Original Article

Comparison of Surgical Site Infections Using Absorbable and Non-Absorbable Sutures during Skin Closure in Patients Undergoing Caesarean Section

Hajra Bibi[1], Naheed Maqbool[2], Ayesha Mehmood[3], Maryam Mehfooz[4], Syeda Samina[5], Nausheen Farooq[6]

[1] 4th year Postgraduate trainee, Gynae/Obs Federal Government Polyclinic Hospital, Islamabad
[2]Medical Officer, MCH, PIMS, Islamabad, [3]Trainee Registrar MCH, PIMS, Islamabad
[4]4th year trainee Quaid e Azam International Hospital, Islamabad
[5]4th year PGR RHQ Hospital, Skardu (Ex PG trainee FGPH, Islamabad)
[6]HOD Gynae/Obs Federal Government Polyclinic Hospital, Islamabad

***Correspondence**: Dr Hajra Bibi*
Postgraduate Trainee Dept of Obs and Gynae, Federal Government Polyclinic Hospital, Islamabad
hajrashafqat93@gmail.com

Abstract

Objective: To determine the rates of SSIs between patients undergoing subcuticular skin closure during CS using absorbable (polyglactin) or non-absorbable (polypropylene) suture materials.

Methodology: This randomized clinical study was conducted in the Department of Obstetrics and Gynecology of Federal Government Polyclinic (FGPC) Hospital, Islamabad from April 2025 to September 2025. Two hundred and one eligible gravid females were randomized into groups of absorbable (Group A; n=100) and non-absorbable (Group B; n=101) skin closure groups. The randomization method employed was alternating suture material type every other day. Group A patients underwent skin closure using polyglactin 2-0 in a subcuticular running manner, whereas those of group B received subcuticular skin closure with polypropylene 2-0 suture. Subsequently, they were prospectively followed until the 10th postoperative day for the development of SSIs and their signs (redness, pus discharge, and swelling).

Results: The mean age of the population was 28.32 ± 5.46 years, the median parity was 2, and the mean BMI was 24.26 ± 3.39kg/m2. The rates of SSI were 7% in group A and 18.8% in group B (odds ratio [OR] 3.078, 95% confidence interval [CI] 1.232 - 7.694, p=0.013). The group A patients with SSIs showed erythema and swelling in 42.8%, compared to 78.9% (p=0.003) and 73.7% (p=0.006) in group B.

Conclusion: Patients with skin incision closure by absorbable suture had not only a low risk of SSI, but also a lower severity of wound infection. Hence, we recommend preferring the absorbable suture material over the non-absorbable for this purpose.

Keywords: SSI, Prolene©, Vicryl©, Cesarean section

Cite this article as: Bibi H, Maqbool N, Mehmood A, Mehfooz M, Samina S, Farooq N. Comparison of Surgical Site Infections Using Absorbable and Non-Absorbable Sutures during Skin Closure in Patients Undergoing Caesarean Section. J Soc Obstet Gynaecol Pak. 2026;16(1):145-149. DOI. 0.71104/jsogp.v16i2.1016

Introduction

Worldwide, Cesarean section (CS) is the most widely performed surgery. Around 20% (1 in 5) births take place by CS globally, with incidence as high as more than 50% in Turkey, Brazil, and Egypt, and as low as 9% in Sub-Saharan Africa.[1] Just like any other surgery, it carries the risk of postoperative complications, the commonest of them being surgical site infections (SSIs).[2] SSIs are observed in approximately 3% of patients after CS.[3] These infections can range anywhere from mild pus exudate or erythema to puerperal sepsis. Certain pre-operative, intraoperative, and postoperative risk factors predispose the patient to develop SSIs. While some of these are non-modifiable, others can be mitigated by preoperatively optimizing the case, improving surgical technique, and ensuring postoperative care focused on better wound healing. Maternal obesity, anemia, and diabetes are the most recognized preoperative risk factors that can be effectively addressed by weight management, dietary modifications, regular antenatal visits, prenatal supplementation, and appropriate glycemic control.[4] Intraoperatively, prophylactic antibiotic administration, use of aseptic techniques (from instrument sterilization to skin closure), reducing the

Authorship Contribution: [1,4,5]Substantial contributions to the conception or design of the work or the acquisition, [6]Final approval of the study to be published, [1,3]Drafting the work or revising it critically for important intellectual content.

Funding Source: none
Conflict of Interest: none

Received: Feb 20, 2026 Revised: Mar 30, 2026
Accepted: April 06, 2026

length of surgery, and limiting the rates of emergency C-sections can be helpful.[5] Early decatheterization, decreasing duration of hospital stay, improving nutritional status, and practicing wound hygiene postoperatively can potentially reduce the incidence of SSIs.[6]

There has been extensive ongoing research on the effects of different surgical techniques or materials in all steps of CS to identify the best-suited techniques in terms of postoperative outcomes, especially SSIs. For instance, the Pfannenstiel incision and subcuticular closure are preferred over vertical skin incision (adjusted odds ratio [aOR] 4.77) and interrupted closure (aOR 6.29), considering wound infection risk [7], povidone-iodine solution application after Cesarean section has no impact on SSI risk [8], and wound dressing or leaving it exposed does not alter SSI risk.[9]

Ideally, wound closure technique should provide skin apposition till healing, prevent wound infection, provide equal strength throughout the length of the incision, have a good cosmetic result, and should be easy to use.[10] An ideal wound closure material should be non-allergenic, easily available, and effective. The requirement of skin approximation by any method is that it should hold the skin edges in apposition for a sufficient length of time to allow the healing to occur.

Skin incision closure materials potentially impact the development of SSIs owing to their variable biochemical properties. At the time of the advent of CS, staples and interrupted sutures consisting of non-absorbable materials were in use for skin closure following CS. But with time, they were eliminated from practice, the reasons being the increased risk of postoperative complications such as SSIs[11], and lower patient satisfaction scores. [12] Absorbable subcutaneous sutures have lower wound infection rates than absorbable subcutaneous clips for skin closure in Cesarean deliveries.[13] This lesser incidence of SSI after suture use holds true for both absorbable and non-absorbable suture materials.[14] Among the structures of suture materials, there are contradictory studies regarding the superiority of monofilament absorbable sutures over multifilament absorbable sutures regarding postoperative infections.[15-17] Tissue adhesive agents composed of 2-octylcyanoacrylate have gained popularity in skin closure during the past decades, with equivalent cosmetic results as those with staple closure[18] and comparable SSI rates to polypropylene subcuticular sutures.[19]

As far as the patient's own preferences go, they prioritize the absorbable materials over the non-absorbable sutures or staples to avoid the suture/staple removal, and this preference tends to increase in incidence with the number of prior Cesarean deliveries. [20] However, this reason alone cannot serve as the basis for routinely using absorbable sutures over other materials. Newer researches support the use of sutures for preventing SSIs [21]

Vicryl or polyglactin, the most commonly used absorbable suture for skin closure in CS, is a synthetic, absorbable, multifilament suture that can sustain its tensile strength for nearly 3 to 4 weeks in tissues and is entirely absorbed by hydrolysis within 60 days.[22] Though it is strong, it possesses significant tissue responsiveness. This greater degree of tissue reactivity is hypothesized to predispose the tissue to surgical site infection.[10] Prolene or polypropylene, on the other hand, has low tissue reactivity and greater durability.[23] Prolene is a synthetic, non-absorbable, monofilament suture with high yarn strength. Its monofilament nature, low tissue responsiveness, and good tensile strength are the properties that are associated with the lower risk of SSIs.

In a low-resource setting like Pakistan, the background risk of SSIs is higher, primarily due to poor nutritional status and improper local sanitation.[24] For instance, the SSI rate of 11.3% has been observed after CS skin closure using polypropylene suture in a prospective observational study conducted in Mardan[25] which is much higher than the overall risk globally. This high SSI risk exacerbates the existing healthcare burden and perpetuates a vicious cycle of economic decline. In this context, even a small intervention, such as selecting an alternative suture material, may reduce the risk of SSI and consequently yield a substantial impact at the population level. Although there is literature available regarding the comparison of different suture materials, locoregional evidence has a paucity of randomized studies comparing absorbable and non-absorbable materials, especially in terms of SSIs. This study aimed to contrast SSI rates after using absorbable (Vicryl©) and non-absorbable (Prolene©) sutures for skin closure in CS. This, in turn, can reduce postoperative morbidity and provide options to promote better postoperative recovery.

Methodology

This randomized clinical study was initiated on 220 gravid females aged 18 to 45 years undergoing elective lower segment CS at gestational age more than 32^{+0}

weeks in the Department of Radiology of Federal Government Polyclinic Hospital, Islamabad from 1st April, 2025 to 30th September, 2025 after approval by the Ethical Review Board (ERB) of the hospital Ref No. FGPC.1/12/2024/E-Committee. The sample size turned out to be 220 (200 + 10% attrition rate). They were recruited using a non-probability consecutive sampling technique. Patients with diabetes, anemia (defined as hemoglobin of <10 at the time of elective LSCS), obesity (body mass index [BMI] >30kg/m^2), prelabor rupture of membranes, duration of surgery>90 minutes, need for peripartum hysterectomy, intrauterine fetal death (IUFD), midline vertical incision, and placenta previa were excluded from the study. Informed consent, on a predesigned proforma, was obtained from all the eligible participants. They were randomized into the respective groups by changing suture materials for skin closure on alternate days.

To minimize the risk of confounding, it was ensured that all patients received similar pre- and postoperative antibiotics, preoperative povidone-iodine solution was used for skin preparation, the rest of the surgical procedure did not differ in any step, and all procedures were performed by at least a 3rd year resident. Baseline characteristics of the population, including age, name, parity, and BMI, were recorded preoperatively. Those randomized into group A underwent skin closure in subcuticular running fashion using absorbable suture (Vicryl© 2-0 curved needle), whereas those in group B had non-absorbable suture material (Prolene© 2-0 straight cutting needle) for skin closure in a subcuticular running manner.

These patients received the routine postoperative care. Wound examination was performed at the time of discharge (i.e., 2nd postoperative day). They were advised to follow up on the 10th postoperative day when the surgical sites were examined for any redness, swelling, or pus discharge. Patients of group B had their sutures removed the same day. In case of any suspected or confirmed SSI, pus cultures and other laboratory workup were sent according to the hospital protocols.

After complete data collection, data analysis was carried out using the statistical package for social sciences (SPSS) software version 26. Quantitative variables were expressed in mean ± standard deviation (SD) form, and qualitative data in terms of frequencies. An independent sample t-test compared the means of quantitative variables among the groups. To compare the rates of SSIs among study groups, a chi-square test was employed. A probability value of less than or equal to 0.05 was considered statistically significant.

Results

A study population of 201 patients completed the follow-up period, i.e., 100 patients in group A (Vicryl©) and 101 in group B (Prolene©). Overall, the mean age of the population was 28.32 ± 5.46 years, the median parity was 2, and the mean BMI was 24.26 ± 3.39kg/m2. 14.4% belonged to the low socioeconomic class (monthly cumulative household income <20000 PKR), 67.2% had income between 20 to 50 thousand Pakistani rupees, and 18.1% with income more than 50,000PKR/month; socioeconomic status also showed no difference among the groups (p=0.83). 3% of the population had a BMI of ≤ 18.5kg/m2, 61.7% had it in the range of 18.6 to 24.9kg/m2, and the remaining had ≥25kg/m2.

Age, parity, and BMI were matched among the groups and did not show any statistically significant difference (

). SSI affected 7% (7) in group A and 18.8% (19) in group B (odds ratio [OR] 3.078, 95% confidence interval [CI] 1.232 - 7.694, p=0.013). In patients belonging to group A having SSIs, 42.8% (3/7) had erythema and swelling as compared to 78.9% (15/19) with erythema and 73.7% (14/19) with swelling in group B (p=0.003 and 0.006 for redness and swelling, respectively). In the subgroup analysis of patients without or with SSIs, no significant differences existed in parity (2.11 ± 1.19 vs. 2.38 ± 1.75), age (28.37± 5.32 vs. 28.0 ± 6.38 years), BMI (24.06 ± 3.32 vs. 25.65 ± 3.58 kg/m2), or socioeconomic status.

	Absorbable	**Non-absorbable**	**p-value**
BMI (kg/m2)	23.89±3.12	24.64±3.61	0.118
Age (years)	27.92±5.55	28.72±5.36	0.298
Parity (n)	2.03±1.17	2.26±1.37	0.207
Parity (n)	2.03±1.17	2.26±1.37	0.207

Table II: Rates of SSIs among absorbable and non-absorbable suture groups.

	Group A	Group B
Rate of SSI (%)	7	18.8
Erythema (%) in SSI subgroup	42.8	78.9
Wound edema (%) in SSI subgroup	42.8	73.7

Discussion

SSIs contribute to a substantial degree of postoperative morbidity. Various surgical techniques and materials undoubtedly influence the development of infection, whereas others do not. Our study determined significant

differences in the risk of postoperative infection after CS among polypropylene (non-absorbable) and polyglactin (absorbable) sutures for skin approximation in a population controlled for other possible confounding factors. Sobodu et al., in a meta-analysis [26], observed contrasting results, i.e., monofilament sutures (poliglecaprone and polypropylene) showed a lesser SSI risk (relative risk [RR] 0.71) compared to multifilament suture (polyglactin). But this meta-analysis made a comparison of the synthetic nature of suture materials rather than their absorbability, and the study group included not only polypropylene (non-absorbable suture) but also poliglecaprone (absorbable) in the monofilament group. Slower wound healing (33.4%) and a high incidence of wound dehiscence (26.6%) were seen in patients undergoing subcuticular skin closure via polyglactin than poliglecaprone and polyamide a randomized clinical study in India. [27]

Overall literature does not support the superiority of one type of suture over the other regarding SSI. For instance, an Egyptian randomized controlled study found no significant difference in wound infection after using polyglactin and polypropylene subcuticular suture (13.3% vs. 110%, p=0.0798) in CS skin closure.[28] Similarly, they were equivalent in other outcomes such as severity of pain, scar dehiscence, pigmentation, hypertrophy, and itching. Siddiqui et al conducted a randomized controlled study in Nishtar Hospital, on the comparison of polyglactin and polypropylene for skin suturing in CS.[29] Their observations were contrary to our study, i.e., a greater proportion of women undergoing skin closure by polyglactin developed wound infection (23.2% vs. 11.9%, p<0.001).

Hasdemir et al determined the SSI rate of 12.7% in the non-absorbable and 14.3% in the absorbable suture group (p=1.00) in patients undergoing elective repeat CS, with a high degree of probability, possibly for the reason that SSI was not their primary outcome.[30] However, their primary outcomes, including scar pain, cosmetic results, and patient satisfaction, also did not differ significantly between the two types of suture groups.

Peri-scar erythema and swelling represent the more severe SSI, which involves the adjacent skin and underlying tissue. Use of non-absorbable suture in our study induced more skin and subcutaneous tissue involvement, evident as higher frequencies of these clinical findings in patients who underwent skin closure by Prolene© 2-0. This can be explained by the higher tissue-responsiveness of absorbable sutures, by which they wall off the surrounding tissue, generating an anatomical barrier between the external environment and the wound.

In contrast, a randomized study comprising 213 participants, with baseline demographic and perioperative characteristics comparable between the two groups, found no statistically significant difference in the incidence of wound complications or superficial surgical site infections between groups (polypropylene: 8.3% vs. polyglactin 910: 10.6%, p = 0.642).[31] Similarly, no significant differences were identified regarding other postoperative surgical site-related outcomes. This study had other factors (such as gravidity, body mass index, operative duration, or whether the Cesarean section was repeated or unplanned) controlled by post-stratification analysis.

This study has the strength of breaking down the symptomatology of SSI between these groups, which promoted the finding of increased severity of SSIs in the patients undergoing skin closure by non-absorbable sutures. The primary limitation of our study was the lack of control over some other important factors besides age, parity, BMI, and socioeconomic status, such as the nature of Cesarean section (primary or repeat), length of the incision, depth of subcutaneous tissue, and immunologic status of the patient. Moreover, this study was conducted in a tertiary care hospital of Islamabad, where the population exhibits better nutritional and socioeconomic status than the rest of the Pakistani population, thus reducing the generalizability of its results.

Conclusion

Skin closure using subcuticular absorbable sutures during Cesarean section is associated with significantly reduced rates of SSIs. Postoperative wound infections after the use of non-absorbable sutures are more severe, leading to more erythema and swelling around the scar site. Therefore, skin closure using absorbable sutures is recommended by us for achieving better postoperative outcomes and reducing maternal morbidity.

Recommendations: Multicentric studies involving heterogeneous settings (both urban and rural) can be carried out to make the results more generalizable.
Correlation of severity of SSIs with nature of suture material needs to be studied further.

Acknowledgements: I thank my supervisor, Dr. Nausheen Farooq, for her support and mentorship in the fulfilment of my research. Our deepest appreciation goes to my colleagues who complied with the study procedure.

References

1. Organization WH. Caesarean section rates continue to rise, amid growing inequalities in access. WHO; 2021. Available from: https://www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access
2. Tan E, Tan TSE, Teo HEL, Lau LC. Complications of caesarean delivery. Part 1: Early complications. *Ultrasound*. 2022;30(2):150-157. https://doi.org/10.1177/1742271X211038595
3. Almutairi WM, Alamri OS. Incidence of surgical site infections following caesarean section and the associated risk factors at King Abdulaziz University Hospital. *J Adv Trends Med Res*. 2025;2(1). https://doi.org/10.4103/ATMR.ATMR_16_25
4. Ayesha, Nasreen, Shazia, Jawaria, Rafique H. Risk factors for surgical site infection following cesarean section. *Biol Clin Sci Res J*. 2024;2024(1):1309. https://doi.org/10.54112/bcsrj.v2024i1.1309
5. Kawakita T, Landy HJ. Surgical site infections after cesarean delivery: Epidemiology, prevention and treatment. *Matern Health Neonatol Perinatol*. 2017;3:12. https://doi.org/10.1186/s40748-017-0051-3
6. Patel K, Zakowski M. Enhanced recovery after cesarean: Current and emerging trends. *Curr Anesthesiol Rep*. 2021;11(2):136-144. https://doi.org/10.1007/s40140-021-00442-9
7. Azeze GG, Bizuneh AD. Surgical site infection and its associated factors following cesarean section in Ethiopia: A cross-sectional study. *BMC Res Notes*. 2019;12(1):288. https://doi.org/10.1186/s13104-019-4325-x
8. Thaisriwong C, Chaithongwongwatthana S. A randomized controlled trial of povidone-iodine application after skin closure for prevention of surgical site infection in emergency cesarean section. *Int J Gynaecol Obstet*. 2025;168(1):149-154. https://doi.org/10.1002/ijgo.15817
9. Tan PC, Rohani E, Lim M, Win ST, Omar SZ. A randomised trial of caesarean wound coverage: Exposed versus dressed. *BJOG*. 2020;127(10):1250-1258. https://doi.org/10.1111/1471-0528.16228
10. Al-Mubarak L, Al-Haddab M. Cutaneous wound closure materials: An overview and update. *J Cutan Aesthet Surg*. 2013;6(4):178-188. https://doi.org/10.4103/0974-2077.123395
11. Mackeen AD, Sullivan MV, Schuster M, Berghella V. Suture compared with staples for skin closure after cesarean delivery: A systematic review and meta-analysis. *Obstet Gynecol*. 2022;140(2):293-303. https://doi.org/10.1097/AOG.0000000000004872
12. Fleisher J, Khalifeh A, Pettker C, Berghella V, Dabbish N, Mackeen AD. Patient satisfaction and cosmetic outcome in a randomized study of cesarean skin closure. *J Matern Fetal Neonatal Med*. 2019;32(22):3830-3835. https://doi.org/10.1080/14767058.2018.1474870
13. Gabbai D, Jacoby C, Gilboa I, Maslovitz S, Yogev Y, Attali E. Comparison of complications and surgery outcomes in skin closure methods following cesarean sections. *Arch Gynecol Obstet*. 2025;312(1):125-129. https://doi.org/10.1007/s00404-024-07911-6
14. Nayak GB, Saha PK, Bagga R, Joshi B, Rohilla M, Gainder S, et al. Wound complication among different skin closure techniques in the emergency cesarean section: A randomized control trial. *Obstet Gynecol Sci*. 2020;63(1):27-34. https://doi.org/10.5468/ogs.2020.63.1.27
15. Buresch A, Arsdale A, Ferzli M, Sahasrabudhe N, Sun M, Bernstein J, et al. Comparison of subcuticular suture type for skin closure after cesarean delivery: A randomized controlled trial. *Obstet Gynecol*. 2017;130:1. https://doi.org/10.1097/AOG.0000000000002200
16. Sharma C, Sharma S, Soni A. Subcuticular skin closure at cesarean delivery with poliglecaprone-25 vs polyglactin-910: A randomized controlled trial. *Am J Obstet Gynecol MFM*. 2024;6(2):101256. https://doi.org/10.1016/j.ajogmf.2023.101256
17. Tuuli MG, Stout MJ, Martin S, Rampersad RM, Cahill AG, Macones GA. Comparison of suture materials for subcuticular skin closure at cesarean delivery. *Am J Obstet Gynecol*. 2016;215(4):490.e1-490.e5. https://doi.org/10.1016/j.ajog.2016.05.012
18. Cromi A, Laganà AS, Ghezzi F, Valdatta L, Casarin J, Cherubino M. Cosmetic outcomes of skin closure with tissue adhesive or staples in repeated cesarean section: A randomized controlled trial. *Eur J Obstet Gynecol Reprod Biol*. 2022;271:112-116. https://doi.org/10.1016/j.ejogrb.2022.02.009
19. Jaafar ZAA, Sarkulova Z, Tokshilykova A, Abdelazim IA, Sarkulov M, Sagidanova Y, et al. Dermabond-adhesive glue versus polypropylene sutures for cesarean section skin closure. *Ginekol Pol*. 2025;96(7):593-598. https://doi.org/10.5603/gpl.102862
20. Khalifeh A, Fleisher J, Gressel G, Berghella V, Leiby B, Mackeen AD. Patient preferences for method of cesarean skin closure: Secondary outcomes from a randomized trial. *J Matern Fetal Neonatal Med*. 2020;33(4):542-546. https://doi.org/10.1080/14767058.2018.1497594
21. Hamel MS, Tuuli M. Prevention of postoperative surgical site infection following cesarean delivery. *Obstet Gynecol Clin North Am*. 2023;50(2):327-338. https://doi.org/10.1016/j.ogc.2023.02.012
22. Trott AT. Instruments, suture materials, and closure choices. In: Trott AT, editor. *Wounds and Lacerations*. 4th ed. Philadelphia: W.B. Saunders; 2012. p. 82-94. https://doi.org/10.1016/B978-0-323-07418-6.00008-3
23. Elgohary DH, Saad MA, Salem MM, Sherazy EH, Khalifa TF. Assessment the properties of various surgical sutures. *Sci Rep*. 2025;15(1):33330. https://doi.org/10.1038/s41598-025-20311-3
24. Khan A, Mahmood M, Arbab R, Khan M, Arshad A, Anwar R. Surgical site infections in low-resource settings: A focused study on the incidence, contributing factors, and prevention strategies for surgical site infections in a resource-constrained environment. *Insights J Health Rehabil*. 2025;3:111-118. https://doi.org/10.71000/geb81793
25. Anam A, Hayat N, Rafiq A, Azmat S, Azmat M, Ullah N, et al. Frequency of wound infection following skin closure with prolene after lower segment cesarean section. *Gomal J Med Sci*. 2024;22(2).
26. Sobodu O, Nash CM, Stairs J. Subcuticular suture type at cesarean delivery and infection risk: A systematic review and meta-analysis. *J Obstet Gynaecol Can*. 2024;46(1):102191. https://doi.org/10.1016/j.jogc.2023.07.010
27. Vats U, Suchitra N. Comparison of efficacy of three suture materials, i.e., poliglecaprone 25, polyglactin 910, polyamide, as subcuticular skin stitches in post-cesarean women: A randomized clinical trial. *J Obstet Gynaecol India*. 2014;64:14-18. https://doi.org/10.1007/s13224-013-0448-5
28. Kolaib M, Mohamed W, Maaty A, Darwish R. Comparison between subcuticular skin closure by different suture materials in cesarean delivery: An interventional randomized controlled clinical trial. *Evid Based Womens Health J*. 2023;13(1):7-13. https://doi.org/10.21608/ebwhj.2022.158890.1195
29. Siddiqui MS, Zafar S, Tariq E, Bukhari S, Nisar E, Shah R, et al. Comparison of wound infection with absorbable suture versus non-absorbable suture after cesarean section. *Pak J Med Health Sci*. 2022;16(11):264. https://doi.org/10.53350/pjmhs20221611264
30. Hasdemir PS, Guvenal T, Ozcakir HT, Koyuncu FM, Dinç Horasan G, Erkan MM, et al. Comparison of subcuticular suture materials in cesarean skin closure. *Surg Res Pract*. 2015;2015:141203. https://doi.org/10.1155/2015/141203
31. Koroglu N, Temel Yuksel I, Aslan Cetin B, Aytufan Z, Deniz N, Akca A, et al. Skin closure at cesarean section, polypropylene versus polyglactin 910: A randomized controlled study. *J Matern Fetal Neonatal Med*. 2022;35(6):1088-1092. https://doi.org/10.1080/14767058.2020.1743654