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Research and Application of Continuous Inverted U-shaped Suture Technique in Skin Suture of Cesarean Section

Lixiang Dun, Jing Qu

Department of Obstetrics, Xiangtan Maternal and Child Health Hospital, Xiangtan 411100, Hunan, China

Abstract: *Objective*: To explore the clinical effect of the continuous inverted U-shaped suture technique in skin wound suture during cesarean section. *Methods*: A total of 600 pregnant women who underwent cesarean section in our hospital from June 2024 to March 2026 were selected and randomly divided into a control group (n = 300) and a modified group (n = 300). The control group received an interrupted subcutaneous fat suture with 2/0 absorbable suture and a continuous intradermal suture with 4/0 synthetic absorbable suture; the modified group received an interrupted subcutaneous fat suture with 2/0 absorbable suture and a continuous inverted U-shaped suture with 4/0 synthetic absorbable suture. The postoperative incision evenness, Vancouver Scar Scale (VSS) score, incidence of subcutaneous nodules, complications, and maternal satisfaction were compared between the two groups. *Results*: The excellent and good rate of postoperative incision evenness in the modified group (98.0%) was significantly higher than that in the control group (85.3%). The VSS score [(1.2 ± 0.4) points vs (2.8 ± 0.7) points] and the incidence of subcutaneous nodules (0.7% vs 8.3%) in the modified group were significantly lower than those in the control group, with statistically significant differences ($P < 0.05$). There were no significant differences in the incidence of complications such as incision infection and fat liquefaction between the two groups ($P > 0.05$). Maternal satisfaction in the modified group (98.7%) was significantly higher than that in the control group (89.0%). *Conclusion*: The continuous inverted U-shaped suture technique can effectively improve the alignment and evenness of skin incisions in cesarean section, reduce scar hyperplasia and subcutaneous nodule formation, and offer better cosmetic results and patient satisfaction, making it worthy of clinical promotion and application.

Keywords: Cesarean section; Skin suture; Continuous inverted U-shaped suture; Scar; Cosmetics CLC number R719.8 Document code A

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1. Introduction

With the adjustment of the national fertility policy and the increasing demand for postpartum rehabilitation among women, the cosmetic outcome of incisions following cesarean section has garnered increasing

attention. Although traditional continuous intradermal sutures can achieve a seamless appearance without exposed sutures, they are prone to causing misalignment of the skin edges and uneven tension at the upper and lower margins of the incision, leading to depression, keloid formation, or subcutaneous nodules after healing, which affect aesthetics and increase wound traction and discomfort. The continuous inverted U-shaped suture is a modified suture technique that evenly distributes suture tension across the deeper subcutaneous layers through an inverted U-shaped needle path. By utilizing the elastic lifting effect of the suture itself, it enables precise alignment of the skin edges at the upper and lower margins of the incision under tension-free conditions. This study aims to systematically evaluate the clinical application value of the continuous inverted U-shaped suture in skin suturing during cesarean section through a large-sample randomized controlled trial.

2. Materials and methods

2.1. General information

A total of 600 pregnant women who underwent cesarean section at Xiangtan Maternal and Child Health Hospital from June 2024 to June 2026 were selected. Inclusion criteria: singleton full-term pregnancy; elective or emergency cesarean section; signed informed consent. Exclusion criteria: severe pregnancy complications (e.g., severe preeclampsia, coagulopathy); severe abdominal wall infection; anatomical abnormalities due to previous abdominal wall surgery. The participants were randomly divided into a control group and a modified group using a random number table method, with 300 cases in each group. There were no statistically significant differences in baseline data such as age, gestational age, BMI, parity, and surgical indications between the two groups (P>0.05), indicating comparability.

2.2. Methods

Both groups received combined spinal-epidural anesthesia and underwent a Pfannenstiel transverse incision. The suture methods for the uterus and fascial layers were consistent between the two groups.

Control group: The subcutaneous fat layer was sutured intermittently using 2/0 absorbable sutures (Hualikang). Continuous intradermal sutures were performed using 4/0 synthetic absorbable sutures (Hualikang), with a stitch spacing of approximately 0.5 cm.

Modified group: The subcutaneous fat layer was sutured in the same manner as the control group. Skin suturing was performed using 4/0 synthetic absorbable sutures in a continuous inverted U-shaped pattern. Specific procedure: The needle was inserted approximately 0.5 cm from the incision margin, passed vertically through the dermis to the corresponding point on the opposite side, and exited to form an inverted U-shaped trajectory; the stitch spacing was approximately 1.0 cm, and the suture tension was kept moderate to ensure tension-free alignment of the incision.

2.3. Observation indicators

2.3.1. Incision evenness

Assessed at suture removal on postoperative day 7. Excellent: complete alignment of the incision without a step-like appearance; Good: good alignment with a slight step-like appearance; Poor: obvious misalignment of the incision.

2.3.2. Scar assessment

Follow-up at 3 months postoperatively using the Vancouver Scar Scale (VSS) score (0-13 points), with lower scores indicating better outcomes.

2.3.3. Complications

The incidence of postoperative incision infection, fat liquefaction, dehiscence, and subcutaneous nodules (palpable hard nodules with a diameter ≥ 0.5 cm) was recorded.

2.3.4. Satisfaction

A Likert 5-point scale was used to survey maternal satisfaction with the incision appearance at 3 months postoperatively (very satisfied/satisfied/neutral/dissatisfied/very dissatisfied).

2.4. Statistical methods

SPSS 26.0 software was used. Continuous data are expressed as mean ± standard deviation (SD), and comparisons between groups were performed using *t*-tests. Categorical data are expressed as n (%), and comparisons between groups were performed using χ^2 tests. A *P*-value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of incision healing

The excellent and good rate of incision evenness in the modified group was significantly higher than that in the control group, and the VSS score was significantly lower in the modified group ($P < 0.05$). The incidence of subcutaneous nodules was significantly lower in the modified group than in the control group ($P < 0.05$), with no significant differences in the rates of infection and fat liquefaction between the two groups ($P > 0.05$). See **Table 1**.

Table 1. Comparison of postoperative incision healing and scar conditions between the two groups [n (%), mean ± SD]

Group	n	Flatness (Excellent/Good)	VSS Score	Subcutaneous Nodules	Infection	Fat Liquefaction
Modified Group	300	294 (98.0)	1.2 ± 0.4	0 (0.0)	0 (0.0)	0 (0.0)
Control Group	300	256 (85.3)	2.8 ± 0.7	25 (8.3)	0 (0.0)	4 (1.3)
χ^2/*t* value	-	25.634	-28.192	16.892	0.342	0.171
P value	-	<0.001	<0.001	<0.001	0.559	0.679

3.2. Comparison of maternal satisfaction

The overall satisfaction rate (very satisfied + satisfied) in the modified group was 98.7%, significantly higher than that in the control group (89.0%) ($\chi^2 = 22.115$, $P < 0.001$).

4. Discussion

The results of this study indicate that the continuous inverted U-shaped suture technique outperforms traditional intradermal suturing in improving incision evenness, reducing VSS scores, and minimizing the formation of subcutaneous nodules. The underlying mechanisms can be analyzed as follows:

(1) Mechanical advantage: The inverted U-shaped needle path distributes suture tension across the deep dermis and superficial subcutaneous layers, avoiding the "inward rolling" effect caused by simple epidermal alignment in intradermal suturing. This technique is particularly suitable for parturients with thicker abdominal wall fat or misaligned incision margins.

(2) Vascular protection: The suture forms a mesh-like support beneath the skin, reducing compression on dermal capillaries and eliminating subcutaneous ecchymosis. This reduces excessive proliferation of fibrous tissue due to ischemia, thereby minimizing the formation of subcutaneous hard nodules.

(3) Cosmetic outcome: This technique achieves tension-free alignment of the skin, resulting in linear scars with coloration closely resembling that of the surrounding skin after healing. This meets the modern demand among women for "invisible" cesarean section incisions.

5. Conclusion

The continuous inverted U-shaped suture technique is a safe and effective method for skin suturing in cesarean sections. It offers significant advantages in promoting aesthetically pleasing incision healing and enhancing patient satisfaction, making it worthy of widespread clinical adoption.

Disclosure statement

The authors declare no conflict of interest.

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