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Original research article

SURGICAL SITE INFECTIONS AND WOUND DISRUPTION IN SKIN CLOSURE WITH STAPLES VERSUS ABSORBABLE SUBCUTICULAR SUTURES IN CESAREAN SECTIONS: A COMPARATIVE STUDY

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Abstract: C*esarean sections are among the most common surgical procedures globally, and optimal skin closure methods are critical for minimizing postoperative complications. This study evaluates the incidence of surgical site infections (SSIs) and wound disruptions and compares postoperative outcomes between skin closure with metallic staples and absorbable subcuticular sutures in cesarean deliveries* ***Objective:*** *To compare surgical site infections and wound disruptions in skin closure with staples vs absorbable subcuticular sutures in patients undergoing cesarean sections.* ***Methodology:*** *A prospective study was conducted in the Surgery and Gynecology Department of Jinnah Hospital, Lahore from August 2023 to August 2024. A total of 100 pregnant women with a gestation age of 24 weeks or more undergoing c-sections were selected for the study. Patients were divided into Group A (n=50) with women undergoing skin closure with metallic staples and Group B (n=50) with women undergoing skin closure with 4-0 Monocryl sutures. All patients were examined at discharge and 4-6 weeks postpartum. The primary endpoint was postpartum surgical site infection or wound disruption. The second endpoints were postoperative and postpartum pain score, surgery duration, cosmesis score and patient satisfaction.* ***Results:*** *At discharge, the primary outcome was 8% in group A and 1% in group B (RR: 13.2 (2.2-100), p<0.001). At follow-up, the primary outcome was 15% in group A and 5.8% in group B (2.7 (1.5-4.8), p=0.010). The average duration of surgery was longer in group B (60 vs 50 minutes). Both groups did not differ significantly in pain scores, satisfaction scores, and cosmesis scores.* ***Conclusion:*** *High incidence of surgical site infections and wound disruption were noted in skin closure with staples as compared to sutures in women undergoing cesarean delivery. However, both methods were similar in pain scores, cosmesis scores, and patient satisfaction.*

Keywords: C-section, Infections, Sutures, Staples.

Introduction

Surgical site infections are a common complication after surgical procedures as they affect the cosmetics, quality of life, and length of hospital stay.1 It has been suggested to use antimicrobial prophylaxis and absorbable sutures, skin sterilization, pulsatile lavage, and maintain barrier wound protection to reduce the incidence of SSI.2 Triclosan sutures have also shown a significant reduction in SSIs than traditional ones.3

Preoperative comorbidities including obesity, malnutrition, and diabetes are risk factors for SSIs, and new methods for prevention are needed. Subcuticular sutures show promising results with respect to cosmetic appearance and surgical site infections in cardiovascular, orthopedic, and abdominal surgeries as compared to staples.4, 5 A study conducted on over 200 patients undergoing coronary artery bypass reported that SSIs were similar between staples and intradermal sutures but significantly fewer wound complications were noted after sutures.6 In another study patients undergoing c-sections showed that stainless steel staples increased the risk of wound separation by four folds (p<0.001) and reported poor patient satisfaction as compared to 4-0 Monocryl sutures.7

Cesarean delivery is a clean elective surgery with 21% incidence worldwide. Wound complications are common post-surgery which increases the morbidity of patients. Suture closure has been seen to have better outcomes like higher cosmesis scores, patient satisfaction, and pain scores than staples. Due to the absence of consensus on preference for skin closure method, this study was conducted to compare surgical site infections and wound disruptions in skin closure with staples vs absorbable subcuticular sutures in patients undergoing cesarean sections.

Methodology

A prospective study was conducted in the Surgery and Gynecology Department of Jinnah Hospital, Lahore from August 2023 to August 2024. A total of 100 pregnant women with a gestation age of 24 weeks or more undergoing c-sections were selected for the study. Women with miscarriage or stillbirth, immunodeficiency disorders, contraindications to postpartum analgesics, and chronic steroid use were excluded. All patients provided their informed consent to become a part of the study. The ethical board of the hospital approved the study.

Women were prepped for surgery by skin sterilization with a povidone-iodine solution and administration of prophylactic antibiotics. Patients were divided into Group A (n=50) with women undergoing skin closure with metallic

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staples and Group B (n=50) with women undergoing skin closure with 4-0 Monocryl sutures.

Cesarean section was performed by traditional technique in both groups. In Group B, perioperative antibiotics were administered after clamping the umbilical cord, fascia was closed by running closure with 1 polytrioxane suture, and the subcutaneous layer was irrigated with saline and cauterized for hemostasis. In women with subcutaneous layers larger than 2 cm, 3-0 Vicryl was used for closure. The Monocryl continuous buried sutures were done with Aberdeen knots at lateral ends. In Group A, wound eversion was done for staple placement. Wound dressing was done with an abdominal pad and Elastoplast tape. Dressing was removed one day post-op and women were asked to shower. In group A, staples were removed third- or fourth-day post-op thin adhesive strips were placed before discharge in patients with low transverse abdominal incisions and staples were removed 7-10 post-op in patients with vertical incisions.

All patients were examined at discharge and 4-6 weeks postpartum. The primary endpoint was postpartum surgical site infection or wound disruption. The second endpoints were postoperative (3-4 days) and postpartum (4-6 weeks) pain score, surgery duration, cosmesis score (4-6 weeks post-op), comfort of scar (4-6 weeks post-op), and patient satisfaction.

All data was analyzed by SPSS version 24. Categorical data was evaluated by Fisher's exact test and Chi-squared test of independence and quantitative data was evaluated by t-test and Wilcoxon rank test. A p-value of 0.05 or less was taken as significant.

Results

A total of 100 pregnant women undergoing cesarean section were analyzed for the study. Patients were divided into Group A (n=50) with women undergoing skin closure with metallic staples and Group B (n=50) with women undergoing skin closure with 4-0 Monocryl sutures. The groups did not differ significantly for BMI (37 vs 36 kg/m2) and history of c-section (46% vs 52%). 15 patients (30%) in group A received intrapartum antibiotics and 49 patients (98%) received intraoperative antibiotics. In group B, 14 patients (28%) received intrapartum antibiotics and 49 patients (98%) received intraoperative antibiotics. The baseline characteristics of patients are shown in Table I.

The primary outcomes and composite outcomes at discharge and follow-up are shown in Table II. At discharge, the primary outcome was 8% in group A and 1% in group B (RR: 13.2 (2.2-100), p<0.001). At follow-up, the primary outcome was 15% in group A and 5.8% in group B (2.7 (1.5-4.8), p=0.010). 6% of women in group A had disruptions >1 cm and no women were reported in group B (p=0.010). 4% of women in group A had disruption >0.5 cm and 1 woman in group B (P=0.040).

Stratification of primary outcome according to baseline characteristics showed that composite outcome had a higher incidence in women closed with staples regardless of variables including BMI <30 (16% vs 0, p=0.009), BMI ≥30 (16% vs 8%, p=0.120), history or absence of a history of c-sections, labor or attempted induction and incidence of chorioamnionitis.

Secondary outcomes are illustrated in Table III. The average duration of surgery was longer in group B (60 vs 50 minutes). Both groups did not differ significantly in pain scores, satisfaction scores, and cosmesis scores.

Table I: Baseline characteristics of patients

Characteristics	Group A (n=50)	Group B (n=50)	P value
Age	27.6 ± 5.8	27.1 ± 6.0	0.619
BMI	37.2 ± 8.0	36.1 ± 8.8	0.261
Primiparous	16 (32%)	17 (34%)	0.525
History of c-section	23 (46%)	26 (52%)	0.401
Chronic hypertension	6 (12%)	5 (10%)	0.633
Diabetes	10 (20%)	9 (18%)	0.836
HIV	1 (2%)	-	0.502
Chorioamnionitis	5 (10%)	17 (34%)	0.617
Labor or induction	25 (50%)	27 (54%)	0.509
Intrapartum antibiotics	15 (30%)	14 (28%)	0.594
Vertical midline incision	4 (8%)	4 (8%)	0.900
Intraoperative antibiotics	49 (98%)	49 (98%)	>0.999
Steroids	4 (8%)	3 (6%)	0.795
Intraoperative bilateral tubal ligation	17 (34%)	14 (28%)	0.216

Table II: Primary outcomes

	Group A	Group B	Relative risk
At discharge	N=50	N=50	
Composite outcome	4 (8%)	2 (1%)	13.2 (2.2-100)
Infection	-	2 (1%)	
Disruption	3 (6%)	2 (1%)	13.2 (2.2-100)
At postpartum follow-up	N= 40	N= 35	
Composite outcome	6 (15%)	2 (5.8%)	2.7 (1.5-4.8)
Infection	2 (5%)	1 (3.1%)	0.8 (0.5-2.5)
Disruption	6 (15%)	1 (3.1%)	4.0 (1.8-8.8)

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Table III: Secondary outcomes

	Group A (n=40)	Group B (n=35)	P value
Duration of surgery	50 (40-60)	60 (50-70)	0.351
Postoperative pain score	6 (2-8)	6 (5-8)	0.288
Follow-up pain score	0 (0-2)	0 (0-3)	0.070
Composite cosmesis score	4 (4-5)	5 (4-6)	0.748
Satisfied with the appearance of scar	5 (5-6)	5 (5-6)	0.839
Satisfied with the comfort of scar	5 (5-6)	5 (5-6)	0.896
Satisfied with the location of the scar	5 (5-6)	5 (5-6)	0.542

Discussion

This study was conducted to compare the incidence of surgical site infections in patients undergoing skin closure with staples vs sutures after cesarean section. Wound disruption was also assessed as a primary outcome. The results revealed that primary outcomes were significantly higher in women closed with staples (8% vs 1%, discharge) and (15 vs 5.8%, at follow-up). These results are backed by previous studies.8, 9, 10 The high primary outcome in the suture group at discharge may indicate the early removal of staples postoperatively but no clear consensus is available in the literature. 11

Staples group was also more frequent in wound disruption greater than 0.5 and 1 cm which indicates the need for more frequent follow-up visits in patients closed with staples after surgery. Surgery time was longer in the suture group but other secondary outcomes were similar in both groups. However, in a clean-contaminated surgery like abdominal surgery, better patient satisfaction and cosmesis score were reported by skin closure with sutures.12, 13

A recent study by Bandari et al also showed similar results as comparable pain scores and patients' satisfaction were reported.14 However, in contrast to our study the operative time was shorter in patients closed with staples. Hence the study concluded similar effectiveness of both methods of skin closure. Arpitha et al and Vilchez et al also agree with these results.15, 16

Our study included more obese patients which justifies the high frequency of wound morbidity. A randomized clinical trial by Rodel et al conducted in women with a BMI of 40 or more reported that significantly fewer complications and SSIs were noted in the staples group undergoing cesarean delivery.17 However, in a meta-analysis by Han et al in obese women undergoing c-sections, no significant difference was reported in terms of wound infection, complications, pain score, cosmesis score, and patient satisfaction.18

Our study has some limitations. 12.5% of the women were not included in the postpartum follow-up. Secondly, vertical incision was made in a limited number of women so our results can't be generalized to such women.

Conclusion

High incidence of surgical site infections and wound disruption were noted in skin closure with staples as compared to sutures in women undergoing cesarean delivery. However, both methods were similar in pain scores, cosmesis scores, and patient satisfaction.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication
Approved
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Conflict of interest

The authors declared an absence of conflict of interest.

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Concept & Design of Study

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