Research Square

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Effects of Different Suture Materials on Postoperative Healing After Septoplasty: A Randomized Controlled Trial

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Abstract

Background

Suture selection is an important consideration in septoplasty because of its potential influence on postoperative healing and patient experience. This study compared postoperative healing and patient-reported outcomes after septoplasty using triclosan-coated versus conventional polyglactin sutures.

Methods

This prospective randomized controlled study included 142 adults undergoing elective septoplasty, with 71 patients per group. Surgeons and postoperative assessors were blinded to suture allocation. Clinical healing, complications, pain, nasal obstruction, and comfort were evaluated on postoperative days 7 and 21. Analyses were exploratory and included covariate-adjusted marginal linear models and Benjamini–Hochberg false discovery rate correction.

Results

Normal mucosal healing on day 7 occurred in 83.1% of the antibacterial group and 64.8% of the conventional group. Day 21 edema was present in 15.5% and 31.0%, respectively. Unadjusted comparisons of healing and edema scores did not remain significant after multiplicity correction. In adjusted models, antibacterial sutures were associated with lower day 7 mucosal healing scores (difference, 0.29 points; q = 0.011) and lower day 21 edema scores (difference, 0.20 points; q = 0.046). The mucosal healing group-by-time interaction was significant (q = 0.010), indicating attenuation of the early difference. Infection signs occurred equally in both groups, and no differences in patient-reported outcomes remained significant after correction.

Conclusion

Triclosan-coated sutures were associated with improved early mucosal healing and reduced later edema in adjusted exploratory analyses. No clear benefit was demonstrated for infection or patient-reported outcomes. Confirmation in studies with prespecified outcomes and longer follow-up is needed.

Trial Registration

ClinicalTrials.gov Identifier NCT07919496 (Registration date 05.11.2026) Retrospectively registered

Background

Surgical site infections (SSIs) account for a substantial proportion of healthcare-associated infections, increasing patient morbidity and imposing a considerable economic burden on healthcare systems (1). Suture materials are essential for restoring tissue integrity and achieving hemostasis during surgical procedures. However, as foreign bodies implanted in tissue, these materials may facilitate bacterial colonization and infection, particularly when their braided structure or surface characteristics favor microbial adhesion (2).

Antibacterial, triclosan-coated suture materials were developed to address this biological challenge by suppressing bacterial colonization and minimizing infection risk through antimicrobial agents on their surfaces. In vitro and in vivo studies, together with large meta-analyses, have shown that triclosan-coated sutures significantly reduce SSI rates, attenuate tissue inflammation, and improve wound healing compared with conventional absorbable or nonabsorbable sutures (3–5).

Septoplasty, a frequently performed procedure in otorhinolaryngology, aims to relieve upper airway obstruction caused by nasal septal deviation and improve quality of life. The prevention of postoperative complications and sequelae depends on surgical technique and closure materials, as well as prophylactic antibiotic use and surgical site care (6). In recent years, replacing conventional nasal packing with transseptal suturing techniques after septoplasty has improved patient comfort and supported tissue healing (7, 8). Nevertheless, the distinctive moist mucosal environment of the nasal cavity requires careful assessment of suture materials in terms of tissue reactions and infection risk (9).

An ideal suture material should induce minimal tissue reaction in the nasal mucosa, support cellular proliferation and tissue remodeling, and maintain mechanical strength without facilitating infection (2, 9). Although the effectiveness of triclosan-coated sutures in preventing SSIs has been extensively demonstrated in general surgery and other surgical disciplines, studies directly evaluating the clinical effects of different suture types, particularly antibacterial sutures, on wound healing, patient comfort, and complications in rhinology and septoplasty remain limited (4, 10). Accordingly, this study aimed to compare the effects of antibacterial (triclosan-coated) and conventional sutures used in septoplasty on postoperative wound healing, infection rates, pain, and patient comfort, thereby contributing evidence to clinical practice.

Methods

Study Design and Ethical Approval

This prospective, randomized, controlled clinical study compared two parallel groups. It was conducted in the department of otorhinolaryngology of a tertiary hospital between June 1 and December 31, 2025. The study protocol was approved by the Local Ethics Committee [Approval No: 21.05.2025-266], and written informed consent was obtained from all participants. All procedures were performed in accordance with the principles of the Declaration of Helsinki. This randomized controlled trial is reported

in accordance with the CONSORT 2025 guidelines, and the completed CONSORT checklist is provided in Supplementary file 2.

Randomization and Blinding

Patients were randomly assigned to the antibacterial or conventional suture group. The surgeons performing the procedures and the assessors conducting postoperative clinical evaluations were blinded to whether the sutures belonged to the antibacterial or conventional group. The researcher responsible for collecting patient information-initiated computer-based randomization. Access to the allocation sequence was restricted within the computer system, and upcoming assignments remained concealed from this researcher until allocation.

Study Population

Patients aged 18–65 years who were scheduled for elective septoplasty in the Department of Otorhinolaryngology and classified as American Society of Anesthesiologists (ASA) physical status I or II were eligible. Additional inclusion criteria were voluntary participation, the ability to communicate, understand, and respond in main language, and the absence of hearing or speech impairment severe enough to interfere with assessments. Patients younger than 18 or older than 65 years, those whose cognitive status precluded interviews, and those with difficulty cooperating were excluded. Patients with uncontrolled systemic disease, immunosuppression, active local or systemic infection before surgery, major postoperative complications preventing continued follow-up, or inability to attend the day 7 and day 21 follow-up visits were also excluded.

Sample size was calculated using G*Power version 3.1. Assuming a medium effect size (Cohen's d = 0.5), a significance level of 5% ($\alpha = 0.05$), and 80% power ($1 - \beta = 0.80$), at least 65 patients per group were required to detect a significant between-group difference. To account for potential missing data or losses to postoperative follow-up, the sample size was increased by 10%, and the study was planned to include 142 patients, with 71 in each group.

Procedure

Septoplasty was performed through a hemitransfixion incision, with elevation of mucoperichondrial flaps and, where necessary, mucoperiosteal flaps. Deviated cartilaginous and bony portions of the septum were corrected while preserving dorsal and caudal support and maintaining L-strut integrity. After hemostasis, the mucosal flaps were reapproximated, and transseptal sutures were placed to reduce dead space. The incision was closed using the suture material assigned to the patient's group. Inferior turbinate radiofrequency treatment and/or outfracture were performed when clinically indicated. The antibacterial group received 4 – 0 Coated VICRYL Plus Antibacterial sutures (polyglactin 910; Ethicon,

Johnson & Johnson), whereas the conventional group received Coated VICRYL sutures of the same size (polyglactin 910; Ethicon, Johnson & Johnson).

Data were collected using a structured data collection form developed by the investigators based on the literature and standardized assessment scales. Postoperative pain was measured using a visual analog scale (VAS; 0 = no pain, 10 = unbearable pain). Nasal obstruction severity and associated symptomatic changes were assessed using the validated Turkish version of the Nasal Obstruction Symptom Evaluation (NOSE) scale. Mucosal wound healing was evaluated by nasal endoscopy and examination with a nasal speculum. Signs of infection, including local edema, erythema, purulent or serous discharge, and tissue tenderness, were recorded as present or absent. Overall postoperative comfort and symptom burden were assessed through structured face-to-face interviews using a form developed by the investigators specifically for this study. The interview form had not previously been published. An English translation, including the interview questions and response options, is provided in Supplementary file 1. The study-specific comfort items were distinct from the standardized VAS and NOSE assessments. Data collection began with baseline assessments before surgery and was completed through clinical examinations and patient interviews on postoperative days 7 and 21.

Statistical Analysis

Statistical analyses were performed using Python 3.12.13 (SciPy 1.17.0, NumPy 2.3.5, and pandas 2.2.3). Continuous variables were summarized as mean ± standard deviation and median, and categorical variables as counts and percentages. Age and operative duration were compared using Welch's independent-samples t-test. Baseline categorical characteristics were compared using Pearson's chi-square test when expected cell counts were adequate and Fisher's exact test or the Fisher–Freeman–Halton exact test when they were low. Standardized mean differences were also calculated to assess baseline balance. Because a single primary outcome had not been prespecified, all analyses were exploratory. Patient-reported VAS, NOSE, relief of nasal obstruction, intranasal pressure sensation, return to activities of daily living, and overall comfort scores, together with ordinal clinical outcomes, were summarized as medians. The antibacterial and conventional suture groups were compared on postoperative days 7 and 21 using the Mann–Whitney U test. Categorical distributions of mucosal healing, edema, suture-site reactions, and suture material status were additionally assessed using the Fisher–Freeman–Halton exact test. Fisher's exact test was used for binary outcomes such as infection and hematoma. Within-patient changes from postoperative day 7 to day 21 were assessed using the Wilcoxon signed-rank test for numerical and ordinal outcomes, and between-group differences in change were assessed using the Mann–Whitney U test. Temporal changes in binary outcomes were evaluated using the exact McNemar test. Effect sizes were reported as directionally oriented rank-biserial correlations for numerical and ordinal outcomes, absolute risk differences for binary outcomes, and Cramér's V for multicategory outcomes. The 95% confidence intervals for rank-biserial correlations were calculated using 2,500 bootstrap resamples, and confidence intervals for absolute risk differences were calculated using the Newcombe method. Adjusted sensitivity analyses used marginal linear models with patient-clustered robust standard errors. The models included suture group, time, the group

× time interaction, age, sex, smoking status, systemic disease, operative duration, and additional surgical procedures. Multivariable models were not fitted for the infrequent infection and hematoma outcomes because of the risk of overfitting. Multiple comparisons were adjusted using the Benjamini–Hochberg false discovery rate procedure, with clinical and patient-reported outcomes treated as separate families; both raw p values and adjusted q values were reported. All tests were two-sided. Although the nominal significance threshold was $p < 0.05$, exploratory findings were interpreted jointly with 95% confidence intervals, effect sizes, and q values.

Results

A total of 142 patients were included, with 71 in each suture group. Mean age was 35.76 ± 12.41 years in the antibacterial group and 33.39 ± 12.26 years in the conventional group ($p = 0.255$). Smoking was more common in the conventional group [40 (56.3%) vs. 28 (39.4%); $p = 0.044$]. No statistically significant differences were found in sex, systemic disease, operative duration, or the distribution of additional surgical procedures (all $p > 0.05$) (Table 1).

Table 1
Group characteristics and demographics

Characteristic	**Antibacterial suture n = 71**	**Conventional suture n = 71**	**p**
Age	35.76 ± 12.41	33.39 ± 12.26	0.255
Sex – Female	29 (40.8%)	37 (52.1%)	0.178
Sex – Male	42 (59.2%)	34 (47.9%)	0.178
Smoking	28 (39.4%)	40 (56.3%)	0.044
Systemic disease	13 (18.3%)	11 (15.5%)	0.654
Operative duration (min)	48.4 ± 11.7	46.8 ± 11.1	0.404
Additional procedure – ITRF	32 (45.1%)	31 (43.7%)	0.422
Additional procedure – TO	12 (16.9%)	18 (25.4%)	0.422
Additional procedure – TO and ITRF	27 (38.0%)	22 (31.0%)	0.422

Data are presented as mean ± standard deviation or n (%). Comparisons used Welch's t-test and Pearson's chi-square test. The p values for sex and additional surgical procedures refer to the overall distributions. ITRF: inferior turbinate radiofrequency treatment; TO: turbinate outfracture.

On postoperative day 7, normal mucosal healing was observed in 59 patients (83.1%) in the antibacterial group and 46 (64.8%) in the conventional group, an absolute difference of 18.3 percentage points. The score distribution favored the antibacterial group ($p = 0.011$; $q = 0.138$). On day 21, normal healing rates

were 91.5% and 84.5%, respectively, with no statistically significant difference in score distributions ($p = 0.229$; $q = 0.549$).

Edema scores at the surgical site did not differ significantly on day 7 ($p = 0.096$; $q = 0.383$). On day 21, edema was present in 11 patients (15.5%) in the antibacterial group and 22 (31.0%) in the conventional group, an absolute difference of 15.5 percentage points. The score distribution favored the antibacterial group ($p = 0.025$; $q = 0.150$). The differences in day 7 mucosal healing and day 21 edema did not remain significant after Benjamini–Hochberg (BH) adjustment for the 12 clinical comparisons.

Signs of infection were recorded in four patients (5.6%) in each group on day 7 and one patient (1.4%) in each group on day 21 ($p = 1.000$ at both time points). Hematoma was present in two patients (2.8%) in the antibacterial group and four (5.6%) in the conventional group at both assessments ($p = 0.681$ on both days). Suture-site reactions and suture material status also did not differ significantly between groups (all $p > 0.05$) (Table 2).

Table 2
Day-specific comparisons of clinical outcomes

Outcome	Day	Antibacterial suture n = 71	Conventional suture n = 71	p	q
Mucosal healing score	7	1.0 [1.0–1.0]	1.0 [1.0–2.0]	0.011	0.138
Mucosal healing score	21	1.0 [1.0–1.0]	1.0 [1.0–1.0]	0.229	0.549
Edema score	7	1.0 [0.0–2.0]	1.0 [0.0–2.0]	0.096	0.383
Edema score	21	0.0 [0.0–0.0]	0.0 [0.0–1.0]	0.025	0.150
Hematoma	7	2 (2.8%)	4 (5.6%)	0.681	0.908
Hematoma	21	2 (2.8%)	4 (5.6%)	0.681	0.908
Signs of infection	7	4 (5.6%)	4 (5.6%)	1.000	1.000
Signs of infection	21	1 (1.4%)	1 (1.4%)	1.000	1.000
Suture-site reaction	7	None: 44 (62.0%) Erythema: 18 (25.4%) Granulation: 5 (7.0%) Dehiscence: 4 (5.6%)	None: 36 (50.7%) Erythema: 22 (31.0%) Granulation: 9 (12.7%) Dehiscence: 4 (5.6%)	0.514	0.908
Suture-site reaction	21	None: 61 (85.9%) Erythema: 4 (5.6%) Granulation: 3 (4.2%) Dehiscence: 3 (4.2%)	None: 56 (78.9%) Erythema: 11 (15.5%) Granulation: 3 (4.2%) Dehiscence: 1 (1.4%)	0.217	0.549
Suture material status	7	In situ: 62 (87.3%) Broken: 5 (7.0%) Dislodged: 4 (5.6%)	In situ: 61 (85.9%) Broken: 8 (11.3%) Dislodged: 2 (2.8%)	0.551	0.908

Data are presented as median [25th–75th percentiles] or n (%). Lower mucosal healing and edema scores indicate better outcomes. Scores were compared using the Mann–Whitney U test, binary variables using Fisher's exact test, and multicategory variables using the Fisher–Freeman–Halton test. p: raw p value; q: p value adjusted using the Benjamini–Hochberg procedure for 12 clinical comparisons.

Outcome	Day	Antibacterial suture n = 71	Conventional suture n = 71	p	q
Suture material status	21	In situ: 62 (87.3%) Broken: 0 (0.0%) Dislodged: 9 (12.7%)	In situ: 61 (85.9%) Broken: 0 (0.0%) Dislodged: 10 (14.1%)	1.000	1.000

Data are presented as median [25th–75th percentiles] or n (%). Lower mucosal healing and edema scores indicate better outcomes. Scores were compared using the Mann–Whitney U test, binary variables using Fisher's exact test, and multicategory variables using the Fisher–Freeman–Halton test. p: raw p value; q: p value adjusted using the Benjamini–Hochberg procedure for 12 clinical comparisons.

VAS pain scores did not differ significantly between groups on days 7 and 21 ($p = 0.110$ and $p = 0.083$, respectively). The distributions of day 21 NOSE scores and day 7 relief of nasal obstruction scores favored the antibacterial group ($p = 0.021$; $q = 0.151$ and $p = 0.025$; $q = 0.151$, respectively). These differences did not remain significant after BH adjustment. No significant between-group differences were observed in intranasal pressure sensation, activities of daily living, or overall comfort scores (Table 3).

Table 3
Comparison of patient-reported pain, nasal obstruction, and comfort scores between suture groups on postoperative days 7 and 21

Outcome	Day	Antibacterial n = 71	Conventional n = 71	p	q
VAS pain score	7	2.0 [2.0–3.0]	2.0 [2.0–4.0]	0.110	0.164
VAS pain score	21	0.0 [0.0–1.0]	0.0 [0.0–1.0]	0.083	0.164
NOSE score	7	2.0 [2.0–3.5]	3.0 [2.0–6.0]	0.058	0.164
NOSE score	21	0.0 [0.0–2.0]	0.0 [0.0–4.5]	0.021	0.151
Relief of nasal obstruction	7	5.0 [4.0–5.0]	5.0 [3.0–5.0]	0.025	0.151
Relief of nasal obstruction	21	5.0 [5.0–5.0]	5.0 [4.0–5.0]	0.095	0.164
Intranasal pressure sensation	7	5.0 [5.0–5.0]	5.0 [4.0–5.0]	0.069	0.164
Intranasal pressure sensation	21	5.0 [5.0–5.0]	5.0 [4.0–5.0]	0.063	0.164
Activities of daily living	7	5.0 [5.0–5.0]	5.0 [4.0–5.0]	0.274	0.299
Activities of daily living	21	5.0 [5.0–5.0]	5.0 [5.0–5.0]	0.192	0.231
Overall comfort	7	5.0 [4.0–5.0]	5.0 [4.0–5.0]	0.166	0.221
Overall comfort	21	5.0 [5.0–5.0]	5.0 [4.5–5.0]	0.349	0.349

Data are presented as median [25th–75th percentiles] and were compared using the Mann–Whitney U test. Lower VAS and NOSE scores and higher comfort item scores indicate better outcomes. VAS: visual analog scale; NOSE: Nasal Obstruction Symptom Evaluation scale (raw total: 0–20). p: raw p value; q: p value adjusted using the Benjamini–Hochberg procedure for 12 comparisons.

VAS and NOSE scores decreased from day 7 to day 21 in both groups (all within-group $p < 0.001$). Improvement in mucosal healing scores was greater in the conventional group ($p = 0.005$; $q = 0.011$). Changes in edema scores did not differ between groups ($p = 0.738$). The change in relief of nasal obstruction scores favored the conventional group at the nominal significance level ($p = 0.014$; $q = 0.085$); none of the between-group comparisons of changes in patient-reported outcomes met the $q < 0.05$ threshold after adjustment (Table 4).

Table 4
Comparison of changes in symptom, comfort, and clinical healing scores from postoperative day 7 to day 21 between suture groups

Outcome	Antibacterial suture Change	Conventional Change	p	q
VAS pain score	2.0 [1.0–2.0]	2.0 [1.0–2.0]	0.307	0.409
NOSE score	2.0 [1.0–2.0]	2.0 [0.5–2.0]	0.412	0.412
Relief of nasal obstruction	0.0 [0.0–0.0]	0.0 [0.0–1.0]	0.014	0.085
Intranasal pressure sensation	0.0 [0.0–0.0]	0.0 [0.0–1.0]	0.269	0.409
Activities of daily living	0.0 [0.0–0.0]	0.0 [0.0–0.0]	0.341	0.409
Overall comfort	0.0 [0.0–0.0]	0.0 [0.0–1.0]	0.306	0.409
Mucosal healing score	0.0 [0.0–0.0]	0.0 [0.0–1.0]	0.005	0.011
Edema score	1.0 [0.0–1.0]	1.0 [0.0–2.0]	0.738	0.738

Changes are presented as median [25th–75th percentiles]. Change was calculated as day 7 minus day 21 for VAS, NOSE, mucosal healing, and edema, and as day 21 minus day 7 for comfort items. Positive values indicate improvement. p: Mann–Whitney U test; q: Benjamini–Hochberg adjustment applied separately to two clinical and six patient-reported comparisons. VAS: visual analog scale; NOSE: Nasal Obstruction Symptom Evaluation scale.

In exploratory adjusted models, the mucosal healing score on day 7 was 0.29 points lower in the antibacterial group ($p = 0.003$; $q = 0.011$); the difference on day 21 was 0.03 points ($p = 0.543$). The group × time interaction for mucosal healing was significant, indicating that the between-group difference observed on day 7 diminished by day 21 ($p = 0.005$; $q = 0.010$). The day 21 edema score was 0.20 points lower in the antibacterial group ($p = 0.023$; $q = 0.046$), whereas the group × time interaction for edema was not significant ($p = 0.686$). The adjusted difference in relief of nasal obstruction on day 7 was 0.39 points in favor of the antibacterial group ($p = 0.011$; $q = 0.127$). No adjusted day-specific comparison of patient-reported outcomes met the $q < 0.05$ threshold; the group × time interaction for relief of nasal obstruction was also nonsignificant after adjustment ($p = 0.015$; $q = 0.088$) (Table 5).

Table 5
Adjusted group differences and group by time interactions for clinical healing and patient-reported outcomes

Outcome	Comparison	Difference	95% CI	p	q
Mucosal healing score	Day 7	0.29	0.10 to 0.47	0.003	0.011
Mucosal healing score	Day 21	0.03	−0.08 to 0.15	0.543	0.543
Mucosal healing score	Interaction	−0.25	−0.43 to −0.08	0.005	0.010
Edema score	Day 7	0.26	−0.02 to 0.54	0.066	0.087
Edema score	Day 21	0.20	0.03 to 0.38	0.023	0.046
Edema score	Interaction	−0.06	−0.33 to 0.22	0.686	0.686
VAS pain score	Day 7	0.36	−0.20 to 0.92	0.210	0.360
VAS pain score	Day 21	0.16	−0.32 to 0.64	0.510	0.583
VAS pain score	Interaction	−0.20	−0.55 to 0.15	0.269	0.505
NOSE score	Day 7	1.00	−0.06 to 2.06	0.064	0.301
NOSE score	Day 21	0.82	−0.16 to 1.80	0.100	0.301
NOSE score	Interaction	−0.18	−0.63 to 0.27	0.421	0.505
Relief of nasal obstruction	Day 7	0.39	0.09 to 0.70	0.011	0.127
Relief of nasal obstruction	Day 21	0.15	−0.07 to 0.38	0.175	0.351
Relief of nasal obstruction	Interaction	−0.24	−0.43 to −0.05	0.015	0.088

Models were adjusted for age, sex, smoking, systemic disease, operative duration, and additional surgical procedures, with patient-clustered robust standard errors. Positive group differences favor the antibacterial group. Interaction denotes the change in the group difference from day 7 to day 21. q values were calculated using the Benjamini–Hochberg procedure separately for clinical and patient-reported outcomes (day-specific: 4 and 12 comparisons; interactions: 2 and 6 comparisons). CI: confidence interval; confidence intervals were not adjusted for multiple comparisons. VAS: visual analog scale; NOSE: Nasal Obstruction Symptom Evaluation scale.

Outcome	Comparison	Difference	95% CI	p	q
Intranasal pressure sensation	Day 7	0.25	−0.05 to 0.55	0.096	0.301
Intranasal pressure sensation	Day 21	0.15	−0.07 to 0.37	0.172	0.351
Intranasal pressure sensation	Interaction	−0.10	−0.31 to 0.12	0.366	0.505
Activities of daily living	Day 7	0.12	−0.16 to 0.40	0.410	0.547
Activities of daily living	Day 21	0.06	−0.14 to 0.26	0.541	0.583
Activities of daily living	Interaction	−0.06	−0.26 to 0.15	0.583	0.583
Overall comfort	Day 7	0.17	−0.14 to 0.47	0.291	0.436
Overall comfort	Day 21	0.07	−0.17 to 0.31	0.583	0.583
Overall comfort	Interaction	−0.10	−0.32 to 0.12	0.374	0.505

Models were adjusted for age, sex, smoking, systemic disease, operative duration, and additional surgical procedures, with patient-clustered robust standard errors. Positive group differences favor the antibacterial group. Interaction denotes the change in the group difference from day 7 to day 21. q values were calculated using the Benjamini–Hochberg procedure separately for clinical and patient-reported outcomes (day-specific: 4 and 12 comparisons; interactions: 2 and 6 comparisons). CI: confidence interval; confidence intervals were not adjusted for multiple comparisons. VAS: visual analog scale; NOSE: Nasal Obstruction Symptom Evaluation scale.

Discussion

Improving surgical outcomes and patient comfort after septoplasty depends on careful management of tissue healing and prevention of postoperative complications. This study compared antibacterial (triclosan-coated) and conventional sutures in terms of wound healing, infection rates, postoperative edema, pain, and patient comfort. The findings indicated that triclosan-coated sutures increased the rate of mucosal healing on postoperative day 7 and significantly reduced edema at the surgical site on day 21. In contrast, no statistically significant between-group differences were identified in SSIs, hematoma formation, suture reactions, or patient-reported VAS pain scores.

The moist nasal mucosal environment, which favors microbial colonization, makes the biocompatibility of implanted suture materials and local tissue reactions particularly important. Surgical sutures may prolong local inflammation by inducing foreign-body reactions and supporting bacterial adhesion to their surfaces. Triclosan-coated sutures are intended to prevent bacterial biofilm formation and suppress

local tissue inflammation through antimicrobial activity around the suture line. In this study, the higher rate of normal mucosal healing on postoperative day 7 in the antibacterial group (83.1% vs. 64.8%) and the significant difference in day 7 healing scores favoring this group ($p = 0.003$) support a beneficial effect of triclosan coating on early cellular proliferation and mucosal integration. The high healing rates achieved in both groups by day 21 (91.5% and 84.5%) and the significant group × time interaction ($p = 0.005$) suggest that antibacterial protection provides its most pronounced clinical benefit during the first week, when tissue repair is particularly vulnerable. Moreover, the lower prevalence of edema in the antibacterial group at day 21 (15.5% vs. 31.0%; $p = 0.023$) suggests that the suture material supports tissue repair by suppressing local inflammatory exudation and tissue reactions. These findings are consistent with reports that antibacterial sutures reduce cellular inflammation in various surgical tissues (4, 7, 11).

Large meta-analyses and the World Health Organization (WHO) guidelines for SSI prevention report that triclosan-coated sutures generally reduce infection risk by 27–30%, irrespective of surgical procedure (4, 11, 12). In pediatric hypospadias surgery, Pogorelić et al. found that triclosan-coated PDS Plus reduced SSI rates from 6.9% to 1.4% compared with conventional PDS II, while also substantially reducing urethrocutaneous fistula formation and the need for reoperation (13). In the present study, however, signs of infection were uncommon in both groups, occurring in 5.6% of patients on day 7 and 1.4% on day 21, with no statistically significant between-group difference. This may reflect the inherently low infection risk associated with the richly vascularized nasal mucosa in septoplasty and the effectiveness of routine prophylactic antibiotics and surgical asepsis protocols used in the study. Kotisalmi et al. emphasized that preoperative antibiotic prophylaxis in septoplasty significantly reduced infection rates (3.3% vs. 12.7%; $p = 0.007$) and unplanned postoperative visits (6). In clean and clean-contaminated procedures with a low baseline incidence of infection, antibacterial sutures may not produce a significant reduction in infection rates (14).

Patient-reported postoperative outcomes, including VAS pain scores, NOSE scores, and comfort, play a critical role in evaluating the choice of surgical materials. The absence of between-group differences in VAS pain scores on postoperative days 7 and 21 suggests that postoperative pain is primarily related to mucoperichondrial flap elevation and the extent of surgical trauma, and that triclosan does not directly influence nociceptive pain mechanisms. Differences favoring the antibacterial group in NOSE scores and day 7 relief of nasal obstruction did not remain significant after Benjamini–Hochberg false discovery rate adjustment. Nevertheless, the marked within-group reductions in VAS and NOSE scores from day 7 to day 21 ($p < 0.001$) are consistent with postoperative recovery. Because there was no control group treated with a different closure technique, these changes cannot be attributed solely to transseptal suturing.

Limitations

This study has several limitations. The single-center design and inclusion of only ASA I–II patients may limit generalizability. Follow-up was restricted to 21 days, preventing evaluation of late complications

and long-term mucosal healing. The small number of infection and hematoma events limits the ability to detect small differences in these outcomes, and nonsignificant findings should not be interpreted as evidence of equivalence or comparable safety. The findings are exploratory because a primary outcome was not prespecified and outcome families were finalized after the data had been examined; multiplicity adjustments applied to separate analysis sets do not fully control the study-wide error rate. Although randomization and surgeon and assessor blinding reduce the risk of bias, subjective clinical scoring and structured comfort items may introduce measurement uncertainty. Furthermore, records of clinical signs of infection do not substitute for standardized SSI surveillance. These findings therefore require confirmation in studies with prespecified outcomes and longer follow-up.

Conclusions

In conclusion, triclosan-coated sutures in septoplasty were associated with favorable early mucosal healing and day 21 edema scores in adjusted exploratory models. Although no clear between-group differences were demonstrated in infection, hematoma, or patient-reported outcomes, antibacterial sutures, which have been shown in previous studies to support early mucosal regeneration and tissue remodeling, may also be considered a safe option for septal closure in rhinological practice.

Declarations

Ethical approval and consent to participate:

The research protocol was submitted to and approved by the Sakarya University Ethics Committee. (21/05/2025-266). Informed consent was obtained from all participants. All procedures were performed in accordance with the principles of the Declaration of Helsinki.

Consent for publication:

Not applicable

Data availability statement:

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Declaration of competing interest:

The authors declare that they have no known competing financial interests or personal relationship that could have appeared to influence the work reported in this paper.

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Authorship contribution statement:

H.E. contributed to the conceptualization and methodology of the study, conducted the investigation, performed data curation and formal analysis, prepared visualizations, and drafted the original manuscript. A.Ç.Y. contributed to the methodology, investigation, resource provision, data curation, project administration, and manuscript review and editing. O.K.E. contributed to the conceptualization, methodology, supervision, validation, and manuscript review and editing. Ş.A.B. contributed to the conceptualization, methodology, supervision, project administration, validation, and manuscript review and editing. A.F.E. assisted with the clinical trial registration process, contributed to the manuscript review and editing. All authors reviewed and approved the final version of the manuscript.

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Figures

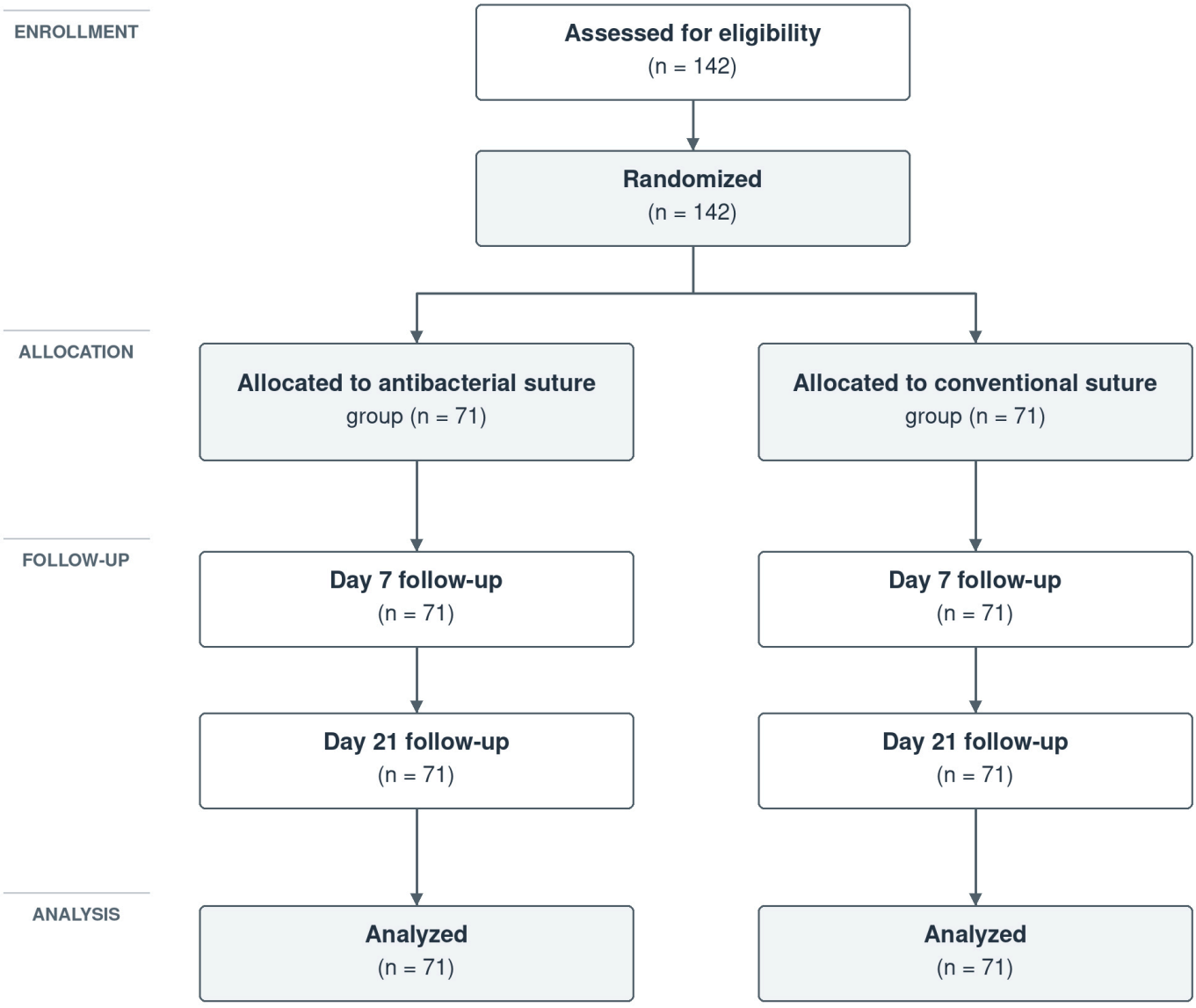


Figure 1

Study flow diagram. POD: postoperative day.

Supplementary Files

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