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Original Research Article

Comparison of Interrupted Vertical Mattress versus Continuous Subcuticular Sutures for Skin Closure in Elective Caesarean Section: A Prospective Comparative Study at District Hospital Kishtwar

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Abstract:

Background: Caesarean section remains a major operative procedure in obstetrics, accounting for approximately 20-30% of deliveries globally. The choice of skin closure technique influences postoperative wound complications and cosmetic outcome. Interrupted vertical mattress sutures provide rapid closure with wound eversion, while continuous subcuticular sutures offer superior cosmesis but require technical expertise.

Objective: To compare interrupted vertical mattress sutures with continuous subcuticular sutures regarding wound infection, dehiscence, pain, operative time, and cosmetic outcome following caesarean section.

Methods: A prospective comparative study was conducted at District Hospital Kishtwar, Department of Obstetrics and Gynaecology, Jammu & Kashmir, India from January 2025 to June 2025. A total of 100 women aged 18-40 years at gestation 37-41 weeks undergoing elective caesarean section via Pfannenstiel incision were allocated into two groups: Group A (continuous subcuticular polyglactin 2-0, n=50) and Group B (interrupted vertical mattress silk 2-0, n=50). All patients received single preoperative ceftriaxone 1gm IV, IV ceftriaxone BD ×3 days, then oral cefuroxime 500mg BD ×7 days. Primary outcomes were wound infection and dehiscence at 7-10 days postoperatively. Secondary outcomes included postoperative pain (visual analogue scale), operative time, and cosmetic appearance at 6 weeks. Statistical analysis used chi-square test for categorical variables and independent t-test for continuous variables; $p<0.05$ was considered statistically significant.

Results: Baseline demographic characteristics were similar between groups (age Group A: 27.6±5.0 years vs Group B: 27.4±3.99 years, p=0.92). Wound infection occurred in 3.4% (n=2) of subcuticular group versus 24% (n=12) in mattress group (p=0.008). Dehiscence was observed in 2% (n=1) versus 10% (n=5) respectively (p=0.204). Mean operative time was 22±7.55 minutes for vertical mattress group. Subcuticular group demonstrated reduced pain, superior cosmesis and higher patient satisfaction compared to mattress group.

Conclusion: Continuous subcuticular polyglactin sutures demonstrated significantly lower wound infection rates (3.4% vs 24%), reduced postoperative pain, and superior cosmetic outcome compared to interrupted vertical mattress silk sutures. Subcuticular closure is recommended as the preferred technique for routine elective caesarean sections.

Keywords: Caesarean section, skin closure, subcuticular sutures, vertical mattress, wound infection, cosmesis.

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Introduction

Caesarean section is one of the most frequently performed major surgical procedures in obstetrics worldwide, with rising rates in both developed and developing nations [1]. The choice of surgical technique and materials significantly impacts postoperative outcomes, including wound complications, pain, and patient satisfaction [2]. While much attention is given to uterine and abdominal closure, skin closure technique remains an underappreciated determinant of postoperative morbidity [3].

Interrupted vertical mattress suturing has been traditionally used for skin closure in caesarean sections due to its simplicity, speed, and ability to provide wound eversion and drainage [4]. However, this technique is associated with several disadvantages, including tissue trauma from multiple bites, suboptimal edge approximation, and characteristic "railroad track" scar appearance [5]. The technique produces thicker, more visible scars and higher rates of wound complications including infection and dehiscence [2].

Continuous subcuticular suturing has gained popularity in recent years as it provides superior cosmetic results through precise edge coaptation and re-

duced tissue trauma [3]. This intracutaneous technique minimizes pain, allows faster healing, and produces finer scars [6]. However, it requires greater technical skill, takes longer to perform, and may provide less drainage in high-risk wound scenarios [4]. Studies comparing these two techniques show variable results, with most demonstrating superiority of subcuticular closure for cosmesis and early complications [2,7]. Despite accumulating evidence in international literature, comparative data from South Asian settings, particularly from low-resource obstetric centers, remain limited [8]. This study was undertaken at District Hospital Kishtwar to provide local evidence regarding the optimal skin closure technique in caesarean sections, considering both clinical efficacy and cosmetic outcomes relevant to the Jammu & Kashmir population.

Aims and Objectives

Primary Objectives:

- To compare the frequency of wound infection between interrupted vertical mattress and continuous subcuticular skin closure techniques in caesarean section
- To compare the frequency of wound dehiscence between the two techniques

Secondary Objectives:

- To compare postoperative pain between the two groups
- To compare operative closure time between the two techniques
- To assess and compare cosmetic outcome at 6 weeks postoperatively

Materials and Methods

Study Design and Setting

A prospective comparative study was conducted at the Department of Obstetrics and Gynaecology, District Hospital Kishtwar, Jammu & Kashmir, India, from January 2025 to June 2025. The study was approved by the Institutional Ethics Committee and adhered to Declaration of Helsinki principles.

Study Population

Inclusion Criteria:

- Women aged 18-40 years
- Undergoing elective caesarean section
- Singleton pregnancies at term (37-41 weeks gestation)
- Pfannenstiel incision for access
- Willing to provide written informed consent
- Available for follow-up at 7-10 days and 6 weeks postoperatively

Exclusion Criteria:

- Maternal BMI >35 kg/m² (due to differential handling of subcutaneous fat)
- Pregestational or gestational diabetes mellitus
- Current or recent corticosteroid use
- Immunocompromised patients
- Chorioamnionitis or clinical signs of infection at time of surgery
- Emergency caesarean sections
- Patients with bleeding disorders or on anticoagulation therapy
- Incision extensions beyond Pfannenstiel

Sample Size and Randomization

Sample size of 100 (50 per group) was calculated based on previous studies showing infection rates of 35-40% with mattress sutures and 8-15% with subcuticular sutures. Using α=0.05 and β=0.20 (power 80%), the calculated sample size was n=45 per group; 50 per group enrolled to account for attrition.

Women meeting inclusion criteria were alternatively allocated to Group A (continuous subcuticular polyglactin 2-0) or Group B (interrupted vertical mattress silk 2-0) in a 1:1 ratio using a randomization list.

Operative Technique

Skin Closure:

Group A (Continuous Subcuticular):

- Suture material: Polyglactin (Vicryl) 2-0, absorbable monofilament
- Technique: Continuous subcuticular (running intradermal) closure
- No suture removal required (absorbable)

Group B (Interrupted Vertical Mattress):

- Suture material: Non-absorbable silk 2-0
- Technique: Interrupted vertical mattress ("far-far-near-near") sutures placed 1cm apart
- Sutures removed on postoperative day 7-10

Time measurement:

Operative time for skin closure (from first suture to last knot) was recorded for each patient.

Antibiotic Prophylaxis

All patients received:

- Single preoperative dose: Ceftriaxone 1gm IV (<60 minutes before incision)
- Postoperative: Ceftriaxone 1gm IV twice daily for 3 days
- Discharge medication: Cefuroxime 500mg twice daily for 7 days

Outcome Measures

Primary Outcomes:

1. **Wound Infection:** CDC-defined presence of purulent discharge, erythema, and warmth within 30 days. Assessed at 7-10 days and 4 weeks postoperatively.
2. **Wound Dehiscence:** Partial or complete separation of wound edges assessed clinically at 7-10 days postoperatively.

Secondary Outcomes:

1. **Postoperative Pain:** VAS score (0=no pain, 10=worst pain) at day 3-5
2. **Operative Closure Time:** Total time in minutes from first suture to last knot
3. **Cosmetic Outcome:** Vancouver Scar Scale at 6 weeks

Statistical Analysis

Data analyzed using SPSS v25. Chi-square test for categorical variables; t-test for continuous variables. $p<0.05$ considered statistically significant.

Results

Baseline Characteristics: A total of 100 women undergoing elective caesarean section were enrolled. Baseline demographic characteristics are presented in Table 1.

Table 1: Baseline Demographic and Clinical Characteristics

Characteristic	Group A: Subcuticular (n=50)	Group B: Vertical Mattress (n=50)	p-value
Age (years)	27.6±5.0	27.4±3.99	0.92
Gestation (weeks)	37-41	37-41	-
BMI (kg/m²)	Similar	Similar	>0.05
Parity (Primigravida)	24 (48%)	22 (44%)	0.67

Groups were well-balanced for age, gestation, BMI, and parity.

Primary Outcomes

Table 2: Primary Outcomes—Wound Complications

Outcome	Group A: Subcuticular (n=50)	Group B: Vertical Mattress (n=50)	p-value
Wound Infection	**3.4% (n=2)**	**24% (n=12)**	**0.008**
Wound Dehiscence	**2.0% (n=1)**	**10% (n=5)**	**0.204**

Interpretation: Subcuticular sutures resulted in dramatically lower infection rates (3.4% vs 24%, 7-fold reduction, p=0.008). Dehiscence showed trend toward lower rates in subcuticular group (2% vs 10%, p=0.204).

Secondary Outcomes

Table 3: Secondary Outcomes—Pain, Operative Time, and Cosmesis

Outcome	Group A: Subcuticular	Group B: Vertical Mattress	p-value
Pain VAS Day 3	Lower	Higher	<0.05
Operative Time (min)	28±7.55	22±7.55	<0.001
Good Cosmesis	Superior	Inferior	<0.001
Patient Satisfaction	Higher	Lower	<0.001

Subcuticular group demonstrated reduced pain, superior cosmesis, and higher patient satisfaction with scarring compared to mattress group. Vertical mattress group had significantly shorter operative time (22±7.55 vs 28±7.55 minutes, $p<0.001$).

Discussion

Wound Infection

Our finding of 3.4% infection with subcuticular sutures versus 24% with vertical mattress silk sutures (p=0.008) represents a 7-fold reduction in infection risk with subcuticular closure.

This dramatic difference likely reflects:

1. **Braided silk structure:** Non-absorbable silk's braided nature promotes bacterial adherence compared to monofilament synthetic materials[1,2]
2. **Multiple puncture sites:** Vertical mattress creates numerous skin penetrations increasing contamination risk[3]
3. **Precise edge coaptation:** Subcuticular's intracutaneous placement ensures optimal wound approximation with minimal dead space[4]
4. **Extended prophylaxis:** Despite aggressive antibiotic coverage (ceftriaxone+cefuroxime), suture choice remained dominant infection determinant[5]

Wound Dehiscence: Dehiscence rates trended lower in subcuticular group (2% vs 10%, p=0.204). While not statistically significant, this reflects superior edge approximation with subcuticular technique [6]. Larger studies may demonstrate definitive advantage.

Postoperative Pain and Cosmesis: Subcuticular sutures showed reduced early pain and superior cosmetic appearance, consistent with literature demonstrating benefits of intracutaneous closure [3,4].

The superior patient satisfaction ($p<0.001$) underscores the importance of cosmetic outcomes for women undergoing caesarean delivery.

Operative Time: Vertical mattress sutures required significantly less operative time (22 minutes vs 28 minutes, 6-minute difference, $p<0.001$), reflecting the technical simplicity of interrupted technique. However, this modest time savings must be weighed against substantially higher infection rates and inferior cosmesis.

Clinical Implications: For elective caesarean sections at District Hospital Kishtwar and similar centers, continuous subcuticular polyglactin 2-0 is recommended as standard skin closure technique given:

- 7-fold reduction in infection (3.4% vs 24%)
- Superior cosmesis and patient satisfaction
- Acceptable operative time (6-minute increase)
- Absorbable material eliminating suture removal
- Reduced early postoperative pain

Limitations

- Single-center design
- Non-randomized allocation
- Limited long-term scar assessment
- Operator variability possible

Conclusion

In 100 elective caesarean patients at District Hospital Kishtwar, continuous subcuticular polyglactin 2-0 sutures demonstrated 7-fold lower wound infection rates (3.4% vs 24%, $p=0.008$), superior cosmesis, and higher patient satisfaction compared to interrupted vertical mattress silk 2-0 sutures, with operative time of 22±7.55 minutes for mattress versus 28±7.55 minutes for subcuticular closure. Subcuticular closure is recommended as standard skin closure technique for routine elective caesarean sections when surgical expertise is available.

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