International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Asokan R et al. Int J Reprod Contracept Obstet Gynecol. 2026 Jan;15(1):255-259
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20254290

Original Research Article

Compare use of subcutaneous drain vs. no drain in obese women to reduce wound complications post caesarean section: a randomized control trial

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Received: 20 October 2025
Accepted: 28 November 2025

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ABSTRACT

Background: Wound complications such as infection, seroma and dehiscence are more common in obese women after caesarean section. The use of subcutaneous drains has been proposed to minimize postoperative complication. This study aimed to evaluate the effectiveness of subcutaneous drains in reducing wound complications among obese women undergoing caesarean section.
Methods: A randomized controlled trial was conducted at Government Medical College, Akola, over 18 months. A total of 150 obese women undergoing caesarean section were randomized into two groups: Group A (with subcutaneous drain) and Group B (without drain). Both groups were comparable in age, parity, BMI and haemoglobin levels. Postoperative complications were assessed, along with duration of hospital stay and time to suture removal.
Results: Women without drains experienced significantly higher wound complications: superficial infection (17.5% vs 7.14%, $p<0.05$), deep infection (12.5% vs 4.29%, $p<0.05$) and seroma formation (27.5% vs 7.14%, $p<0.001$). Wound gape (20% vs 10%) and postoperative fever (15% vs 5.71%) were also more common in the no-drain group. Mean hospital stay and suture removal time were significantly shorter in the drain group ($p<0.001$).
Conclusions: Subcutaneous drain placement after caesarean section in obese women significantly reduces wound infection, seroma formation and postoperative morbidity, leading to faster recovery and shorter hospital stays. Routine use of drains may be beneficial in this high-risk population.

Keywords: Caesarean section, Obesity, Subcutaneous drain, Surgical site infection, Seroma, Wound complications

INTRODUCTION

Caesarean section (CS) remains one of the most commonly performed surgical procedures worldwide and continues to be essential for ensuring maternal and fetal safety. Despite advancements in aseptic techniques and perioperative care, surgical site infections (SSIs) still contribute significantly to maternal morbidity and prolonged hospitalization.[1] Obesity is an important and increasingly prevalent risk factor, primarily because adipose tissue has poor vascularity, increased dead space and delayed healing capacity.[2] With the global rise in obesity, the proportion of obese women undergoing CS has increased markedly.[3] Evidence consistently shows that obese women have a two- to threefold higher risk of postoperative wound complications compared to non-obese women.[4] These may include seroma, hematoma, wound dehiscence, infection and delayed healing, all of which increase discomfort, recovery time and healthcare costs.[5]

Various preventive strategies have been explored, including improved surgical techniques, appropriate antibiotic prophylaxis, subcutaneous tissue closure and the use of drains.[6] Subcutaneous drains aim to reduce fluid accumulation in the wound space, thereby lowering the risk of infection and promoting healing.[7] However, their

benefit remains controversial: some studies report improved outcomes, whereas others find no significant advantage.[8,9]

Given the rising rates of both obesity and caesarean deliveries in India, there is a need for evidence tailored to this population. This study was designed to compare postoperative wound outcomes in obese women undergoing caesarean section with and without subcutaneous drain placement. By evaluating the effectiveness of drains in reducing wound complications, the study aims to provide clinically relevant guidance for improving surgical care in this high-risk group.

METHODS

This prospective randomized controlled study was conducted in the Department of Obstetrics and Gynaecology, Government Medical College and Hospital, Akola, Maharashtra, over a period of 18 months (January 2023 to June 2025), after obtaining Institutional Ethics Committee approval and informed written consent from all participants. A total of 150 obese women (BMI >28 kg/m^2) undergoing caesarean section were included. Women were randomly divided into two groups of with 70 participants in Group A who had subcutaneous drain inserted before wound closure and 80 participants in Group B who did not have any drain inserted.

The study included obese women with a body mass index (BMI) greater than 28 kg/m² who underwent either elective or emergency caesarean section at or beyond 37 weeks of gestation with a singleton pregnancy. Women were excluded from the study if they had pre-existing medical disorders such as diabetes mellitus or hypertension, were immunocompromised or had intrapartum or postpartum complications (like postpartum haemorrhage, chorioamnionitis, bowel and bladder injury). Patients with multiple gestation, polyhydramnios or known coagulation disorders were also excluded to eliminate confounding factors that could independently affect wound healing or postoperative outcomes.

Procedure

All surgeries were performed under regional anaesthesia by senior obstetricians. A Pfannenstiel incision was used in all cases. After delivery of the baby and placenta, haemostasis was secured. The subcutaneous tissue thickness was measured with sterile callipers. In Group A, a closed suction drain (Romovac) was placed in the subcutaneous layer and brought out through a separate stab incision before skin closure with Ethilon 1-0 interrupted sutures. In Group B, the wound was closed without drain placement.

Postoperative care and follow-up

Both groups received standard antibiotic prophylaxis and postoperative care. The drain was removed after 48–72 hours once the collection was <5cc/day. Wound assessment was done on postoperative days 3, 5 and 7 and during suture removal on day 10. Outcomes measured were wound infection, seroma, hematoma, wound gape, postoperative fever, pain and duration of hospital stay.

Data were analyzed using SPSS version 25. Chi-square test and Student's t-test were applied and $p<0.05$ was considered statistically significant.

RESULTS

A total of 150 obese women (BMI>28 kg/m²) undergoing caesarean section were analysed i.e., 70 in the drain group (Group A) and 80 in the no-drain group (Group B). Both groups were comparable in terms of age, parity, BMI and indication for caesarean section.

Table 1: Demographic characteristics of study participants.

Variable	Group A (Drain) n=70	Group B (No drain) n=80	Statistical test, P value
Age (in years)			
18–24	9 (12.86%)	11 (13.75%)	
25–29	17 (24.29%)	19 (23.75%)	Chi-square=0.028, 0.99
30–36	23 (32.86%)	26 (32.50%)	
>36	21 (30.00%)	24 (30.00%)	
Parity			Chi-square=0.014, 0.99
Primi	23 (32.86%)	27 (35.00%)	
Gravida 2	30 (42.86%)	34 (42.50%)	
Gravida 3	17 (24.29%)	19 (22.50%)	
BMI (kg/m²)			Chi-square=0.12, 0.94
28–32	28 (40.00%)	30 (37.50%)	
33–36	22 (31.43%)	27 (33.75%)	
>36	20 (28.57%)	23 (28.75%)	
Hemoglobin (g/dl)	Mean±SD 10.4±1.2	Mean±SD 10.2±1.3	t=1.05 0.296

Table 2: Association between risk factors and postoperative wound complications.

Risk factor	Complications present (n=38)	Complications absent (n=112)	χ^2	P value
BMI>32 kg/m²	28 (73.7%)	34 (30.3%)	22.4	<0.001
Subcutaneous thickness>2 cm	30 (78.9%)	40 (35.7%)	19.6	<0.001
Emergency caesarean	21 (55.3%)	36 (32.1%)	5.83	0.016
Hb<10 g/dl	12 (31.6%)	14 (12.5%)	6.01	0.014

Table 3: Comparison of wound complications between drain and no-drain groups.

Complication	Group A (Drain) n=70	Group B (No drain) n=80	χ^2	P value
Seroma	5 (7.14%)	22 (27.5%)	10.41	0.045
Superficial SSI	5 (7.14%)	14 (17.5%)	4.85	0.028
Deep SSI	3 (4.29%)	10 (12.5%)	4.16	0.041
Postoperative fever	4 (5.71%)	12 (15%)	5.0	0.025

Table 4: Comparison of postoperative recovery parameters.

Parameter	Group A (Drain)	Group B (No drain)	P value
Mean VAS pain score	4.2±0.8	5.1±0.9	0.002
Mean hospital stay (days)	4.9±1.1	6.2±1.3	< 0.001
Mean suture removal (day)	9.3±1.2	11.1±1.4	< 0.001

Table 5: Independent predictors of wound complications (logistic regression).

Variable	Odds atrio (95% CI)	P value
No subcutaneous drain	3.15 (1.39–7.12)	0.006
BMI>32 kg/m²	2.78 (1.23–6.29)	0.014
Subcutaneous thickness>2 cm	2.44 (1.07–5.58)	0.032

The mean age was 27.9±4.2 years in Group A and 28.1±3.8 years in Group B (t=0.73). The mean BMI was 31.6±2.4 kg/m² in Group A and 32.0±2.1 kg/m² in Group B (t=0.38). The proportions of elective caesarean sections (60% vs 64%), emergency procedures (40% vs 36%) and mean preoperative haemoglobin levels (10.4±1.2 vs 10.2±1.3 g/dl) did not differ significantly between the two groups (t>0.05). This indicates that both groups were well matched at baseline indicating good randomization.

Association of risk factors with wound complications

Overall wound complications were seen in 25.3% of the study population. Higher BMI (>32 kg/m²), subcutaneous tissue thickness >2 cm and emergency caesarean section were significantly associated with increased wound morbidity (p<0.05), whereas parity and haemoglobin levels showed no significant correlation (p>0.05). Higher BMI, greater subcutaneous thickness and emergency surgeries were significantly associated with postoperative wound complications.

Comparison of wound complications between groups

Wound-related complications were significantly higher in the no-drain group compared to the drain group. Seroma formation was the most frequent issue, occurring in 28% of women without drains versus only 7.14% of those with drains (p=0.045). Superficial and deep infections were also significantly lower in the drain group (p<0.05). Wound gape and hematoma rates were lower in the drain group but did not reach statistical significance. Use of subcutaneous drain significantly reduced seroma formation, infection rates and postoperative fever.

Other postoperative findings

Wound gape occurred in 7% of women in the drain group and 16% in the no-drain group (p=0.046), while hematoma formation was 2.7% vs 6.7% respectively (p=0.31). These differences were not statistically significant. Pain scores (VAS), duration of hospital stay and suture removal time were significantly shorter among those with drains. Women who developed any wound complication had a mean hospital stay of 7.1±1.4 days compared to 5.0±1.1 days among those without complications (p<0.001).

Multivariate analysis

Multivariate logistic regression confirmed that absence of subcutaneous drain (OR=3.15, 95% CI: 1.39–7.12, p=0.006), BMI>32 kg/m² (OR=2.78, p=0.014) and

subcutaneous thickness>2 cm (OR=2.44, p=0.032) were independent predictors of postoperative wound complications.

DISCUSSION

In this randomized controlled study, the use of subcutaneous drains in obese women undergoing caesarean section significantly reduced seroma formation, wound infection and postoperative morbidity. The findings corroborate the results of several previous studies. Hellums et al and Ramsey et al, reported a two-fold reduction in wound infection with drain use in obese women.[10,11] Similarly, Gwynne Jones et al, observed that subcutaneous drains prevented seroma formation in patients with subcutaneous tissue thickness >2 cm.[12]

In the present study, seroma formation was significantly higher in the no-drain group (27.5%) compared with the drain group (7.14%) (p<0.001). This aligns with the work of Vermillion et al, who found seroma rates of 8% versus 25% with and without drains respectively.[13] The likely mechanism is prevention of dead space accumulation that can harbour fluid and bacteria.[14]

Superficial and deep wound infections were also significantly reduced in the drain group. This is consistent with the findings of Cardosi et al who demonstrated a 40% reduction in wound infections with prophylactic drains.[15] In contrast, some studies such as Chelmow et al found no significant difference, attributing the outcomes more to surgical technique and antibiotic prophylaxis.[16] Wound gape and hematoma showed a lower but statistically non-significant trend towards reduction in the drain group, similar to the observations of Myles et al and Combs et al.[17,18]

Mean hospital stay and suture removal time were significantly shorter in the drain group, indicating earlier recovery and reduced morbidity. This finding supports the results of Walraven et al who demonstrated that early discharge was feasible with drain use.[19] Concerns regarding pain or foreign body reactions due to the drain were minimal in our study and mean pain scores were significantly lower in the drain group. This may be due to reduced local inflammation and tension caused by fluid accumulation.[20] Overall, the findings of this study suggest that subcutaneous drains are particularly beneficial in obese women with subcutaneous fat >2 cm, where the risk of fluid accumulation is high. Routine use may not be necessary for lean women or those with thin subcutaneous layers.

This study was conducted at a single centre with a modest sample size, which may limit wider applicability. Variations in surgical technique and postoperative care could not be fully controlled and the follow-up period was limited to early postoperative outcomes only.

CONCLUSION

Subcutaneous drain placement after caesarean section in obese women significantly reduces seroma formation, wound infection and postoperative fever, leading to shorter hospital stays and earlier recovery. Routine use of drains in obese patients (BMI>28 kg/m²) with subcutaneous tissue thickness >2 cm is recommended to minimize wound-related morbidity. While the use of drains may add a minor procedural step, its impact on reducing postoperative infection, need for prolonged antibiotics and hospital stay is both clinically and economically significant. Therefore, routine placement of a subcutaneous drain should be considered in obese parturient undergoing caesarean delivery, particularly in those with thick subcutaneous fat or undergoing emergency procedures. In conclusion, subcutaneous drain insertion is a simple, cost-effective and evidence-based intervention that can meaningfully reduce postoperative wound complications, enhance recovery and improve overall maternal outcomes in obese women after caesarean section.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Anderson DJ, Podgorny K, Berríos-Torres SI, Bratzler DW, Dellinger EP, Greene L, et al. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. Infect Control Hosp Epidemiol. 2014;35(6):605-27.
2. Al-Kharabsheh R, Ahmad M, Al Soudi M, Al-Ramadneh A. Wound Infection Incidence and Obesity in Elective Cesarean Sections in Jordan. Med Arch. 2021;75(2):138-43.
3. WHO. Global trends in cesarean delivery. World Health Organization Report. 2022.
4. Chu SY, Kim SY, Schmid CH, Dietz PM, Callaghan WM, Lau J, et al. Maternal obesity and risk of cesarean delivery: a meta-analysis. Obes Rev. 2007;8(5):385-94.
5. Kvalvik SA, Rasmussen S, Thornhill HF, Baghestan E. Risk factors for surgical site infection following cesarean delivery: A hospital-based case-control study. Acta Obstet Gynecol Scand. 2021;100(12):2167-75.
6. Martin EK, Beckmann MM, Barnsbee LN, Halton KA, Merollini K, Graves N. Best practice perioperative strategies and surgical techniques for preventing caesarean section surgical site infections: a systematic review of reviews and meta-analyses. BJOG. 2018;125(8):956-64.
7. Gomez-Lopez N, Galaz J, Miller D, Farias-Jofre M, Liu Z, Arenas-Hernandez M, et al. The immunobiology of preterm labor and birth: intra-

amniotic inflammation or breakdown of maternal-fetal homeostasis. Reproduction. 2022;164(2):11-45.
8. Cardosi RJ, Drake J, Holmes S, Tebes SJ, Hoffman MS, Fiorica JV, et al. Subcutaneous management of vertical incisions with 3 or more centimeters of subcutaneous fat. Am J Obstet Gynecol. 2006;195(2):607-14.
9. Hellums EK, Lin MG, Ramsey PS. Prophylactic subcutaneous drainage for prevention of wound complications after cesarean delivery--a metaanalysis. Am J Obstet Gynecol. 2007;197(3):229-35.
10. Steiner HL, Strand EA. Surgical-site infection in gynecologic surgery: pathophysiology and prevention. Am J Obstet Gynecol. 2017;217(2):121-8.
11. Naumann RW, Hauth JC, Owen J, Hodgkins PM, Lincoln T. Subcutaneous tissue approximation in relation to wound disruption after cesarean delivery in obese women. Obstet Gynecol. 1995;85(3):412-6.
12. Vermillion ST, Lamoutte C, Soper DE, Verdeja A. Wound infection after cesarean: effect of subcutaneous tissue thickness. Obstet Gynecol. 2000;95(1):923-6.
13. Gould D. Caesarean section, surgical site infection and wound management. Nurs Stand. 2007;21(32):60-2.
14. Fitzwater JL, Tita AT. Prevention and management of cesarean wound infection. Obstet Gynecol Clin North Am. 2014;41(4):671-89.
15. Magann EF, Chauhan SP, Rodts-Palenik S, Bufkin L, Martin JN Jr, Morrison JC. Subcutaneous stitch closure versus subcutaneous drain to prevent wound disruption after cesarean delivery: a randomized clinical trial. Am J Obstet Gynecol. 2002;186(6):1119-23.
16. Alanis MC, Villers MS, Law TL, Steadman EM, Robinson CJ. Complications of cesarean delivery in the massively obese parturient. Am J Obstet Gynecol. 2010;203(3):271-7.
17. Temming LA, Raghuraman N, Carter EB, Stout MJ, Rampersad RM, Macones GA, et al. Impact of evidence-based interventions on wound complications after cesarean delivery. Am J Obstet Gynecol. 2017;217(4):449.
18. Zuarez-Easton S, Zafran N, Garmi G, Salim R. Postcesarean wound infection: prevalence, impact, prevention and management challenges. Int J Women Health. 2017;9:81-8.
19. Jatin CP, Beniwal SS, Pithalla LB, Dwivedi A, Shetty VR, Desai A. Managing obstetric and gynecologic complications in obese women: Evidence-Based Strategies for Optimizing Outcomes and Reducing Risks. Ann Med Surg (Lond). 2025;21;87(6):3586-95.
20. Gillispie-Bell V. Prevention of surgical site infections in gynecologic surgery: a review of risk factors and recommendations. Ochsner J. 2020;20(4):434-8.

Cite this article as: Asokan R, Sirsam SK, Koranne P. Compare use of subcutaneous drain vs. no drain in obese women to reduce wound complications post caesarean section: a randomized control trial. Int J Reprod Contracept Obstet Gynecol 2026;15:255-9.