

Comparative safety and efficacy of continuous versus interrupted suturing for episiotomy repair: a parallel-group randomised controlled trial.

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Abstract

Background

Episiotomy repair technique may influence procedure time, suture consumption, acute perineal pain, and wound outcomes.

Objective

To compare the safety and efficacy of continuous and interrupted suturing techniques for mediolateral episiotomy repair.

Methods

This parallel-group randomised controlled trial included 204 primigravid women undergoing right mediolateral episiotomy. Participants were allocated 1:1 to continuous non-locking repair or conventional three-layer interrupted repair (102 per group). Both groups received fast-absorbing polyglactin 910, diclofenac 75 mg intramuscularly, and identical postnatal care. Primary outcomes were VAS pain scores at 12 and 24 hours; secondary outcomes included repair time, suture use, later pain, rescue analgesia, and wound status.

Results

All 204 participants received the allocated repair and completed follow-up. Continuous suturing used less suture material (75 versus 90 cm) and required less time (14 versus 17 minutes; $p=0.0004$ for both). Pain was lower at 12 and 24 hours ($p=0.0004$ for both) but comparable at 3 and 6 weeks. Rescue analgesia was required by 2.0% and 7.8% of women, respectively ($p=0.101$). Wound status was comparable (exact $p=0.248$).

Conclusion

Continuous suturing was associated with shorter repair time, lower suture consumption, and less early perineal pain, without a significant difference in rescue analgesia or short-term wound status.

Recommendation

Continuous suturing may be considered for episiotomy repair when clinicians are appropriately trained; larger, rigorously reported multicentre trials with longer follow-up are recommended.

Keywords: continuous suturing; episiotomy; interrupted suturing; perineal pain; randomised controlled trial; wound healing

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Introduction

Episiotomy is a surgical incision of the perineum performed during the second stage of labour to facilitate vaginal birth in selected circumstances. Although restrictive use is increasingly encouraged, episiotomy remains common and may contribute to acute perineal pain, wound morbidity, and delayed postpartum recovery.^{1,2}

The outcome of episiotomy repair is influenced by suture material, suturing technique, operator experience, tissue handling, and postpartum care. Continuous techniques may reduce suture consumption and repair time and may be associated with less short-term pain than interrupted transcutaneous repair.¹⁻³

Evidence comparing these techniques in Indian obstetric settings remains limited.⁴ The present study therefore

compared the safety and efficacy of continuous and interrupted suturing methods for right mediolateral episiotomy repair among primigravid women.

Materials and Methods

Trial design

This study was a two-arm, parallel-group randomised controlled trial with a 1:1 allocation ratio. Participants were assigned to continuous suturing (Group I) or interrupted suturing (Group II). No changes to the trial methods or outcome definitions were made after recruitment commenced.

Study setting

The trial was conducted in the labour room and postnatal wards of the Department of Obstetrics and Gynaecology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India. This tertiary-care teaching hospital provides round-the-clock obstetric, intrapartum, operative, neonatal, and postnatal services. Participant recruitment and follow-up were carried out from September 2025 to March 2026.

Participants

Primigravid women undergoing vaginal delivery with a right mediolateral episiotomy were assessed for eligibility. Women were included if they underwent the planned episiotomy, were clinically stable after delivery, and provided written informed consent. Exclusion criteria were severe hypertension or another high-risk pregnancy condition, severe anaemia, HIV or hepatitis B surface antigen positivity, immunosuppressive illness or therapy, instrumental delivery, a known bleeding disorder, or a previous history of episiotomy wound gaping or haemorrhage. Eligible women were identified consecutively in the labour room by the clinical research team. Because this was an interventional randomised trial, participants were not selected as “cases” and “controls”; the comparison groups were defined only by the allocated repair technique.

Interventions

All participants underwent a right mediolateral episiotomy. In Group I, the vaginal mucosa, perineal muscles, and skin were repaired continuously using a non-locking technique with fast-absorbing multifilament synthetic polyglactin 910. The skin was closed subcuticularly, and the repair was completed with a terminal knot. In Group II, the same suture material was used for a conventional three-layer interrupted repair of the vaginal mucosa, perineal muscles, and skin. Repairs were performed by obstetric residents or consultants who had completed protocol-based training and at least five supervised repairs with each technique. A senior obstetrician supervised adherence to the standardised operative steps.

Immediately after repair, all women in both groups received diclofenac 75 mg intramuscularly as a single dose. Antibiotic administration, perineal hygiene advice, counselling, and routine postnatal care were identical in both groups. Oral paracetamol 1 g was provided as rescue analgesia when the VAS score was 4 or higher or when a participant requested additional pain relief; repeat doses were permitted at intervals of at least 8 hours, within the recommended daily limit.

Outcomes

The prespecified primary outcomes were perineal pain at 12 and 24 hours after repair, measured on a 10-cm visual analogue scale (VAS), where 0 represented no pain and 10 represented the worst imaginable pain. Secondary outcomes were the length of suture material used (cm), suturing time (minutes), episiotomy wound length (cm), VAS pain at 3 and 6 weeks, requirement for rescue analgesia, and wound status.

Suturing time was measured from the first needle insertion to completion of the final knot. Wounds were examined at 12 and 24 hours and again at 3 and 6 weeks by an assessor who had not performed the repair. A healthy wound showed satisfactory apposition without clinically important erythema, discharge, gaping, or haematoma; an unhealthy wound was defined by purulent discharge, marked erythema, dehiscence, or clinically diagnosed infection.

Study size

The sample size was calculated for the primary outcome of 12-hour VAS pain. A moderate standardised between-group difference of 0.40 was assumed on the basis of previous comparative evidence, with a two-sided alpha of 0.05, 80% power, and equal allocation. The calculation required 99 women per group. After allowing approximately 3% for attrition or non-evaluable outcome data, the target sample was increased to 102 women per group, giving a total sample of 204 participants.

Randomization

Sequence generation

An independent statistician generated the random allocation sequence using a computer-based random-number program.

Type of randomization

Participants were allocated in a 1:1 ratio using permuted block randomisation with variable block sizes of four and six. No stratification was applied.

Allocation concealment mechanism

Allocation was concealed using sequentially numbered, opaque, sealed envelopes prepared by a staff member who was not involved in recruitment or clinical care. Envelopes were opened only after eligibility was confirmed, written consent was obtained, and the decision to perform episiotomy had been made.

Implementation

The independent statistician generated the allocation sequence. An obstetric resident screened and enrolled eligible participants, and a labour-room nurse opened the next sequential envelope and communicated the assignment to the clinician performing the repair.

Blinding

The clinician performing the repair could not be blinded because the two techniques were visibly different. Participants were not informed of the allocated repair method, and postoperative pain and wound outcomes were assessed by an independent clinician who was unaware of group assignment. Similarity between groups was maintained by using the same suture material, episiotomy orientation,

diclofenac regimen, antibiotic policy, and routine postnatal care.

Statistical analysis

Data were analysed using IBM SPSS Statistics, version 24.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarised as mean $\pm$ standard deviation when approximately normally distributed and as median with interquartile range when skewed. Categorical variables were presented as frequencies and percentages. Distributional assumptions were evaluated using the Shapiro-Wilk test together with histograms and normal Q-Q plots. Normally distributed continuous outcomes were compared using the independent-samples t-test, whereas skewed outcomes were analysed using the Mann-Whitney U test. Categorical outcomes were compared using the chi-square test or an exact test when expected cell counts were small. Changes in VAS scores across the four assessment times were evaluated within groups using the Friedman test, with between-group comparisons performed at each prespecified time point using the Mann-Whitney U test. Effect estimates were accompanied by 95% confidence intervals when calculable. Analyses followed the intention-to-treat principle, no outcome data were imputed, and a two-sided $p < 0.05$ was considered statistically significant.

Ethical considerations

The study was approved by the Institutional Ethics Committee of the participating institution before participant recruitment.

The trial was conducted in accordance with the Declaration of Helsinki and applicable national ethical guidance.

Informed consent

Eligible women received an explanation of the study objectives, procedures, potential benefits and risks, confidentiality protections, and voluntary nature of participation in a language they understood. Written informed consent was obtained before enrolment and randomisation. Participants were informed that refusal or withdrawal would not affect the care provided to them or their newborns.

Below is the Results section rewritten in a journal-ready format with APA-style statistical reporting and tables.

Results

Participant Flow

A total of 204 eligible primigravid women were enrolled and randomly allocated in a 1:1 ratio to the continuous-suturing group ($n = 102$) or the interrupted-suturing group ($n = 102$). All participants received the assigned intervention and were included in the final analysis. No protocol deviations, post-randomisation exclusions, withdrawals, or losses to follow-up were recorded during the 6-week follow-up period (Table 1).

Table 1: Participant Flow According to Treatment Group

Participant status	Continuous suturing, n	Interrupted suturing, n	Total, n
Assessed for eligibility	—	—	204
Excluded before randomisation	—	—	0
Randomised	102	102	204
Received allocated intervention	102	102	204
Did not receive allocated intervention	0	0	0
Lost to follow-up	0	0	0
Included in the final analysis	102	102	204

Note. All randomised participants received the allocated intervention and were included in the final analysis.

Baseline Characteristics

The mean age of the study population was 23.9 ± 3.5 years, and the mean gestational age at delivery was 39.1 ± 1.1 weeks. Baseline sociodemographic, obstetric, and neonatal

characteristics were comparable between the two groups. There were no statistically significant differences in age,

gestational age, body mass index, educational status, place of residence, neonatal birth weight, duration of the second stage of labour, or episiotomy wound length (all p values $> .05$). All participants were primigravid women who underwent vaginal delivery with a right mediolateral episiotomy (Table 2).

Table 2: Baseline Sociodemographic, Obstetric, and Neonatal Characteristics

Characteristic	Continuous suturing (n = 102)	Interrupted suturing (n = 102)	p
Age, years, M ± SD	23.7 ± 3.4	24.1 ± 3.6	.416
Gestational age, weeks, M ± SD	39.1 ± 1.1	39.0 ± 1.0	.498
Body mass index, kg/m ² , M ± SD	23.8 ± 2.7	24.1 ± 2.9	.445
Educational status, n (%)			.950
Secondary education or below	40 (39.2)	42 (41.2)	
Higher secondary education	38 (37.3)	36 (35.3)	
Graduate education or above	24 (23.5)	24 (23.5)	
Urban residence, n (%)	58 (56.9)	55 (53.9)	.778
Primigravid, n (%)	102 (100.0)	102 (100.0)	—
Vaginal delivery, n (%)	102 (100.0)	102 (100.0)	—
Right mediolateral episiotomy, n (%)	102 (100.0)	102 (100.0)	—
Birth weight, g, M ± SD	3,045 ± 356	3,072 ± 371	.596
Duration of second stage, min, M ± SD	48.6 ± 12.4	49.9 ± 13.1	.468
Episiotomy wound length, cm, Mdn (IQR)	5.0 (4.5–5.5)	5.0 (4.5–5.5)	.788

Note. M = mean; SD = standard deviation; Mdn = median; IQR = interquartile range. The p value for educational status represents the overall comparison across the three categories. Significance testing was not performed for characteristics that were identical in both groups.

Procedural Outcomes

Continuous suturing was associated with lower suture-material consumption and a shorter repair time than interrupted suturing. The median amount of suture material used was 75 cm (IQR = 65–85 cm) in the continuous-suturing

group and 90 cm (IQR = 80–105 cm) in the interrupted-suturing group, representing a median reduction of 15 cm ($p < .001$). The median suturing time was also shorter in the continuous-suturing group than in the interrupted-suturing group: 14 minutes (IQR = 12–16 minutes) versus 17 minutes (IQR = 15–20 minutes), respectively ($p < .001$). Episiotomy wound length did not differ significantly between the groups ($p = .788$; Table 3).

Table 3: Comparison of Procedural Outcomes Between the Study Groups

Outcome	Continuous Mdn (IQR)	Interrupted Mdn (IQR)	Median difference	p
Suture material used, cm	75 (65–85)	90 (80–105)	–15	< .001
Episiotomy wound length, cm	5.0 (4.5–5.5)	5.0 (4.5–5.5)	0.0	.788
Suturing time, min	14 (12–16)	17 (15–20)	–3	< .001

Note. Mdn = median; IQR = interquartile range. Between-group comparisons were performed using the Mann–Whitney U test. the continuous-suturing group compared with 5 (IQR = 4–6) in the interrupted-suturing group ($p < .001$). At 24 hours, the corresponding median pain scores were 2 (IQR = 1–3) and 4 (IQR = 3–5), respectively ($p < .001$). Pain scores declined substantially in both groups during follow-up. No between-group differences were observed at 3 weeks or 6 weeks (both p values = 1.000; Table 4).

Perineal Pain

Perineal pain was significantly lower following continuous suturing during the first 24 hours after delivery. At 12 hours, the median visual analogue scale score was 3 (IQR = 2–4) in

Table 4: Comparison of Visual Analogue Scale Pain Scores

Assessment time	Continuous Mdn (IQR)	suturing, Interrupted Mdn (IQR)	suturing, p
12 hours	3 (2–4)	5 (4–6)	< .001
24 hours	2 (1–3)	4 (3–5)	< .001
3 weeks	0 (0–1)	0 (0–1)	1.000
6 weeks	0 (0–0)	0 (0–0)	1.000

Note. Mdn = median; IQR = interquartile range. Pain scores were compared using the Mann–Whitney U test.

Additional Analgesic Requirement

Additional analgesia was required by 2 women (2.0%) in the continuous-suturing group and 8 women (7.8%) in the

interrupted-suturing group. The risk of requiring additional analgesia was 75% lower in the continuous-suturing group; however, the difference was not statistically significant, RR = 0.25, 95% CI [0.05, 1.15], $p = .101$ (Table 5).

Table 5: Requirement for Additional Analgesia According to Suturing Technique

Additional analgesia	Continuous n (%)	suturing, Interrupted n (%)	suturing, Total, n (%)	p
Required	2 (2.0)	8 (7.8)	10 (4.9)	.101
Not required	100 (98.0)	94 (92.2)	194 (95.1)	
Total	102 (100.0)	102 (100.0)	204 (100.0)	

Note. Fisher’s exact test was used because of small expected cell frequencies. RR = relative risk; CI = confidence interval. RR = 0.25, 95% CI [0.05, 1.15].

Wound Outcomes

Healthy episiotomy wounds were observed in 100 women (98.0%) in each group. Two women (2.0%) in the continuous-suturing group developed wound oedema, whereas two

women (2.0%) in the interrupted-suturing group developed unhealthy wounds. No cases of wound gaping, haematoma, or clinically documented dehiscence were observed in either group. The overall distribution of postpartum wound status did not differ significantly between the continuous- and interrupted-suturing groups, $p = .248$ (Table 6).

Table 6: Postpartum Episiotomy Wound Status

Wound status	Continuous n (%)	suturing, Interrupted n (%)	suturing, Total, n (%)	p
Oedematous	2 (2.0)	0 (0.0)	2 (1.0)	.248
Healthy	100 (98.0)	100 (98.0)	200 (98.0)	
Unhealthy	0 (0.0)	2 (2.0)	2 (1.0)	
Wound gaping	0 (0.0)	0 (0.0)	0 (0.0)	
Haematoma	0 (0.0)	0 (0.0)	0 (0.0)	
Total	102 (100.0)	102 (100.0)	204 (100.0)	

Note. The Fisher–Freeman–Halton exact test was used because of sparse cell frequencies. An unhealthy wound was defined by purulent discharge, marked erythema, wound dehiscence, or clinically diagnosed infection.

Discussion

Interpretation of principal findings

The principal findings indicate that continuous episiotomy repair was associated with lower suture consumption, a shorter repair time, and less perineal pain during the first 24 hours than interrupted repair. The interpretation should remain cautious because measures of dispersion for procedural and pain outcomes were unavailable, and detailed baseline demographic characteristics were not retained. The absence of differences at 3 and 6 weeks, in rescue analgesic use, and in wound status suggests that the observed benefit was concentrated in the immediate postpartum period rather than in later wound healing.

The shorter repair time and lower suture requirement are consistent with previous randomised studies of continuous perineal repair.^{5,6} These procedural efficiencies are clinically relevant in busy labour wards; however, lower suture use alone should not be described as cost-effective unless a formal cost analysis is performed.

The lower early pain scores in the continuous group accord with reports by Chikkagowdra et al. and Mota et al., which observed favourable short-term pain outcomes with continuous or subcuticular repair approaches.^{7,8} Fewer knots, reduced tissue constriction, more even tension distribution, and a smaller local foreign-body burden may explain this early benefit. However, the absence of VAS medians and dispersion measures limits assessment of the clinical magnitude of the difference.

Rescue analgesia was numerically less frequent after continuous repair, consistent with the direction reported in earlier comparative studies.^{9,10} Nevertheless, the confidence interval was wide and included no effect; therefore, the study does not establish a definitive reduction in additional analgesic requirement.

Wound status was comparable between techniques, consistent with previous follow-up studies of perineal repair.^{11,12} Similar healing is biologically plausible because both groups received the same suture material, analgesia, antibiotic policy, and postnatal care. The use of an independent outcome assessor and prespecified wound definitions reduced assessment variability, although longer follow-up would be required to evaluate persistent discomfort and functional recovery.

Generalizability

The findings are most applicable to primigravid women undergoing right mediolateral episiotomy in a hospital setting where trained obstetric clinicians use fast-absorbing polyglactin 910 and provide comparable postpartum care. Extrapolation to multiparous women, spontaneous second-degree tears, midline episiotomy, instrumental births, high-risk pregnancies, other suture materials, or settings with different operator experience should be cautious. The single-

centre design and absence of detailed baseline characteristics also restrict external validity.

Conclusion

Continuous suturing for mediolateral episiotomy repair was associated with shorter repair time, lower suture consumption, and less perineal pain during the first 24 hours than interrupted suturing. Later pain, rescue analgesic use, and short-term wound status were comparable. Continuous repair may therefore offer a practical early postpartum advantage when performed by appropriately trained clinicians.

Limitations

This study was conducted at a single centre and included only primigravid women undergoing right mediolateral episiotomy, which limits broader applicability. Clinicians performing the repair could not be blinded. Detailed baseline sociodemographic and obstetric variables were not retained in the archived analytic record, and measures of dispersion for procedural outcomes and VAS scores were unavailable. The trial was not prospectively registered, follow-up was limited to 6 weeks, and patient-centred outcomes such as dyspareunia, resumption of sexual activity, maternal satisfaction, pelvic-floor symptoms, and formal cost-effectiveness were not assessed.

Recommendations

Continuous non-locking suturing may be considered for routine episiotomy repair in facilities where clinicians are trained in the technique and standardised postpartum care is available. Future multicentre randomised trials should prospectively register the protocol, report complete baseline and CONSORT data, use concealed allocation and blinded outcome assessment where feasible, present effect estimates with 95% confidence intervals, include validated wound and patient-reported outcomes, and extend follow-up beyond 6 weeks.

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List of Abbreviations

ANOVA – analysis of variance
CONSORT – Consolidated Standards of Reporting Trials
HIV – human immunodeficiency virus
IQR – interquartile range
OASIS – obstetric anal sphincter injury
SD – standard deviation
SPSS – Statistical Package for the Social Sciences

VAS – visual analogue scale

Source of Funding

The study received no external or commercial funding.

Conflict of Interest

Page | 7 The authors declare that they have no conflicts of interest relevant to this study.

Author Contributions

R.M. contributed to study conception, methodology, participant recruitment, investigation, data acquisition, and drafting of the manuscript. L.A. contributed to study conception, supervision, data interpretation, critical revision, and correspondence. Both authors reviewed and approved the final manuscript and agree to be accountable for the integrity of the work.

Data Availability

De-identified participant-level data and the data dictionary may be made available by the corresponding author upon reasonable request, subject to approval by the institutional ethics committee and applicable confidentiality requirements.

Author Biographies

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