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Original Article

Comparative Evaluation of Suture Removal Timing on Soft Tissue Healing after Oral Surgery

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ABSTRACT

Background: The optimal interval for removing sutures after oral surgery remains uncertain because premature removal may reduce wound support, whereas prolonged retention may increase tissue irritation and discomfort. Objective: To compare postoperative soft-tissue healing, pain, inflammation, patient comfort, wound dehiscence, and infection following suture removal on Days 5, 7, and 10. Methods: This parallel-group randomized clinical trial was conducted in dental teaching hospitals in Sindh, Pakistan, from January to December 2025. A total of 105 adults undergoing oral surgical procedures requiring primary closure were allocated equally to Day 5, Day 7, or Day 10 removal. Healing was evaluated using the Early Wound Healing Score, while pain, inflammation, comfort, dehiscence, and infection were assessed during follow-up. Complete-case analysis included 103 participants. Results: Day 5 healing scores did not differ significantly among groups (p=0.531). From Day 7 onward, the Day 7 group demonstrated higher healing scores and lower pain and inflammation. On Day 14, healing scores were 8.8±0.7, 9.6±0.5, and 9.3±0.6 in the Day 5, Day 7, and Day 10 groups, respectively (p<0.001). Corresponding pain scores were 0.5±0.3, 0.2±0.1, and 0.4±0.2 (p=0.004), while inflammation scores were 1.1±0.4, 0.5±0.2, and 0.8±0.3 (p<0.001). Dehiscence and infection differences were not statistically significant. Conclusion: Day 7 removal produced the most favourable overall healing and patient-reported profile under the study protocol, although complication outcomes remained inconclusive. Keywords: Oral surgery; Suture removal; Wound healing; Postoperative pain; Inflammation; Patient-reported outcome; Randomized clinical trial.

INTRODUCTION

Oral surgical procedures frequently require primary closure of mucosal or mucoperiosteal wounds to stabilize tissue margins, control bleeding, protect the operative site, and facilitate healing by primary intention. Conventional sutures remain widely used for this purpose despite the availability of tissue adhesives and alternative closure techniques (1–4). Successful postoperative healing depends on the interaction of patient-related, wound-related, and procedural factors, including systemic health, oral hygiene, vascular supply, surgical trauma, infection control, flap stability, suture material, and postoperative care (5,6).

Wound healing is a coordinated biological process involving overlapping phases of haemostasis, inflammation, proliferation, and tissue remodelling. During the early postoperative period, sutures provide mechanical support while epithelial continuity, fibroblast proliferation, angiogenesis, collagen deposition, and extracellular matrix formation progressively restore tissue integrity (5,7). The timing of

suture removal must therefore balance two competing clinical considerations. Premature removal may reduce wound support before sufficient tissue strength has developed, potentially increasing the risk of wound separation or delayed healing. Conversely, prolonged suture retention may increase plaque accumulation, local tissue irritation, inflammatory reaction, bacterial colonization, and patient discomfort because the suture remains a foreign material within the oral environment (6,8,9).

Clinical recommendations for removing oral sutures commonly range from approximately 5 to 14 days, depending on the anatomical site, wound characteristics, surgical procedure, tissue tension, suture material, and clinician preference (8–10). In routine practice, some clinicians favour removal at approximately five days to reduce plaque retention and foreign-body irritation, whereas others retain sutures for seven to ten days to provide longer mechanical support during early tissue repair. The absence of a universally accepted interval has contributed to variation in postoperative protocols across institutions and practitioners.

Previous clinical research has shown that wound-management strategies can influence postoperative pain, swelling, inflammation, tissue approximation, and patient recovery. Studies comparing primary and secondary closure, sutureless approaches, interrupted and continuous suturing techniques, and different numbers of sutures have reported clinically relevant differences in early postoperative outcomes (1–4,11–15). These findings support the broader principle that the method and duration of wound support may affect healing. However, most available investigations have focused on closure technique or suture configuration rather than directly comparing predefined suture-removal intervals.

Direct evidence concerning the optimal time for oral suture removal remains limited. One comparative investigation suggested that removal after approximately one week may provide more favourable healing than earlier or more prolonged retention (8). Nevertheless, available evidence is insufficient to establish a uniform protocol, particularly when patient characteristics, oral hygiene practices, postoperative adherence, surgical procedures, and healthcare settings vary. Region-specific evidence is especially limited in Pakistan, where oral surgical services are delivered across heterogeneous clinical settings and postoperative suture-removal practices are not consistently standardized.

Assessment of postoperative healing should incorporate both clinician-observed and patient-reported outcomes. The Early Wound Healing Score provides a structured clinical assessment of re-epithelialization, haemostasis, and inflammation during the early healing period (16). Pain intensity, local inflammatory manifestations, wound dehiscence, infection, functional comfort, oral-hygiene difficulty, and satisfaction provide complementary information regarding the patient's postoperative experience. Evaluating these outcomes together may produce a more clinically meaningful comparison of different suture-retention periods than assessment of wound closure alone.

The present randomized clinical trial therefore compared suture removal on postoperative Day 5, Day 7, and Day 10 among adults undergoing oral surgical procedures requiring primary wound closure in dental teaching hospitals in Sindh, Pakistan. The primary objective was to compare early soft-tissue healing among the three removal groups using the Early Wound Healing Score. Secondary objectives were to compare postoperative pain, clinical inflammation, patient comfort, wound dehiscence, and infection. It was hypothesized that suture-removal timing would influence postoperative healing and that removal after sufficient early tissue stabilization, without prolonged retention, would produce the most favourable overall clinical and patient-reported outcomes.

MATERIALS AND METHODS

This parallel-group randomized clinical trial was conducted between January and December 2025 in the oral and maxillofacial surgery departments of selected dental teaching hospitals in Sindh, Pakistan. The study compared three predefined postoperative suture-removal intervals and was prepared in accordance with the relevant principles of the Consolidated Standards of Reporting Trials guidelines

(17,18). The study protocol was reviewed and approved by the responsible institutional ethical review committee before participant recruitment. All participants provided written informed consent before enrolment, and the study was conducted in accordance with the ethical principles of the Declaration of Helsinki (19).

The target population comprised adults requiring minor oral surgical procedures involving mucoperiosteal flap elevation and primary wound closure with sutures. Eligible procedures included surgical extraction of impacted mandibular third molars, minor cyst enucleation, periodontal flap surgery, and pre-prosthetic oral surgical procedures. Patients were eligible if they were 18–45 years of age, required an oral surgical procedure involving primary closure, were classified as American Society of Anesthesiologists Physical Status I or II, agreed to comply with the scheduled postoperative assessments, and provided written informed consent. Patients were excluded if they had an uncontrolled systemic disease, smoked more than 10 cigarettes per day, were pregnant or lactating, were receiving immunosuppressive therapy, had undergone radiotherapy to the head and neck, had an active infection at the intended surgical site, or had oral-hygiene or behavioural factors considered likely to prevent adherence to the postoperative protocol.

Eligible patients presenting to the participating departments were recruited consecutively until the required sample size was reached. The sample size was estimated using OpenEpi version 3.01 for comparison of postoperative wound-healing outcomes among three groups. The calculation used a 95% confidence level, 80% statistical power, a two-sided significance level of 5%, and an anticipated standardized effect size of 0.50 based on previous studies evaluating postoperative healing following oral surgery (8,12). The minimum estimated sample was 90 participants. This number was increased to 105 to allow for attrition and incomplete follow-up, resulting in an intended allocation of 35 participants to each group.

After enrolment, participants were assigned in a 1:1:1 ratio using a computer-generated random-allocation sequence. Allocation concealment was implemented using sequentially numbered, opaque, sealed envelopes prepared by an investigator who was not involved in participant recruitment or clinical outcome assessment. The envelopes were opened sequentially after eligibility confirmation and consent. Participants assigned to Group A underwent suture removal on postoperative Day 5, those assigned to Group B underwent removal on postoperative Day 7, and those assigned to Group C underwent removal on postoperative Day 10.

Participants and operating surgeons could not be blinded to the assigned removal schedule because of the nature of the intervention. Clinical assessments were undertaken by an examiner who was not involved in sequence generation, allocation, surgery, or postoperative treatment decisions. The examiner was not informed of the assigned group before assessment; however, the presence or absence of sutures could make allocation apparent at some postoperative visits. A standardized assessment form and predefined scoring criteria were used to reduce subjective variation.

All procedures were performed by experienced oral and maxillofacial surgeons using a standardized perioperative protocol. Local anaesthesia was administered, a mucoperiosteal flap was elevated where required, and the planned surgical intervention was completed according to the clinical indication. The operative field was irrigated with sterile normal saline, and the wound margins were approximated using 3-0 black braided silk sutures. The same suture material and primary-closure approach were used across the study groups to reduce variability related to wound-closure material. The type of surgical procedure was recorded for each participant because differences in operative indication and tissue involvement could influence postoperative healing.

All participants received uniform postoperative instructions and medication prescriptions. Amoxicillin 500 mg was prescribed three times daily for five days, ibuprofen 400 mg was prescribed up to three times daily for three days as required for pain, and 0.12% chlorhexidine mouth rinse was prescribed twice daily

for seven days. Participants were instructed to maintain oral hygiene, avoid mechanical trauma to the operative site, follow the medication regimen, and attend all scheduled follow-up visits.

The primary outcome was soft-tissue healing measured using the Early Wound Healing Score described by Farina and colleagues (16). The score evaluates clinical re-epithelialization, haemostasis, and inflammatory manifestations and produces a total score ranging from 0 to 10, with higher values indicating more favourable early healing. The same examiner assessed healing using the standardized scoring criteria at the scheduled postoperative visits. Examiner calibration was undertaken before data collection to promote consistency, and the same examiner completed all clinical outcome assessments to avoid inter-examiner variation.

Secondary outcomes included postoperative pain, clinical inflammation, patient comfort, wound dehiscence, and postoperative infection. Pain intensity was measured using a 10-cm Visual Analogue Scale ranging from 0, representing no pain, to 10, representing the worst pain imaginable. Clinical inflammation was evaluated from erythema, oedema, local tenderness, and bleeding on examination. Each component was graded from 0 to 3, where 0 indicated absence and 3 indicated severe involvement, and the component scores were combined to describe the overall inflammatory response.

Patient comfort was assessed using a structured five-item questionnaire addressing comfort during eating, comfort during speaking, ease of maintaining oral hygiene, overall satisfaction, and freedom from foreign-body sensation. Each item was scored on a five-point Likert scale, with higher scores representing a more favourable patient experience. Wound dehiscence was defined clinically as postoperative separation of the approximated wound margins and was recorded as present or absent. Postoperative infection was assessed clinically from findings suggestive of infection, including purulent discharge accompanied by local inflammatory or systemic manifestations. Normal postoperative redness or swelling in isolation was not considered sufficient to establish infection.

Participants were reviewed on postoperative Days 3, 5, 7, 10, and 14. Pain and relevant postoperative symptoms were assessed from Day 3 onward, while the Early Wound Healing Score was recorded on Days 5, 7, 10, and 14. At visits scheduled for suture removal, clinical outcomes were assessed before removal of the sutures assigned for that day so that wound status was evaluated under a consistent sequence of examination followed by intervention. Sutures were subsequently removed according to group allocation. Wound healing, pain, inflammation, comfort, dehiscence, infection, medication-related information, and other postoperative findings were documented on the standardized clinical assessment form.

Demographic characteristics, type of surgery, group allocation, follow-up findings, outcome scores, and complications were entered initially into Microsoft Excel and subsequently transferred to IBM SPSS Statistics version 26.0 for analysis. Data were checked for completeness, range errors, coding consistency, and duplicate entries before analysis. Participants with available follow-up data were analysed according to their originally assigned groups. Because one participant in Group A and one participant in Group C did not complete follow-up, the principal reported analysis was based on the 103 participants with evaluable outcome data.

Continuous variables, including age, Early Wound Healing Score, pain score, inflammation score, and comfort scores, were summarized as mean and standard deviation. Categorical variables, including sex, surgical-procedure category, wound dehiscence, and postoperative infection, were summarized as frequencies and percentages using the relevant group denominators. One-way analysis of variance was used for comparisons of continuous outcomes among the three groups at individual postoperative assessments, followed by Tukey-adjusted pairwise comparisons where the overall group comparison was statistically significant. Longitudinal changes in repeated continuous outcomes were evaluated using repeated-measures analysis of variance to examine differences across time and between treatment groups. Categorical outcomes were compared using chi-square procedures, with exact methods

considered where expected cell frequencies were small. All tests were two-sided, and a p-value below 0.05 was considered statistically significant.

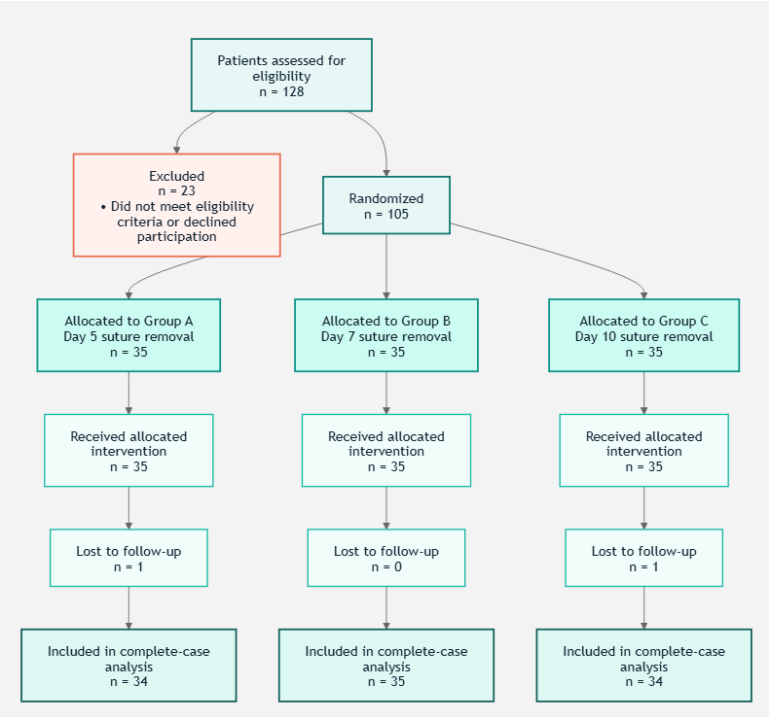

Figure 1 CONSORT Flowchart

Potential sources of bias were addressed through computer-generated randomization, concealed allocation, separation of the allocation and assessment roles, use of a common suture material, standardized postoperative treatment, predefined follow-up visits, examiner calibration, use of the same outcome assessor, and application of uniform clinical assessment forms. The type of oral surgical procedure was documented for evaluation of clinical comparability among the randomized groups. Participant flow from eligibility assessment through allocation, follow-up, and final analysis was documented in accordance with CONSORT recommendations.

RESULTS

A total of 128 patients were assessed for eligibility, of whom 105 were randomized equally to suture removal on postoperative Day 5, Day 7, or Day 10. One participant in the Day 5 group and one in the Day 10 group did not complete follow-up. The complete-case analysis therefore included 103 participants: 34 in Group A, 35 in Group B, and 34 in Group C. The groups had similar distributions of age, sex, and broad surgical-procedure categories at baseline. Mean age ranged from 28.9 ± 6.4 years in Group C to 30.2 ± 7.1 years in Group B, and surgical extraction accounted for 67.6%–71.4% of procedures.

Early Wound Healing Scores increased progressively in all three groups. No statistically significant difference was observed on Day 5, when mean scores were 6.2 ± 1.1 in Group A, 6.5 ± 1.0 in Group B, and 6.4 ± 1.2 in Group C ($p = 0.531$). Differences emerged from Day 7 onward. On Day 7, Group B had a mean score of 8.5 ± 0.9 compared with 7.4 ± 1.0 in Group A and 8.2 ± 1.0 in Group C ($p < 0.001$). The unadjusted mean difference between Groups B and A was 1.10 points (95% CI 0.65–1.55; Hedges' $g = 1.14$), whereas the difference between Groups B and C was 0.30 points (95% CI −0.15 to 0.75; Hedges' $g = 0.31$).

The healing advantage observed in Group B was maintained at later assessments. On Day 10, mean Early Wound Healing Scores were 8.1 ± 0.8, 9.1 ± 0.7, and 8.8 ± 0.9 in Groups A, B, and C, respectively ($p < 0.001$). By Day 14, the corresponding scores were 8.8 ± 0.7, 9.6 ± 0.5, and 9.3 ± 0.6 ($p < 0.001$). At the final assessment, Group B exceeded Group A by 0.80 points (95% CI 0.51–1.09; Hedges' $g = 1.30$) and Group

C by 0.30 points (95% CI 0.04–0.56; Hedges' g = 0.54). The reported repeated-measures analysis also showed an overall difference in healing-score progression among the groups (F = 8.94, p < 0.001).

Pain declined over time in all groups. There was no statistically significant difference on Day 3 or Day 5, but Group B reported lower pain from Day 7 onward. On Day 7, mean Visual Analogue Scale scores were 2.9 ± 0.9 in Group A, 2.1 ± 0.8 in Group B, and 2.6 ± 0.9 in Group C (p = 0.002). Group B was 0.80 points lower than Group A (95% CI −1.20 to −0.40; Hedges' g = −0.93) and 0.50 points lower than Group C (95% CI −0.90 to −0.10; Hedges' g = −0.58). On Day 10, the respective scores were 1.7 ± 0.6, 1.1 ± 0.5, and 1.5 ± 0.7 (p = 0.001). By Day 14, pain was low in all groups but remained lowest in Group B, with mean scores of 0.5 ± 0.3 in Group A, 0.2 ± 0.1 in Group B, and 0.4 ± 0.2 in Group C (p = 0.004).

Clinical inflammation scores followed a similar pattern. The difference among the groups was not statistically significant on Day 5 (p = 0.091). On Day 7, mean inflammation scores were 4.3 ± 1.0 in Group A, 3.1 ± 0.9 in Group B, and 3.8 ± 1.0 in Group C (p < 0.001). Group B was 1.20 points lower than Group A (95% CI −1.65 to −0.75; Hedges' g = −1.25) and 0.70 points lower than Group C (95% CI −1.15 to −0.25; Hedges' g = −0.73). The differences persisted on Day 10, when scores were 3.0 ± 0.8, 1.9 ± 0.7, and 2.6 ± 0.9, respectively (p < 0.001), and on Day 14, when scores were 1.1 ± 0.4, 0.5 ± 0.2, and 0.8 ± 0.3 (p < 0.001).

Group B also had the highest patient-reported scores for eating comfort, speaking comfort, ease of oral-hygiene maintenance, overall satisfaction, and freedom from foreign-body sensation. Overall satisfaction was 4.0 ± 0.7 in Group A, 4.8 ± 0.4 in Group B, and 4.4 ± 0.5 in Group C (p < 0.001). Freedom from foreign-body sensation was scored as 3.5 ± 0.8, 4.7 ± 0.5, and 3.8 ± 0.7, respectively (p < 0.001).

Wound dehiscence occurred in four participants in Group A (11.8%), one in Group B (2.9%), and two in Group C (5.9%). Reanalysis of the displayed counts did not show a statistically significant overall difference among the groups (Pearson $\chi^2 = 2.23$, p = 0.328). Compared with Group A, the relative risk in Group B was 0.24 (95% CI 0.03–2.07). Postoperative infection occurred in three participants in Group A (8.8%), one in Group B (2.9%), and two in Group C (5.9%). This difference was also not statistically significant (Pearson $\chi^2 = 1.12$, p = 0.571). The relative risk for infection in Group B compared with Group A was 0.32 (95% CI 0.03–2.92).

Overall, the Day 7 removal group had higher healing scores and lower pain and inflammation scores from Day 7 onward. Patient-reported comfort scores also favoured this group. Although fewer wound dehiscence and infection events occurred in Group B, the event numbers were small and the between-group differences were not statistically significant.

Table 1. Baseline Demographic and Surgical Characteristics of the Study Groups

Characteristic	Group A: Day 5 Removal (n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Age, years, mean ± SD	29.4 ± 6.8	30.2 ± 7.1	28.9 ± 6.4	0.721
Male, n (%)	19 (55.9)	18 (51.4)	17 (50.0)	0.884
Female, n (%)	15 (44.1)	17 (48.6)	17 (50.0)	
Surgical extraction, n (%)	24 (70.6)	25 (71.4)	23 (67.6)	0.912
Periodontal surgery, n (%)	7 (20.6)	6 (17.1)	7 (20.6)	
Other oral surgical procedures, n (%)	3 (8.8)	4 (11.4)	4 (11.8)	

SD, standard deviation. Continuous variables were compared using one-way analysis of variance, and categorical variables were compared using the chi-square test.

Table 2. Early Wound Healing Scores Across Postoperative Assessments

Postoperative Assessment	Group A: Day 5 Removal (n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Day 5	6.2 ± 1.1	6.5 ± 1.0	6.4 ± 1.2	0.531
Day 7	7.4 ± 1.0	8.5 ± 0.9	8.2 ± 1.0	<0.001
Day 10	8.1 ± 0.8	9.1 ± 0.7	8.8 ± 0.9	<0.001
Day 14	8.8 ± 0.7	9.6 ± 0.5	9.3 ± 0.6	<0.001

Values are mean ± SD. The Early Wound Healing Score ranges from 0 to 10, with higher scores indicating more favourable healing. Reported p-values represent comparisons among the three groups at each assessment.

Table 3. Derived Between-Group Differences in Early Wound Healing Score

Assessment	Comparison	Mean Difference	95% CI	Hedges' g
Day 7	Group B minus Group A	1.10	0.65 to 1.55	1.14
Day 7	Group B minus Group C	0.30	−0.15 to 0.75	0.31
Day 10	Group B minus Group A	1.00	0.64 to 1.36	1.32
Day 10	Group B minus Group C	0.30	−0.08 to 0.68	0.37
Day 14	Group B minus Group A	0.80	0.51 to 1.09	1.30
Day 14	Group B minus Group C	0.30	0.04 to 0.56	0.54

CI, confidence interval. Mean differences, confidence intervals, and standardized effect sizes were derived from the reported group means, standard deviations, and sample sizes. Positive values favour Group B.

Table 4. Postoperative Pain Scores Across Follow-up

Postoperative Assessment	Group A: Day 5 Removal (n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Day 3	5.9 ± 1.3	5.7 ± 1.2	5.8 ± 1.1	0.832
Day 5	4.2 ± 1.1	3.7 ± 1.0	4.0 ± 1.2	0.176
Day 7	2.9 ± 0.9	2.1 ± 0.8	2.6 ± 0.9	0.002
Day 10	1.7 ± 0.6	1.1 ± 0.5	1.5 ± 0.7	0.001
Day 14	0.5 ± 0.3	0.2 ± 0.1	0.4 ± 0.2	0.004

Values are mean ± SD. Pain was measured using a 0–10 Visual Analogue Scale, with higher scores indicating greater pain.

Table 5. Derived Between-Group Differences in Postoperative Pain

Assessment	Comparison	Mean Difference	95% CI	Hedges' g
Day 7	Group B minus Group A	−0.80	−1.20 to −0.40	−0.93
Day 7	Group B minus Group C	−0.50	−0.90 to −0.10	−0.58
Day 10	Group B minus Group A	−0.60	−0.86 to −0.34	−1.08
Day 10	Group B minus Group C	−0.40	−0.69 to −0.11	−0.65
Day 14	Group B minus Group A	−0.30	−0.41 to −0.19	−1.33
Day 14	Group B minus Group C	−0.20	−0.27 to −0.13	−1.26

CI, confidence interval. Negative values favour Group B because lower scores indicate less pain.

Table 6. Clinical Inflammation Scores Across Postoperative Assessments

Postoperative Assessment	Group A: Day 5 Removal (n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Day 5	5.4 ± 1.2	4.8 ± 1.1	5.1 ± 1.0	0.091
Day 7	4.3 ± 1.0	3.1 ± 0.9	3.8 ± 1.0	<0.001
Day 10	3.0 ± 0.8	1.9 ± 0.7	2.6 ± 0.9	<0.001
Day 14	1.1 ± 0.4	0.5 ± 0.2	0.8 ± 0.3	<0.001

Values are mean ± SD. The inflammation score was derived from erythema, oedema, tenderness, and bleeding, with lower scores indicating less inflammation.

Table 7. Derived Between-Group Differences in Clinical Inflammation

Assessment	Comparison	Mean Difference	95% CI	Hedges' g
Day 7	Group B minus Group A	−1.20	−1.65 to −0.75	−1.25
Day 7	Group B minus Group C	−0.70	−1.15 to −0.25	−0.73
Day 10	Group B minus Group A	−1.10	−1.46 to −0.74	−1.45
Day 10	Group B minus Group C	−0.70	−1.08 to −0.32	−0.86
Day 14	Group B minus Group A	−0.60	−0.75 to −0.45	−1.88
Day 14	Group B minus Group C	−0.30	−0.42 to −0.18	−1.17

CI, confidence interval. Negative values favour Group B because lower scores indicate less inflammation.

Table 8. Patient-Reported Comfort Scores

Patient-Reported Outcome	Group A: Day 5 Removal \(n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Eating comfort	4.0 ± 0.7	4.6 ± 0.5	4.3 ± 0.6	0.001
Speaking comfort	4.1 ± 0.6	4.7 ± 0.4	4.4 ± 0.5	0.001
Ease of maintaining oral hygiene	3.8 ± 0.8	4.5 ± 0.6	4.1 ± 0.7	0.002
Overall satisfaction	4.0 ± 0.7	4.8 ± 0.4	4.4 ± 0.5	<0.001
Freedom from foreign-body sensation	3.5 ± 0.8	4.7 ± 0.5	3.8 ± 0.7	<0.001

Values are mean ± SD. Items were scored on a five-point Likert scale, with higher scores indicating a more favourable patient experience.

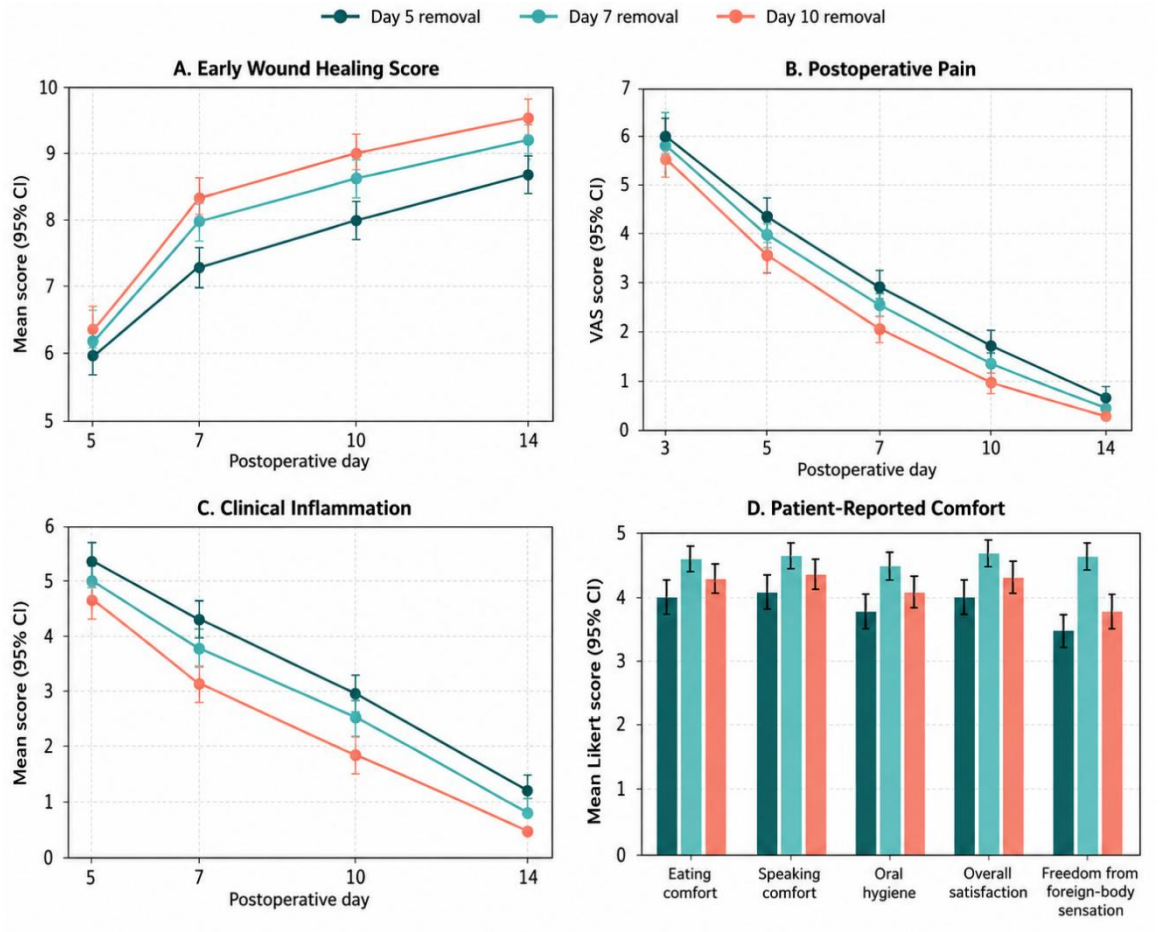

Figure 2 The multipanel figure compares clinical and patient-reported outcomes across suture removal on postoperative Days 5, 7, and 10. Early Wound Healing Scores increased progressively in all groups, with the Day 7 removal group demonstrating the highest scores from Day 7 onward and reaching 9.6 by Day 14, compared with 8.8 in the Day 5 group and 9.3 in the Day 10 group. Postoperative pain and clinical inflammation declined over time in all groups but remained consistently lowest in the Day 7 group during later follow-up. Patient-reported eating comfort, speaking comfort, ease of oral hygiene, overall satisfaction, and freedom from foreign-body sensation also favoured Day 7 removal. Overall, the figure indicates that removal on postoperative Day 7 produced the most favourable combined healing, symptom, and comfort profile, while differences between Day 7 and Day 10 removal were generally smaller than those between Day 7 and Day 5 removal.

Table 9. Wound Dehiscence and Postoperative Infection

Outcome	Group A: Day 5 Removal (n = 34)	Group B: Day 7 Removal (n = 35)	Group C: Day 10 Removal (n = 34)	p-value
Wound dehiscence, n (%)	4 (11.8)	1 (2.9)	2 (5.9)	0.328
No wound dehiscence, n (%)	30 (88.2)	34 (97.1)	32 (94.1)	
Postoperative infection, n (%)	3 (8.8)	1 (2.9)	2 (5.9)	0.571
No postoperative infection, n (%)	31 (91.2)	34 (97.1)	32 (94.1)	

P-values were recalculated using Pearson's chi-square test from the reported group counts. Percentages were calculated using the analysed group denominators.

Table 10. Pairwise Relative Risks for Postoperative Complications

Outcome	Comparison	Relative Risk	95% CI
Wound dehiscence	Group B versus Group A	0.24	0.03 to 2.07
Wound dehiscence	Group B versus Group C	0.49	0.05 to 5.15
Postoperative infection	Group B versus Group A	0.32	0.03 to 2.92
Postoperative infection	Group B versus Group C	0.49	0.05 to 5.15

CI, confidence interval. A relative risk below 1.00 indicates fewer events in Group B. Confidence intervals were derived from the reported event counts and group denominators.

DISCUSSION

This randomized clinical trial compared suture removal on postoperative Days 5, 7, and 10 following oral surgical procedures requiring primary wound closure. Healing improved progressively in all three groups; however, participants assigned to Day 7 removal demonstrated higher Early Wound Healing Scores and lower pain and inflammation scores from postoperative Day 7 onward. Patient-reported comfort also favoured Day 7 removal. Although wound dehiscence and infection occurred less frequently in the Day 7 group, the numbers of these events were small, the confidence intervals were wide, and the recalculated between-group comparisons were not statistically significant. The findings therefore support a favourable clinical pattern associated with Day 7 removal under the study protocol but do not establish a universal removal interval for all oral surgical wounds.

The absence of a meaningful between-group difference in healing on Day 5 suggests that the early biological response was broadly comparable before the assigned removal schedules had fully differentiated the groups. Separation became more evident from Day 7 onward. Early wound repair depends on haemostasis, inflammatory-cell activity, fibroblast proliferation, angiogenesis, re-epithelialization, and progressive collagen deposition (5,7). Sutures provide mechanical support during this period, but their continued presence may also promote plaque retention, local irritation, and foreign-body reaction within the oral environment (6,9,10). Day 7 removal may therefore have provided a practical balance between maintaining approximation during early tissue stabilization and limiting prolonged exposure to retained braided silk. This mechanism remains plausible rather than proven because the study did not measure bacterial colonization, plaque accumulation, wound tension, histological repair, or inflammatory biomarkers.

The healing pattern was consistent with the comparative findings reported by Abdull and colleagues, who observed more favourable surgical wound healing following removal after approximately one week than after earlier or more prolonged retention (8). The present findings also correspond with the conceptual basis of the Early Wound Healing Score, which emphasizes re-epithelialization, haemostasis, and local inflammatory status during the initial postoperative period (16). At Day 14, the mean healing score in the Day 7 group exceeded that in the Day 5 group by 0.80 points and that in the Day 10 group by 0.30 points. The larger standardized difference between Days 7 and 5 suggests that premature loss of wound support may have had greater clinical relevance than the comparatively modest difference between Days 7 and 10. Nevertheless, interpretation should consider that the score approaches its upper limit of 10, potentially restricting discrimination among patients with favourable late healing.

Previous studies have demonstrated that postoperative recovery is influenced by wound-closure strategy, suture configuration, and the degree of tissue stabilization. Osunde and colleagues reported differences in inflammatory morbidity according to the number and placement of sutures following third-molar surgery (1,2), while Maria and colleagues observed that primary and secondary closure produced different postoperative pain and swelling profiles (3). Tissue adhesives, drainage techniques, sutureless closure, and alternative suturing approaches have also produced variable early outcomes across oral surgical populations (4,11–15). Although these investigations did not directly evaluate removal timing, they support the broader interpretation that postoperative wound management can affect tissue response and patient recovery.

Clinical inflammation was lower in the Day 7 group from the seventh postoperative day onward. Rodrigues and colleagues similarly demonstrated that suturing technique influenced inflammatory signs after third-molar extraction, while Gürses and colleagues found that interrupted and locked continuous sutures were associated with differences in early wound-healing behaviour (20,21). Retained sutures may harbour debris and microorganisms, particularly when multifilament material is used, whereas removal before adequate tissue stabilization may expose wound margins to mechanical disruption (6,22). The present results are compatible with these competing mechanisms, but the composite inflammation measure was based on erythema, oedema, tenderness, and bleeding rather than a fully validated inflammatory index. Consequently, the magnitude of the differences should be interpreted cautiously.

Pain declined in all groups, reflecting the expected postoperative recovery trajectory. The Day 7 group demonstrated lower pain from Day 7 onward, with mean differences of 0.80 points compared with Day 5 removal and 0.50 points compared with Day 10 removal at the seventh-day assessment. Pain following oral surgery is influenced by surgical trauma, tissue tension, inflammation, wound exposure, and analgesic use (3,5,23). The lower pain scores in the Day 7 group may have reflected more stable wound approximation than after Day 5 removal and less continuing irritation than with retention until Day 10. Actual ibuprofen consumption was not reported, however, and differential analgesic use may have influenced patient-reported pain.

The patient-reported outcomes also favoured Day 7 removal. Eating comfort, speaking comfort, ease of oral-hygiene maintenance, overall satisfaction, and freedom from foreign-body sensation were highest in this group. These findings are clinically relevant because oral sutures may affect mastication, speech, hygiene access, and awareness of a foreign material even when objective wound healing is acceptable. Studies of single versus multiple sutures, primary versus secondary closure, and alternative closure techniques have similarly emphasized the importance of patient comfort and postoperative function alongside clinician-rated healing outcomes (24–30). The current study extends that patient-centred perspective to the timing of suture removal. However, the exact assessment time for the comfort questionnaire should remain clearly specified, and the questionnaire's psychometric properties require consideration when interpreting differences between groups.

Wound dehiscence occurred in 11.8% of participants in the Day 5 group, 2.9% in the Day 7 group, and 5.9% in the Day 10 group. Although the numerical pattern favoured Day 7 removal, recalculation from the reported counts did not demonstrate a statistically significant overall difference. The relative risk comparing Day 7 with Day 5 removal was 0.24, but the 95% confidence interval ranged from 0.03 to 2.07. The estimate was therefore imprecise and compatible with both a clinically important reduction and no reliable difference. The same limitation applied to postoperative infection, which occurred in 8.8%, 2.9%, and 5.9% of the respective groups. These complication outcomes should be considered exploratory rather than confirmatory because event counts were low and all participants received postoperative antibiotics and chlorhexidine, which may have reduced the ability to detect differences.

The randomized design, concealed allocation, common suture material, uniform postoperative instructions, repeated assessments, and inclusion of clinical and patient-reported outcomes were important strengths. The study also addressed a practical question for which region-specific evidence is limited. Reporting followed the general principles of CONSORT, which supports transparent presentation of randomized trials (17,18). Nevertheless, several limitations affect interpretation. The trial included heterogeneous procedures with potentially different flap designs, wound dimensions, tissue tension, contamination levels, and healing requirements. Procedure type was not incorporated into an adjusted model, and centre and surgeon effects were not reported. The outcome assessor may also have inferred allocation from the presence or absence of sutures, creating a risk of detection bias despite separation of assessment and allocation roles.

The analysis was based on 103 participants who completed follow-up rather than all 105 randomized participants, and no sensitivity analysis for missing data was available. Multiple outcomes were assessed at several postoperative visits, but the reported analysis did not provide full group-by-time interaction estimates, degrees of freedom, assumption testing, or multiplicity-adjusted confidence intervals. The derived effect estimates were calculated from aggregate means and standard deviations and were not substitutes for participant-level longitudinal modelling. The inflammation score and comfort questionnaire also require clearer evidence of validation and reliability. Other potentially influential variables—including operative duration, wound size, number and pattern of sutures, surgeon, oral-hygiene status, adherence, and analgesic consumption—were not incorporated into the reported analysis. Follow-up ended on Day 14 and therefore did not address later wound maturation or scar-related outcomes.

These findings suggest that Day 7 removal may represent a clinically reasonable interval for uncomplicated oral surgical wounds managed under conditions similar to those used in this trial. They should not, however, be interpreted as supporting an identical schedule for every oral procedure or patient. Removal timing should continue to reflect wound location, flap stability, tissue tension, suture material, operative complexity, systemic health, infection risk, and clinical examination. Future multicentre trials should use procedure-stratified randomization, clearly prespecified primary endpoints, validated patient-reported measures, blinded photographic assessment where feasible, intention-to-treat analysis, and mixed-effects longitudinal modelling. Larger samples would also be required to determine whether the observed numerical reductions in dehiscence and infection represent true clinical effects.

CONCLUSION

Suture removal on postoperative Day 7 was associated with the most favourable observed combination of early soft-tissue healing, pain reduction, inflammatory response, and patient-reported comfort among participants undergoing oral surgical procedures in the studied settings. The Day 7 group demonstrated higher healing scores and lower pain and inflammation from the seventh postoperative day onward, whereas the numerical differences in wound dehiscence and infection were not statistically significant. These findings support Day 7 as a reasonable removal interval for comparable uncomplicated oral surgical wounds, while clinical decisions should remain individualized according to the procedure, wound characteristics, suture material, and patient-related factors.

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