverse perinatal outcomes that may predispose to hemorrhage (Wang et al., 2023).

6. INTRAPARTUM AND INTRAOPERATIVE FACTORS

Risk is elevated with emergency and second-stage CDs, prolonged or technically complicated surgery, and excessive bleeding during the index operation (Amikam et al., 2024; Mandal et al., 2021; Levin et al., 2012; Hadar et al., 2011). Older series further implicate prior cesarean scar complications, HELLP syndrome, and uterine rupture in selected cohorts (Sak et al., 2012; Shinar et al., 2013; Seal et al., 2007). Hemorrhage-focused analyses from tertiary centers emphasize patient comorbidity and operative complexity as key contributors (Pencolé et al., 2021; Peker et al., 2020; Akkurt et al., 2020).

7. OPERATIVE FINDINGS AND MANAGEMENT PRINCIPLES

At relaparotomy, uterine scar or angle oozing and broad-ligament hematomas are common sources; in a notable minority no discrete source is identified, necessitating systematic exploration (Amikam et al., 2024). Management follows a stepwise escalation: optimize uterotonics, apply compression techniques, and proceed to devascularization (uterine/uterine-ovarian/internal iliac artery ligation) when conservative measures fail; hysterectomy is reserved for refractory bleeding or uterine catastrophe (Raagab et al., 2014; Mandal et al., 2021; Ragab et al., 2015). Evidence supporting uterotonic strategies (e.g., rectal misoprostol vs. oxytocin infusion in at-risk women) complements surgical control (Badejoko et al., 2012).

8. OUTCOMES

Outcomes vary by resources, case-mix, and timing of re-exploration. In a contemporary tertiary center, no maternal deaths occurred, but ~10% underwent hysterectomy and ~7% required repeat relaparotomy (Amikam et al., 2024; Levitt et al., 2016). In contrast, single-center experiences from India and Egypt reported maternal mortality of 5.4% and 11.5%, respectively, with higher hysterectomy rates (Mandal et al., 2021; Raagab et al., 2014). These differences plausibly reflect referral patterns, availability of blood products, critical care, and thresholds for re-operation (Gedikbasi et al., 2008; Seal et al., 2007).

9. PREVENTION AND QUALITY IMPROVEMENT

Risk-informed planning is central: flag patients with placenta previa/abruption risk, fibroids, Müllerian anomalies, hypertensive disorders, and IVF conception for senior surgical support and robust PPH preparedness (Amikam et al., 2024; Kessous et al., 2012; Wang et al., 2023; Gui et al., 2020; Ganer Herman et al., 2021). Minimize second-stage CDs when safe through protocolized labor management (Shinar et al., 2013). Meticulous technique—prevent hysterotomy extensions,

ensure hemostasis at the angles and rectus sheath, and avoid unnecessary dissection—may reduce bleeding and injury (Levin et al., 2012; Hadar et al., 2011). For SSI prevention, adhere to peri-operative bundles and early recognition of wound complications (Opøien et al., 2007; Ramshorst et al., 2010). Finally, implement structured escalation for PPH and team training; case–control data highlight recognizable risk factors for severe PPH (Nyfløt et al., 2017) and hemorrhage-specific relaparotomy (Pencolé et al., 2021; Peker et al., 2020; Akkurt et al., 2020).

10. KNOWLEDGE GAPS AND FUTURE DIRECTIONS

Key gaps include standardized definitions for relaparotomy windows and indications, multicenter predictive models that incorporate operative metrics (e.g., incision extensions, intra-operative bleeding control measures), and prospective evaluations of bundles that integrate medical and surgical escalation. Notably, some contemporary cohorts suggest surgeon seniority alone may be less predictive than clinical complexity and intra-operative events (Amikam et al., 2024; Levitt et al., 2016).

11. CONCLUSION

Relaparotomy after cesarean delivery is infrequent yet concentrated in the immediate postpartum period and primarily driven by hemorrhage. A prevention-first mindset, vigilant early recognition, and decisive stepwise management can improve outcomes while preserving fertility when feasible (Amikam et al., 2024; Mandal et al., 2021; Raagab et al., 2014).

REFERENCES

[1] Amikam, U., Botkovsky, Y., Hochberg, A., et al. (2024): Risk factors for relaparotomy after a cesarean delivery: a case-control study. *BMC Pregnancy and Childbirth*, 24, 284.

[2] Mandal, D., Santra, D. and Ganguly, A. (2021): Risk Factors, Indications and Outcome among Relaparotomy following Caesarean Section cases in BSMC & H, Bankura, WB. *International Journal of Health and Clinical Research*, 4(10), pp. 224-228.

[3] Raagab, A.E., Mesbah, Y.H., Brakat, R.I., Zayed, A.A. and Alsaammani, M.A. (2014): Re-laparotomy after cesarean section: risk, indications and management options. *Medical Archives*, 68(1), pp. 41-43.

[4] Levin, I., Rapaport, A.S., Salzer, L., Maslovitz, S., Lessing, J.B. and Almog, B. (2012): Risk factors for relaparotomy after cesarean delivery. *International Journal of Gynecology & Obstetrics*, 119(2), pp. 163-165.

[5] Lurie, S., Sadan, O. and Golan, A. (2007): Re-laparotomy after cesarean section. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 134(2), pp. 184-187.

[6] Seal, S.L., Kamilya, G., Bhattacharyya, S.K., Mukherji, J. and Bhattacharyya, A.R. (2007): Relaparotomy after caesarean delivery: experience from an Indian teaching hospital. *Journal of Obstetrics and Gynaecology Research*, 33(6), pp. 804-809.

[7] Kessous, R., Danor, D., Weintraub, Y.A., Wiznitzer, A., Sergienko, R., Ohel, I., et al. (2012): Risk factors for relaparotomy after cesarean section. *Journal of Maternal-Fetal & Neonatal Medicine*, 25(11), pp. 2167-2170.

[8] Shinar, S., Hareuveni, M., Ben-Tal, O. and Many, A. (2013): Relaparotomies after cesarean sections: risk factors, indications and management. *Journal of Perinatal Medicine*, 41(5), pp. 567-572.

[9] Huras, H., Radon-Pokracka, M. and Nowak, M. (2018): Relaparotomy following cesarean section – a single center study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 225, pp. 185-188.

[10] Pencolé, L., Peyronnet, V., Mandelbrot, L. and Lepercq, J. (2021): Risk factors of relaparotomy for intra-abdominal hemorrhage after cesarean delivery. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 260, pp. 118-123.

[11] Levitt, L., Sapir, H., Kabiri, D., Ein-Mor, E., Hochner-Celnikier, D. and Amsalem, H. (2016): Relaparotomy following cesarean delivery – risk factors and outcomes. *Journal of Maternal-Fetal & Neonatal Medicine*, 29(4), pp. 607-609.

[12] Akkurt, M.O., Coşkun, B., Güçlü, T., Çift, T. and Korkmazer, E. (2020): Risk factors for relaparotomy after cesarean delivery and related maternal near-miss event due to bleeding. *Journal of Maternal-Fetal & Neonatal Medicine*, 33(10), pp. 1695-1699.

[13] Peker, N., Yavuz, M., Aydın, E., Ege, S., Bademkıran, M.H. and Karacor, T. (2020): Risk factors for relaparotomy after cesarean section due to hemorrhage: a tertiary center experience. *Journal of Maternal-Fetal & Neonatal Medicine*, 33(3), pp. 464-470.

[14] Gedikbasi, A., Akyol, A., Asar, E., Bingol, B., Uncu, R., Sargin, A., et al. (2008): Re-laparotomy after cesarean section: operative complications in surgical delivery. *Archives of Gynecology and Obstetrics*, 278(5), pp. 419-425.

[15] Opøien, H.K., Valbø, A., Grinde-Andersen, A. and Walberg, M. (2007): Post-cesarean surgical site infections according to CDC standards: rates and risk factors. *Acta Obstetricia et Gynecologica Scandinavica*, 86(9), pp. 1097-1102.

[16] Hasegawa, J., Nakamura, M., Hamada, S., et al. (2012): Prediction of hemorrhage in placenta previa. *Taiwanese Journal of Obstetrics & Gynecology*, 51(1), pp. 3-6.
[17] Badejoko, O.O., Ijarotimi, A.O., Awowole, I.O., et al. (2012): Adjunctive rectal misoprostol versus oxytocin infusion for prevention of postpartum hemorrhage in women at risk: a randomized controlled trial. *Journal of Obstetrics and Gynaecology Research*, 38(11), pp. 1294-1301.
[18] Seffah, J.D. (2005): Re-laparotomy after cesarean section. *International Journal of Gynecology & Obstetrics*, 88(3), pp. 253-257.
[19] Ramshorst, G.H., Nieuwenhuizen, J., Hop, W.C., et al. (2010): Abdominal wound dehiscence in adults: development and validation of a risk model. *World Journal of Surgery*, 34, pp. 20-27.
[20] Hadar, E., Melamed, N., Tzadikevitch-Geffen, K. and Yogev, Y. (2011): Timing and risk factors of maternal complications of cesarean section. *Archives of Gynecology and Obstetrics*, 283(4), pp. 735-741.
[21] Nyfløt, L.T., Sandven, I., Stray-Pedersen, B., et al. (2017): Risk factors for severe postpartum hemorrhage: a case-control study. *BMC Pregnancy and Childbirth*, 17, 17.
[22] Wang, S., Wang, K., Hu, Q., Liao, H., Wang, X. and Yu, H. (2023): Perinatal outcomes of women with Müllerian anomalies. *Archives of Gynecology and Obstetrics*, 307(4), pp. 1209-1216.
[23] Gui, J., Ling, Z., Hou, X., et al. (2020): In vitro fertilization is associated with the onset and progression of preeclampsia. *Placenta*, 89, pp. 50-57.
[24] Ganer Herman, H., Farhadian, Y., Shevach Alon, A., et al. (2021): Complications of the third stage of labor in in vitro fertilization pregnancies: an additional expression of abnormal placentation? *Fertility and Sterility*, 115(4), pp. 1007-1013.
[25] Wertheimer, A., Melamed, S., Ashwal, E., et al. (2022): Complications of the third stage of labor are more prevalent in IVF pregnancies. *Journal of Maternal-Fetal & Neonatal Medicine*, 35(4), pp. 663-667.
[26] Alchalabi, H.A., Amarin, Z.O., Badria, L.F. and Zayed, F.F. (2007): Does the number of previous cesarean deliveries affect maternal outcome and complication rates? *Eastern Mediterranean Health Journal*, 13, pp. 544-550.
[27] Ragab, A., Mousbah, Y., Barakat, R., Zayed, A. and Badawy, A. (2015): Re-laparotomy after caesarean deliveries: risk factors and how to avoid? *Journal of Obstetrics and Gynaecology*, 35(1), pp. 1-3.
[28] Sak, M.E., Turgut, A., Evsen, M.S., et al. (2012): Relaparotomy after initial surgery in obstetric and gynecologic operations: analysis of 113 cases. *Ginekologia Polska*, 83(6), pp. 429-432.