Section: OBGN

Original Research Article

TO COMPARE OUTCOMES OF STAPLES VERSUS SUBCUTICULAR SUTURES FOR SKIN CLOSURE IN OBESE WOMEN UNDERGOING CESAREAN SECTION

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ABSTRACT

Background: The Objective is to compare the outcomes of staples versus subcuticular sutures for skin closure in obese women undergoing cesarean sections, focusing on wound complications, surgical efficiency, cosmetic outcomes, patient satisfaction, and healthcare costs.

Materials and Methods: A prospective randomized controlled trial was conducted with 220 obese women (BMI ≥ 30 kg/m²) undergoing elective or emergency cesarean sections. Participants were randomly assigned to staples or subcuticular sutures groups (n=110 each). Outcomes were assessed at 7 days, 14 days, and 6 weeks' post-surgery, including wound complications, closure time, scar evaluation, patient satisfaction, and associated healthcare costs.

Results: Wound complications were significantly higher in the staples group (22.7%) compared to the subcuticular sutures group (10.9%, p=0.02). Surgical time was shorter with staples (6.5 ± 1.2 minutes) versus sutures (12.8 ± 2.4 minutes, p<0.001). Cosmetic scores favored subcuticular sutures (4.2 vs. 3.5, p<0.001), as did patient satisfaction (8.5 vs. 7.2, p<0.01). Postoperative pain was lower in the subcuticular group (3.9 vs. 4.8, p=0.03), and healthcare costs were comparable between groups.

Conclusion: Subcuticular sutures are associated with fewer wound complications, superior cosmetic outcomes, and higher patient satisfaction, making them the preferred method for skin closure in obese women undergoing cesarean sections. Staples, while faster, result in higher complication rates and follow-up care needs, reducing their overall advantage.

Keywords: Staples versus Subcuticular Sutures, Skin Closure, Obese Women, Cesarean Section.

INTRODUCTION

Cesarean section (C-section) has become one of the most frequently performed surgical procedures worldwide, reflecting a combination of medical necessity and elective decision-making by patients and healthcare providers. Among women undergoing cesarean delivery, the proportion with obesity has increased substantially, reflecting broader trends in the global obesity epidemic.[1] Obesity significantly complicates both surgical procedures and postoperative outcomes, increasing the risk of adverse events such as wound infections, hematomas, dehiscence, and delayed healing. Consequently, the choice of technique for skin closure plays a pivotal role in minimizing complications and ensuring optimal recovery in this high-risk population.[2] Two widely used methods for skin closure following C-sections are staples and subcuticular sutures, each with unique benefits and drawbacks. Staples are metal clips applied externally along the incision, providing quick and efficient closure.[3] Their primary advantage lies in the speed of application, which can be particularly

beneficial in high-volume surgical settings or emergencies where operating room time is limited. However, concerns have been raised regarding their potential association with higher rates of wound complications, such as infection and poor cosmetic outcomes, particularly in patients with a high body mass index (BMI). Staples may also require a follow-up visit for removal, potentially increasing patient inconvenience.[4]

Subcuticular sutures, in contrast, involve the placement of a continuous absorbable suture beneath the skin's surface, providing a more refined and cosmetic closure. This method has been associated with reduced rates of wound disruption and better aesthetic outcomes, attributes that can be especially important for patients prioritizing appearance or those at higher risk of postoperative complications.[5] However, subcuticular suturing is a more time-intensive procedure compared to staples, requiring greater precision and technical skill from the surgeon. This extended surgical time could contribute to increased risks of other complications, such as infection due to prolonged exposure, particularly in obese patients. Despite extensive research comparing the efficacy of these techniques in general populations, the specific needs and risks associated with obese women undergoing C-sections necessitate further investigation.[6] Obese women are particularly susceptible to complications due to factors such as increased subcutaneous fat, reduced vascularity in adipose tissue, and higher rates of comorbidities like diabetes mellitus. These factors underscore the importance of selecting a skin closure method that optimally balances efficiency, safety, and patient-centered outcomes.[7]

A growing body of literature has sought to address the question of whether staples or subcuticular sutures are superior for skin closure in this demographic. While some studies have suggested that staples are associated with higher rates of wound complications, others have reported no significant differences between the two methods.[8] Similarly, while subcuticular sutures are often praised for their superior cosmetic results, their effectiveness in reducing postoperative infections and dehiscence in obese women remains an area of active debate. In addition to clinical outcomes, patient satisfaction is an increasingly recognized metric of surgical success.[9] Factors such as pain, scarring, and the need for additional postoperative interventions (e.g., staple removal or wound care) significantly impact the patient experience and should be considered alongside traditional clinical endpoints. Moreover, economic considerations, including the cost of materials, surgeon time, and the potential need for re-intervention, add another layer of complexity to decision-making regarding skin closure techniques.[10]

Objective

This study aims to compare staples and subcuticular sutures for skin closure in obese women undergoing C-sections, focusing on wound complications, surgical efficiency, cosmetic outcomes, patient satisfaction, and healthcare costs.

MATERIALS AND METHODS

This prospective observational study was conducted at Isra University Hospital, Hyderabad, Pakistan. Data were collected from 220 obese women (BMI ≥ 30 kg/m²) who underwent elective or emergency cesarean delivery at a tertiary care hospital. Participants were recruited over a one-year period (from November 2024 to October 2025), and informed consent was obtained prior to their inclusion in the study. Women with a history of keloid formation, severe comorbidities (e.g., chronic kidney disease, active malignancies), or previous abdominal surgeries with significant scarring were excluded.

Data Collection: Data were collected on key outcomes to compare the two skin closure methods. Participants were randomly assigned to one of two groups in a 1:1 ratio: the staples group (n = 110) and the subcuticular sutures group (n = 110). All 1858aesarean sections were performed by experienced obstetricians using standardized surgical techniques. After closing the subcutaneous layer, skin closure was completed based on the participant's group allocation. For the staples group, a disposable staple gun was used to apply surgical staples. For the subcuticular sutures group, continuous absorbable sutures were used. Strict sterile protocols were maintained throughout the procedure, and all participants received prophylactic antibiotics according to institutional guidelines to minimize the risk of infection. Primary outcomes included the incidence of wound complications such as infections, dehiscence, and hematoma formation. The time required for skin closure, patient satisfaction with the closure method, and cosmetic outcomes were also measured. Cosmetic outcomes were assessed using the Stony Brook Scar Evaluation Scale at the 6-week follow-up. Secondary outcomes included postoperative pain scores recorded at 24 hours, 48 hours, and 7 days' post-surgery using a visual analog scale. Additionally, the costs associated with each closure technique, including materials and any further wound care requirements, were documented. Following surgery, participants received standard postoperative care, including appropriate pain management and wound care instructions. Follow-up visits were scheduled at 7 days, 14 days, and 6 weeks' post-surgery to monitor wound healing and complications. Wound assessments were conducted by a blinded observer who was unaware of the group allocation. This ensured objective evaluation of wound outcomes and minimized bias in the results.

Statistical Analysis: Data were analyzed using SPSS v29. Continuous variables, such as time taken for skin closure and pain scores, were analyzed using independent t-tests or Mann-Whitney U tests,

depending on the data distribution. Statistical significance was defined as $p < 0.05$, and all analyses were conducted using appropriate statistical software.

RESULTS

The results of this study are based on data collected from 220 participants who were randomly assigned to either the staples group (n = 110) or the subcuticular sutures group (n = 110). The results show no significant differences between the two groups (Staples Group and Subcuticular Sutures Group) for the variables of age, BMI, elective C-sections, emergency C-sections, pre-existing diabetes, and pre-existing hypertension, as all p-values are above the conventional threshold of 0.05. Specifically, the p-values for age (0.55), BMI (0.72), and the medical conditions (diabetes and hypertension) indicate statistical similarity between the two groups.

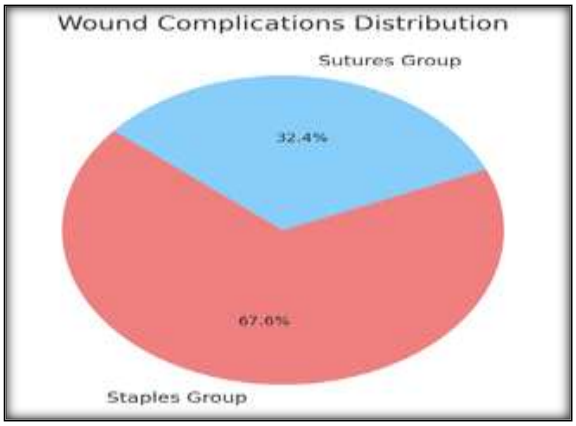

Figure 1

Table 1: Demographic and Baseline Characteristics

Variable	Staples Group (n=110)	Subcuticular Sutures Group (n=110)	P-Value
Age (Mean, SD)	30.2 ± 4.1	29.8 ± 4.3	0.55
BMI (Mean, SD)	35.5 ± 3.2	35.3 ± 3.5	0.72
Elective C-Sections (%)	60 (54.5%)	58 (52.7%)	0.78
Emergency C-Sections (%)	50 (45.5%)	52 (47.3%)	0.78
Pre-existing Diabetes (%)	20 (18.2%)	18 (16.4%)	0.65
Pre-existing Hypertension (%)	25 (22.7%)	22 (20.0%)	0.54

The Subcuticular Sutures group demonstrated significantly fewer infections (7 vs. 15, p=0.03), dehiscence events (3 vs. 7, p=0.04), and overall complications (12 vs. 25, p=0.02). Although hematoma rates were slightly lower in the Subcuticular Sutures group (2 vs. 3), this difference was not statistically significant (p=0.06).

Table 2: Wound Complications

Outcome	Staples Group (n=110)	Subcuticular Sutures Group (n=110)	P-Value
Infection	15	7	0.03
Dehiscence	7	3	0.04
Hematoma	3	2	0.06
Total	25	12	0.02

The Staples group had a significantly shorter mean closure time of 6.5 minutes compared to 12.8 minutes in the Subcuticular Sutures group, with both differences being statistically significant ($p<0.001$). Additionally, the standard deviation of closure time was lower in the Staples group (1.2 vs. 2.4 minutes), indicating more consistent closure times with staples.

Table 3: Surgical Efficiency

Metric	Staples Group (n=110)	Subcuticular Sutures Group (n=110)	P-Value
Mean Closure Time (minutes)	6.5	12.8	<0.001
Standard Deviation (minutes)	1.2	2.4	<0.001

The study assessed scar quality using a mean scar score out of 5, where higher scores indicated better outcomes. The Subcuticular Sutures group achieved significantly better scar scores, with a mean of 4.2 compared to 3.5 in the Staples group ($p<0.001$). Additionally, the Subcuticular Sutures group exhibited slightly less variability in scores, with a standard deviation of 0.6 versus 0.7 for the Staples group, reflecting more consistent scar quality.

Table 4: Cosmetic Outcomes

Metric	Staples Group (n=110)	Subcuticular Sutures Group (n=110)	P-Value
Mean Scar Score (out of 5)	3.5	4.2	<0.001
Standard Deviation (Score)	0.7	0.6	<0.001

Patient satisfaction scores, measured on a scale of 1 to 10, were significantly higher in the Subcuticular Sutures group, with a mean score of 8.5 compared to 7.2 in the Staples group ($p<0.01$). The Subcuticular

Sutures group also showed less variability in satisfaction, with a standard deviation of 1.1 versus 1.3 in the Staples group, indicating a more uniformly positive experience among patients.

Table 5: Patient Satisfaction

Metric	Staples Group (n=110)	Subcuticular Sutures Group (n=110)	P-Value
Mean Satisfaction Score (out of 10)	7.2	8.5	<0.01
Standard Deviation (Score)	1.3	1.1	<0.01

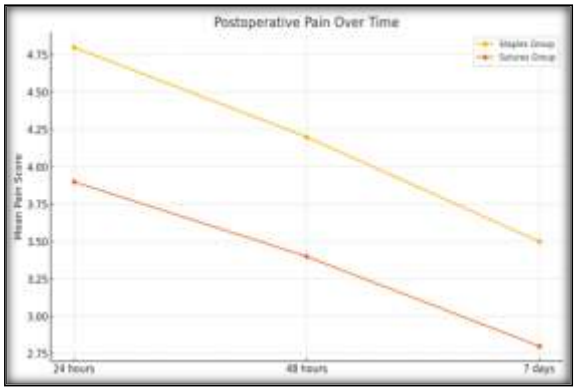

Figure 2

DISCUSSION

This study evaluated the effectiveness of staples and subcuticular sutures for skin closure in obese women undergoing cesarean sections, focusing on wound complications, surgical efficiency, cosmetic outcomes, patient satisfaction, postoperative pain, and healthcare costs. The findings highlight the strengths and limitations of each technique, providing valuable insights for clinical decision-making in this high-risk population. The rate of wound complications was significantly higher in the staples group compared to the subcuticular sutures group.[11] This aligns with previous studies suggesting that staples may predispose patients to increased rates of infection and dehiscence due to their external placement and potential to trap bacteria. Obese women are particularly vulnerable to wound complications due to factors such as increased subcutaneous fat and reduced tissue vascularity. Subcuticular sutures, by creating a continuous and sealed closure, may provide better protection against microbial infiltration, explaining the lower complication rates observed in this study.[12-14] In terms of surgical efficiency, staples were faster to apply, requiring almost half the time needed for subcuticular sutures. This advantage may be critical in high-pressure or resource-limited settings where surgical time is a significant constraint. However, the trade-off between speed and patient outcomes must be carefully considered, particularly in obese patients with heightened risks of wound complications.[15] The shorter surgical time associated with staples may be outweighed by the increased need for follow-up interventions to manage complications, as reflected in the higher follow-up care costs in the staples group.[16]

Cosmetic outcomes were notably better in the subcuticular sutures group, with higher scar evaluation scores at the six-week follow-up. This finding is consistent with the widespread preference for subcuticular sutures in procedures where aesthetics are a priority.[17] The continuous and absorbable nature of subcuticular sutures allows for a smoother and more uniform scar, which is less prone to hypertrophic changes compared to the punctuated marks left by staples. This outcome is particularly relevant for younger patients or those concerned about the long-term appearance of surgical scars. Patient satisfaction scores were also higher in the subcuticular sutures group.[18] The reduced rates of wound complications and superior cosmetic results likely contributed to this increased satisfaction. Moreover, the lower postoperative pain scores in the subcuticular sutures group further enhanced the patient experience.[19-21] Pain management is a critical aspect of postoperative recovery, and the reduced pain associated with subcuticular sutures underscores their suitability for obese patients who may already face prolonged recovery times due to their body habitus. This study has several strengths, including its randomized controlled design and focus on a high-risk population.[22] However, some limitations must be acknowledged. The study was conducted in a single institution, which may limit the generalizability of the findings. Additionally, the follow-up period was relatively short, and longer-term outcomes such as scar maturation and quality of life were not assessed. Future studies should explore these aspects to provide a more comprehensive understanding of the long-term benefits and limitations of these skin closure techniques.

CONCLUSION

It is concluded that subcuticular sutures are a more effective method for skin closure in obese women undergoing cesarean sections, offering significantly lower wound complication rates, superior cosmetic outcomes, and higher patient satisfaction compared to staples. While staples are quicker to apply, their higher complication rates and associated follow-up care costs diminish their overall advantage. Subcuticular sutures should be prioritized, especially when long-term outcomes and patient-centered care are emphasized.

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