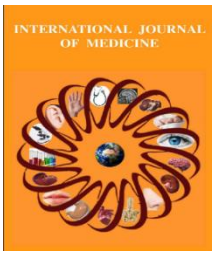

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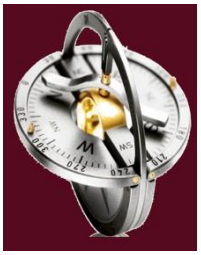

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Original Research

Endoscopic septoplasty without nasal packing: our technique and outcomes.

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Abstract

Background: Nasal packing has traditionally been used after septoplasty to control bleeding, approximate the mucoperichondrial flaps and prevent septal haematoma. However, it may cause pain, nasal obstruction, oral dryness, sleep disturbance and discomfort during removal. Endoscopic septoplasty with trans-septal quilting sutures offers a packing-free alternative that may preserve haemostasis while improving postoperative comfort. *Aim:* To evaluate the technique, safety and clinical outcomes of endoscopic septoplasty performed without postoperative nasal packing. *Materials and Methods:* This hospital-based prospective descriptive study included 80 patients with symptomatic deviated nasal septum who underwent endoscopic septoplasty at a tertiary-care teaching hospital. Deviated septal cartilage and bone were corrected under endoscopic visualization, and the mucoperichondrial flaps were approximated using trans-septal quilting sutures without routine nasal packing. Operative duration, blood loss, haemostasis, hospital stay, NOSE scores, postoperative pain, patient comfort, satisfaction and complications were recorded. Patients were followed for three months. Paired t-test and exact binomial test were applied, with $p<0.05$ considered statistically significant. *Results:* The mean operative duration was 42.7±10.6 minutes, and mean blood loss was 18.6±8.9 mL. Septoplasty was successfully completed without packing in 78 (97.5%) patients, while 77 (96.3%) achieved adequate haemostasis without an additional intervention. The mean hospital stay was 1.18±0.42 days, and 76 (95.0%) patients were discharged within 24 hours. The mean NOSE score decreased from 72.6±13.4 preoperatively to 39.8±14.1 on postoperative day 2 and 7.9±7.6 at three months (mean change: −64.70; 95% CI: −68.28 to −61.12; $p<0.001$). Clinically meaningful improvement was achieved by 74 (92.5%) patients. Mean VAS pain decreased from 3.8±1.5 at six hours to 0.3±0.6 at two weeks ($p<0.001$). Overall, 71 (88.8%) patients were satisfied or highly satisfied, and 76 (95.0%) would recommend the technique. Minimal bleeding occurred in 5 (6.3%) patients, synechiae in 2 (2.5%) and residual deviation in 3 (3.8%). No septal haematoma, septal perforation or revision surgery was recorded. *Conclusion:* Endoscopic septoplasty with trans-septal quilting sutures and without routine nasal packing provided significant relief from nasal obstruction, favourable postoperative comfort and a low incidence of major complications. It may be used as a safe and effective alternative to conventional postoperative nasal packing in appropriately selected patients.

Keywords: *Endoscopic septoplasty; Nasal packing; Trans-septal quilting sutures.*

Introduction

Deviation of the nasal septum is one of the most common structural causes of persistent nasal obstruction encountered in otorhinolaryngology practice. Depending on its location and severity, a deviated nasal septum may produce unilateral or bilateral nasal obstruction, headache, recurrent epistaxis, impaired olfaction, sleep disturbance and recurrent sinonasal infections. When symptoms persist despite appropriate medical treatment, septoplasty remains the principal surgical procedure for correcting the deformity and improving nasal airflow. Recent evidence has demonstrated that septoplasty provides greater symptomatic and quality-of-life improvement than medical management alone in adults with clinically significant nasal obstruction caused by septal deviation [1].

Conventional septoplasty is generally performed using a headlight and nasal speculum. However, illumination and visualization may be inadequate, particularly in patients with posterior deviations, isolated septal spurs or narrow nasal cavities. The introduction of rigid nasal endoscopes has allowed surgeons to obtain magnified and well-illuminated views of the operative field. Endoscopic septoplasty facilitates limited incision, precise elevation of the mucoperichondrial flap and targeted removal of the deviated cartilage or bone while preserving uninvolved septal structures. Systematic reviews have indicated that endoscopic septoplasty may provide better postoperative relief of nasal obstruction and fewer complications than conventional septoplasty, although outcomes remain influenced by the type of deformity and surgical expertise [2,3].

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Following septoplasty, anterior nasal packing has traditionally been used to approximate the mucoperichondrial flaps, control postoperative bleeding, prevent septal haematoma and stabilize the remaining septum. Nevertheless, nasal packing can produce considerable postoperative discomfort, including complete nasal obstruction, oral dryness, headache, sleep disturbance, dysphagia, epiphora, mucosal trauma and pain or bleeding during pack removal. Rare but potentially serious complications such as hypoxaemia, infection and toxic shock syndrome have also been described. Available evidence suggests that non-absorbable packing does not offer clear advantages over packing-free methods in preventing bleeding, septal haematoma, adhesions or infection [4].

Trans-septal quilting sutures provide an alternative method of approximating the mucoperichondrial flaps and obliterating the dead space without obstructing the nasal cavities. They may reduce pain and improve immediate postoperative nasal breathing while maintaining haemostasis and septal stability. Recent meta-analytic evidence has shown that trans-septal suturing can be used safely following septoplasty without increasing postoperative haemorrhage, septal haematoma, synechiae, infection or septal perforation [5].

AIM
To evaluate the technique, safety and clinical outcomes of endoscopic septoplasty performed without postoperative nasal packing.

OBJECTIVES
1. To assess improvement in nasal obstruction following endoscopic septoplasty without nasal packing.
2. To determine postoperative patient comfort and the severity of pain associated with the packing-free technique.
3. To identify postoperative complications, including bleeding, septal haematoma, crusting, synechiae, infection, septal perforation and residual deviation.

Materials and Methods
Source of Data
The study population consisted of patients with symptomatic deviated nasal septum who attended the ENT outpatient department of Subbaiah Institute of Medical Sciences and its associated teaching hospital, Shimoga. Patients who fulfilled the eligibility criteria and underwent endoscopic septoplasty without postoperative nasal packing constituted the source of data. Clinical information was obtained through patient interviews, ENT examination, diagnostic nasal endoscopy, operative records and postoperative follow-up assessments.

Study Design
This was a hospital-based, prospective descriptive observational study. All eligible participants underwent the same endoscopic septoplasty technique, followed by approximation of the mucoperichondrial flaps using trans-septal quilting sutures without inserting anterior nasal packs.

Study Location
The study was conducted in the Department of ENT, Subbaiah Institute of Medical Sciences and its associated teaching hospital, Shimoga, Karnataka, India. Patient recruitment, preoperative evaluation, surgery and postoperative follow-up were performed in the ENT outpatient department, inpatient wards and operation theatre of the institution.

Study Duration
The study was conducted over four years, from January 2017 to December 2020. The study period included patient recruitment, preoperative assessment, operative management, postoperative follow-up, data entry and statistical analysis.

Sample Size
A total of 80 patients who satisfied the eligibility criteria were included. Consecutive sampling was used, and all eligible patients presenting during the study period were enrolled until the required sample size was achieved.

Inclusion Criteria
The study included:
- Patients aged 18 years or older.
- Patients with symptomatic deviated nasal septum confirmed by anterior rhinoscopy and diagnostic nasal endoscopy.
- Patients with persistent nasal obstruction despite an adequate trial of medical management.
- Patients with anterior, posterior or combined septal deviation or an isolated septal spur suitable for endoscopic correction.
- Patients who were medically fit to undergo surgery under local or general anaesthesia.
- Patients who provided written informed consent for surgery and participation.
- Patients willing to attend the scheduled postoperative follow-up visits.

Exclusion Criteria
The study excluded:
- Patients younger than 18 years.
- Patients with active acute rhinitis, acute sinusitis or other active nasal infections.
- Patients with a bleeding disorder, abnormal coagulation profile or uncontrolled systemic disease.
- Patients receiving anticoagulant or antiplatelet medication that could not be discontinued safely before surgery.
- Patients with septal perforation, septal abscess or extensive destruction of the nasal septum.
- Patients with external nasal deformity requiring septorhinoplasty.
- Patients undergoing revision septoplasty.
- Patients requiring simultaneous functional endoscopic sinus surgery, nasal polypectomy or extensive turbinate surgery.
- Patients with suspected or confirmed sinonasal malignancy.
- Patients who declined consent or were unavailable for postoperative follow-up.

Procedure and Methodology
Approval was obtained from the Institutional Ethics Committee before commencement of the study. Written informed consent was obtained from every participant after explaining the procedure, expected benefits, possible complications and the decision not to use postoperative nasal packing.

A detailed clinical history was recorded, including the duration and side of nasal obstruction, headache, epistaxis, nasal discharge, sneezing, hyposmia, mouth breathing, snoring, previous nasal trauma and prior nasal surgery. General physical examination and systemic examination were performed. ENT assessment included examination of the external nose, anterior rhinoscopy and diagnostic nasal endoscopy using a rigid 0-degree endoscope. The type, site and extent of the septal deviation were documented. Routine preoperative investigations and pre-

anaesthetic evaluation were completed.

Nasal obstruction was assessed using the Nasal Obstruction Symptom Evaluation (NOSE) scale. Each of its five items was rated from 0 to 4, and the total was multiplied by five to obtain a score ranging from 0 to 100. A higher score indicated greater nasal-obstruction severity.

The operation was performed under general or local anaesthesia with appropriate monitoring. The nasal cavities were decongested using cotton pledgets soaked in a topical vasoconstrictor and local anaesthetic solution. The septal mucosa was infiltrated with lignocaine containing adrenaline to provide local anaesthesia, hydrodissection and haemostasis.

A 0-degree rigid nasal endoscope was introduced into the nasal cavity. A limited hemitransfixion or Killian incision was made on the side providing better access to the deformity. A mucoperichondrial flap was carefully elevated under endoscopic visualization. Elevation was restricted to the area required to expose the deviation, thereby minimizing mucosal trauma. The chondral incision was made while preserving an adequate dorsal and caudal L-shaped strut for structural support. The contralateral mucoperichondrial flap was elevated when necessary.

Deviated portions of cartilage and bone were excised conservatively using septal scissors, forceps, an osteotome or other appropriate instruments. Posterior bony deviations and localized septal spurs were removed under direct endoscopic visualization. Any mucosal tear or bleeding point was identified and managed immediately. The septum was reassessed endoscopically to ensure adequate correction and patency of both nasal cavities.

The mucoperichondrial flaps were repositioned and approximated using continuous trans-septal quilting sutures with absorbable suture material. The suture was passed through both mucosal flaps at multiple points to eliminate dead space and prevent blood collection. The incision was closed with an absorbable suture. Haemostasis was confirmed endoscopically, and no anterior nasal pack or intranasal splint was inserted.

Patients were observed for postoperative bleeding, respiratory difficulty and other immediate complications. Analgesics, antibiotics and saline nasal irrigation were prescribed according to the institutional protocol. Patients were instructed to avoid nose blowing, forceful sneezing, nose picking, strenuous activity and manipulation of the nose during the early postoperative period.

Postoperative assessment was performed on the second postoperative day and at approximately two weeks, one month and three months. At each visit, nasal patency, pain, bleeding, crusting, septal haematoma, infection, synechiae, septal perforation and residual or recurrent deviation were evaluated. Nasal endoscopy was performed when required. Postoperative NOSE scores were recorded and compared with the preoperative scores.

Sample Processing
No blood, tissue or other biological specimen was collected specifically for the study because the investigation evaluated a surgical technique and its clinical outcomes. Routine preoperative blood samples were processed in the institutional laboratory according to standard hospital protocols and were used only to determine surgical and anaesthetic fitness. Deviated septal cartilage or bone removed during surgery was disposed of according to biomedical-waste-management regulations unless histopathological examination was clinically indicated.

Data Collection
Data were collected prospectively using a predesigned structured case-record form. The form recorded demographic characteristics, presenting symptoms, duration of symptoms, relevant medical and surgical history, endoscopic findings, type and site of septal deviation, anaesthetic technique, operative findings and duration of surgery.

Outcome information included preoperative and postoperative NOSE scores, postoperative pain, requirement for rescue analgesia, occurrence and severity of bleeding, respiratory discomfort, duration of hospital stay and time required to resume normal activities. Complications such as septal haematoma, infection, crusting, synechiae, septal perforation and residual deviation were documented at each follow-up visit. Data were checked for completeness before entry into the study database.

Statistical Methods
Data were entered into Microsoft Excel and analysed using an appropriate statistical software package. Continuous variables were expressed as mean with standard deviation or median with interquartile range according to their distribution. Categorical variables were presented as frequencies and percentages.

The Shapiro-Wilk test and graphical methods were used to assess the normality of continuous data. Preoperative and postoperative NOSE scores were compared using the paired-samples *t* test when normally distributed or the Wilcoxon signed-rank test when the normality assumption was not satisfied. Changes across more than two follow-up assessments were evaluated using repeated-measures analysis of variance or the Friedman test, as appropriate. Categorical postoperative outcomes were summarized with proportions and 95% confidence intervals. Associations between categorical variables were examined using the chi-square test or Fisher's exact test. A two-sided p value <0.05 was considered statistically significant.

Results
Table 1: Overall evaluation of the technique, safety and clinical outcomes of endoscopic septoplasty without nasal packing (N=80)

Parameter	n (%) or Mean (SD)	95% CI	Test of significance	P value
Operative duration, minutes	42.7 (10.6)	40.34-45.06	One-sample t=−1.94†	0.056
Intraoperative blood loss, mL	18.6 (8.9)	16.62-20.58	One-sample t=−6.43‡	<0.001*
Successful completion without nasal packing	78 (97.5)	91.3%-99.3%	Exact binomial test§	0.023*
Adequate intraoperative haemostasis without additional intervention	77 (96.3)	89.5%-98.7%	Exact binomial test§	0.062
Additional haemostatic intervention required	3 (3.8)	1.3%-10.5%	Exact binomial test¶	0.062
Conversion to conventional technique or nasal packing	2 (2.5)	0.7%-8.7%	Exact binomial test¶	0.023*
Discharged within 24 hours	76 (95.0)	87.8%-98.0%	Exact binomial test§	0.188
Duration of hospital stay, days	1.18 (0.42)	1.09-1.27	One-sample t=−6.82‖	<0.001*
Clinically meaningful improvement in nasal obstruction at three months**	74 (92.5)	84.6%-96.5%	Exact binomial test§	0.577
Satisfied or highly satisfied with surgery	71 (88.8)	80.0%-94.0%	Exact binomial test††	<0.001*

†Compared with a reference operative duration of 45 minutes.
‡Compared with a reference blood loss of 25 mL.
§Compared with the prespecified technical-success benchmark of 90%.
¶Compared with an anticipated intervention or conversion rate of 10%.
‖Compared with a reference hospital stay of 1.5 days.
**Defined as a reduction of at least 30 points in the NOSE score.
††Compared with the null proportion of 50%.
*Statistically significant at p<0.05.

Table 1 presents the overall technical, safety and clinical outcomes of endoscopic septoplasty without routine postoperative nasal packing among 80 patients. The mean operative duration was 42.7 (10.6) minutes (95% CI: 40.34-45.06), which was not significantly different from the reference duration of 45 minutes (t=−1.94, p=0.056). Mean intraoperative blood loss was 18.6 (8.9) mL (95% CI: 16.62-20.58), significantly lower than the reference value of 25 mL (t=−6.43, p<0.001). The procedure was completed successfully without nasal packing in 78 (97.5%) patients (95% CI: 91.3%-99.3%; p=0.023). Adequate intraoperative haemostasis without additional intervention was achieved in 77 (96.3%) patients, whereas only 3 (3.8%) required an additional haemostatic intervention; these proportions did not differ significantly from their prespecified benchmarks (both p=0.062). Conversion to the conventional technique or nasal packing was required in only 2 (2.5%) patients (95% CI: 0.7%-8.7%; p=0.023). A total of 76 (95.0%) patients were discharged within 24 hours, although this proportion was not significantly different from the 90% benchmark (p=0.188). The mean hospital stay was 1.18 (0.42) days, which was significantly shorter than the reference duration of 1.5 days (t=−6.82, p<0.001). At three months, 74 (92.5%) patients achieved a clinically meaningful reduction of at least 30 points in their NOSE score, while 71 (88.8%) were satisfied or highly satisfied with surgery.

Table 2: Improvement in nasal obstruction following endoscopic septoplasty without nasal packing (N=80)

Assessment time	NOSE score, Mean (SD)	Mean change from preoperative score (95% CI)	Test of significance†	P value
Preoperative	72.6 (13.4)	Reference	–	–
Postoperative day 2	39.8 (14.1)	−32.80 (−35.65 to −29.95)	Paired t=−22.92	<0.001*
Two weeks	18.7 (11.6)	−53.90 (−57.28 to −50.52)	Paired t=−31.72	<0.001*
One month	11.4 (9.2)	−61.20 (−64.72 to −57.68)	Paired t=−34.64	<0.001*
Three months	7.9 (7.6)	−64.70 (−68.28 to −61.12)	Paired t=−35.94	<0.001*
Reduction of ≥30 points at three months	74 (92.5)	84.6%-96.5%	Exact binomial test‡	<0.001*
Mild or no obstruction at three months, NOSE score <25	71 (88.8)	80.0%-94.0%	Exact binomial test‡	<0.001*
Complete subjective relief from nasal obstruction	66 (82.5)	72.7%-89.3%	Exact binomial test‡	<0.001*
Persistent moderate-to-severe obstruction	5 (6.3)	2.7%-13.8%	Exact binomial test§	<0.001*

NOSE: Nasal Obstruction Symptom Evaluation; score range: 0-100, with higher scores indicating more severe obstruction.
†Paired comparison with the preoperative NOSE score.
‡Compared with the null proportion of 50%.
§Compared with an anticipated persistent-obstruction rate of 50%.
*Statistically significant at p<0.05.

Table 2 demonstrates a progressive and statistically significant improvement in nasal obstruction following endoscopic septoplasty without nasal packing. The mean preoperative NOSE score was 72.6 (13.4), indicating severe baseline nasal obstruction. This decreased to 39.8 (14.1) on postoperative day 2, corresponding to a mean reduction of 32.80 points (95% CI: 29.95-35.65; t=−22.92, p<0.001). At two weeks, the mean score declined further to 18.7 (11.6), representing a reduction of 53.90 points from baseline (95% CI: 50.52-57.28; t=−31.72, p<0.001). The mean NOSE score was 11.4 (9.2) at one month and 7.9 (7.6) at three months, with respective mean reductions of 61.20 and 64.70 points; both changes were statistically significant (p<0.001). At three months, 74 (92.5%) patients achieved a reduction of at least 30 points, and 71 (88.8%) had mild or no residual obstruction, defined as a NOSE score below 25. Complete subjective relief from nasal obstruction was reported by 66 (82.5%) patients, whereas persistent moderate-to-severe obstruction occurred in only 5 (6.3%). All categorical clinical outcomes were statistically significant (p<0.001).

Table 3: Postoperative patient comfort and pain following packing-free endoscopic septoplasty (N=80)

Patient-comfort outcome	n (%) or Mean (SD)	Effect estimate/change (95% CI)	Test of significance	P value
Pain score at 6 hours, VAS	3.8 (1.5)	3.47-4.13	Reference	–
Pain score on postoperative day 1	2.9 (1.3)	MD=−0.90 (−1.19 to −0.61)	Paired t=−6.18	<0.001*
Pain score on postoperative day 2	1.8 (1.1)	MD=−2.00 (−2.35 to −1.65)	Paired t=−11.31	<0.001*
Pain score at two weeks	0.3 (0.6)	MD=−3.50 (−3.87 to −3.13)	Paired t=−18.69	<0.001*
Required rescue analgesia during first 24 hours	18 (22.5)	14.7%-32.8%	Exact binomial test†	<0.001*
Comfortable nasal breathing within 24 hours	62 (77.5)	67.2%-85.3%	Exact binomial test†	<0.001*
Absence of sleep disturbance on first night	66 (82.5)	72.7%-89.3%	Exact binomial test†	<0.001*
Absence of troublesome oral dryness	62 (77.5)	67.2%-85.3%	Exact binomial test†	<0.001*
No difficulty in swallowing	71 (88.8)	80.0%-94.0%	Exact binomial test†	<0.001*
Able to tolerate oral intake within 6 hours	74 (92.5)	84.6%-96.5%	Exact binomial test†	<0.001*
Satisfied or highly satisfied with postoperative comfort	71 (88.8)	80.0%-94.0%	Exact binomial test†	<0.001*
Willing to recommend the packing-free technique	76 (95.0)	87.8%-98.0%	Exact binomial test†	<0.001*

VAS: Visual Analogue Scale ranging from 0=no pain to 10=worst possible pain; MD: mean difference.
Pain scores were compared with the six-hour postoperative score.
†Exact binomial test against a null proportion of 50%. For undesirable outcomes, the observed occurrence was compared with 50%.
*Statistically significant at p<0.05.

Table 3 summarizes postoperative pain and patient comfort following packing-free endoscopic septoplasty. The mean VAS pain score at six

hours was 3.8 (1.5), which decreased significantly to 2.9 (1.3) on postoperative day 1, with a mean reduction of 0.90 points (95% CI: 0.61-1.19; t=−6.18, p<0.001). Pain declined further to 1.8 (1.1) on postoperative day 2, representing a reduction of 2.00 points from the six-hour score (95% CI: 1.65-2.35; t=−11.31, p<0.001). At two weeks, the mean pain score was only 0.3 (0.6), with a mean reduction of 3.50 points (95% CI: 3.13-3.87; t=−18.69, p<0.001). Rescue analgesia during the first 24 hours was required by 18 (22.5%) patients. Comfortable nasal breathing within 24 hours was reported by 62 (77.5%) patients, and 66 (82.5%) experienced no sleep disturbance on the first postoperative night. Troublesome oral dryness was absent in 62 (77.5%), while 71 (88.8%) experienced no swallowing difficulty. Oral intake was tolerated within six hours by 74 (92.5%) patients. Overall, 71 (88.8%) were satisfied or highly satisfied with their postoperative comfort, and 76 (95.0%) stated that they would recommend the packing-free technique. All comfort-related outcomes were statistically significant (p<0.001), indicating that avoidance of nasal packing was associated with rapidly declining pain and favourable postoperative tolerance.

Table 4: Postoperative complications following endoscopic septoplasty without nasal packing (N=80)

Postoperative complication	n (%)	95% CI	Test of significance†	P value
Any postoperative complication	14 (17.5)	10.7%-27.3%	Exact binomial test	0.037*
Minimal postoperative bleeding	5 (6.3)	2.7%-13.8%	Exact binomial test	0.350
Bleeding requiring additional intervention	2 (2.5)	0.7%-8.7%	Exact binomial test	0.023*
Septal haematoma	0 (0.0)	0.0%-4.6%	Exact binomial test	<0.001*
Crusting on postoperative day 2	12 (15.0)	8.8%-24.4%	Exact binomial test	0.136
Persistent crusting at two weeks	3 (3.8)	1.3%-10.5%	Exact binomial test	0.062
Synechiae	2 (2.5)	0.7%-8.7%	Exact binomial test	0.023*
Local infection	1 (1.3)	0.2%-6.7%	Exact binomial test	0.004*
Septal perforation	0 (0.0)	0.0%-4.6%	Exact binomial test	<0.001*
Residual septal deviation	3 (3.8)	1.3%-10.5%	Exact binomial test	0.062
Postoperative sinusitis	1 (1.3)	0.2%-6.7%	Exact binomial test	0.004*
Readmission within 30 days	1 (1.3)	0.2%-6.7%	Exact binomial test	0.004*
Revision surgery required within three months	0 (0.0)	0.0%-4.6%	Exact binomial test	<0.001*

†Two-sided exact binomial test compared the observed complication proportion with a prespecified reference complication rate of 10%. For "any postoperative complication," the reference rate was 30% because individual patients could experience more than one complication. Confidence intervals for proportions were calculated using the Wilson method.
*Statistically significant at p<0.05.

Table 4 presents the postoperative complications observed after packing-free endoscopic septoplasty. At least one postoperative complication was recorded in 14 (17.5%) patients (95% CI: 10.7%-27.3%), which was significantly below the prespecified reference rate of 30% (p=0.037). Minimal postoperative bleeding occurred in 5 (6.3%) patients and was not significantly different from the 10% reference rate (p=0.350). Bleeding requiring additional intervention occurred in only 2 (2.5%) patients and was significantly below the reference rate (p=0.023). No patient developed a septal haematoma or septal perforation (both p<0.001). Crusting was observed in 12 (15.0%) patients on postoperative day 2; however, persistent crusting at two weeks was found in only 3 (3.8%) patients. Neither finding differed significantly from its reference rate (p=0.136 and p=0.062, respectively). Synechiae occurred in 2 (2.5%) patients (p=0.023), while local infection, postoperative sinusitis and 30-day readmission were each recorded in only 1 (1.3%) patient (p=0.004 for each). Residual septal deviation was identified in 3 (3.8%) patients and was not statistically different from the 10% reference rate (p=0.062). No patient required revision surgery within three months (p<0.001).

Discussion

The present study evaluated the feasibility, safety, clinical effectiveness and patient acceptability of endoscopic septoplasty performed without routine postoperative nasal packing. The findings demonstrated a high rate of technical completion, limited intraoperative blood loss, early discharge, substantial improvement in nasal-obstruction symptoms, rapidly declining postoperative pain and a low frequency of major complications. These results support the use of trans-septal quilting sutures as an alternative to routine nasal packing in appropriately selected patients. Nevertheless, because the study did not include a concurrent packed control group, comparisons with conventional packing should be interpreted in relation to previously published evidence rather than as direct causal comparisons.

Technical and overall clinical outcomes

The mean operative duration was 42.7±10.6 minutes and was not significantly different from the reference duration of 45 minutes (p=0.056). This suggests that placement of trans-septal quilting sutures did not materially prolong the operation. Although suturing may initially require additional operative time, it eliminates the time required for pack insertion and subsequent removal. Korkut et al. (2010)[1] similarly found trans-septal suturing with a septal-suture device to be a practical alternative to postoperative packing without compromising operative outcomes.

Mean intraoperative blood loss was only 18.6±8.9 mL and was significantly below the reference value of 25 mL (p<0.001). Adequate haemostasis without further intervention was achieved in 96.3% of patients, and only 3.8% required an additional haemostatic measure. These findings indicate that careful endoscopic dissection, direct visualization of bleeding points and approximation of the mucoperichondrial flaps provided satisfactory haemostasis despite the absence of packing. Plasencia et al. (2016)[9], in a randomized study of 92 patients, reported no postoperative bleeding in the trans-septal-suture group and concluded that suturing was an effective and cost-efficient substitute for conventional packing.

Successful completion without nasal packing was achieved in 97.5% of patients, while conversion to a conventional technique or packing was required in only 2.5%. Similar findings were reported by Naik (2015)[8], who compared nasal packing with trans-septal splint suturing in 200 septoplasty procedures and found suturing to be a feasible method that avoided packing-associated morbidity. The low conversion rate in the present study suggests that packing can be avoided in most uncomplicated endoscopic septoplasty procedures, although it should remain available when persistent bleeding or extensive mucosal injury occurs.

In the present study, 95.0% of patients were discharged within 24 hours, and the mean hospital stay was 1.18±0.42 days, significantly below the reference duration of 1.5 days (p<0.001). Avoiding packing may facilitate early discharge by allowing immediate nasal breathing and removing the need for hospital observation until pack removal. Mane et al. (2013)[4] also observed that patients undergoing septoplasty without packing experienced less discomfort and could be managed without the morbidity associated with pack removal. Plasencia et al. (2016)[9] further demonstrated improved procedural efficiency and reduced material-related costs with trans-septal suturing.

At three months, 92.5% of patients achieved a clinically meaningful reduction in nasal obstruction, and 88.8% were satisfied or highly satisfied with surgery. These findings indicate that omitting nasal packing did not compromise the functional effectiveness of septoplasty. Banglawala et al. (2013)[5], in a meta-analysis of 16 studies, found no evidence that routine nasal packing improved postoperative bleeding, septal haematoma, adhesions, septal perforation or residual deviation. Their findings support the view that postoperative success primarily depends on accurate correction of the septal deformity, mucosal preservation and appropriate flap approximation rather than routine packing.

Improvement in nasal obstruction

The mean preoperative NOSE score was 72.6±13.4, indicating severe nasal obstruction. A significant reduction was already evident on postoperative day 2, when the mean score decreased to 39.8±14.1. Further improvement occurred at two weeks, one month and three months,

with corresponding mean scores of 18.7±11.6, 11.4±9.2 and 7.9±7.6. All postoperative reductions from baseline were statistically significant ($p<0.001$).

The 64.7-point mean reduction at three months was clinically substantial and was greater than the minimum change generally considered meaningful on the NOSE scale. Gandomi et al. (2010)[2] similarly demonstrated significant improvement in mean NOSE scores at three months after septoplasty, with some symptoms continuing to improve during longer follow-up. The progressive improvement in the present study may reflect the resolution of early mucosal oedema, crusting and postoperative inflammation in addition to correction of the structural obstruction. A reduction of at least 30 NOSE-score points was achieved by 92.5% of patients, while 88.8% had mild or no obstruction at three months. Complete subjective relief was reported by 82.5%, whereas persistent moderate-to-severe obstruction occurred in only 6.3%. Residual symptoms in a small proportion of patients could have resulted from residual septal deviation, turbinate hypertrophy, allergic rhinitis, nasal-valve dysfunction or postoperative adhesion. Therefore, persistent symptoms should not necessarily be attributed solely to failure of the septoplasty technique.

The present functional findings are consistent with Kim and Kwon (2017)[10], whose meta-analysis concluded that non-absorbable nasal packing was no more effective than packing-free alternatives in improving postoperative results. Similarly, Wang and Dong (2017)[11], in a systematic review and meta-analysis of 19 randomized trials involving 1,845 participants, found that trans-septal suturing and nasal packing were comparable regarding residual septal deviation and other major surgical outcomes. Thus, avoidance of packing appeared not to diminish the functional benefit of septal correction.

Postoperative pain and patient comfort

Postoperative pain decreased rapidly in the present study. The mean VAS score declined from 3.8±1.5 at six hours to 2.9±1.3 on postoperative day 1, 1.8±1.1 on day 2 and 0.3±0.6 at two weeks. Each reduction was statistically significant ($p<0.001$). Only 22.5% of patients required rescue analgesia during the first 24 hours. These findings suggest that the packing-free technique was associated with mild-to-moderate early pain followed by rapid recovery.

Mane et al. (2013)[4] reported significantly less pain among patients who underwent septoplasty without postoperative packing. Bernardo et al. (2013)[6] also found that patients receiving nasal packing experienced greater nasal pain and headache in the immediate postoperative period and concluded that routine packing should be questioned. These findings are clinically plausible because packing exerts pressure on the septal mucosa and lateral nasal wall and may cause mucosal ischaemia, headache and additional trauma during removal.

Comfortable nasal breathing within 24 hours was reported by 77.5% of patients in the present study. Furthermore, 82.5% experienced no sleep disturbance on the first night, 77.5% had no troublesome oral dryness, 88.8% had no swallowing difficulty and 92.5% tolerated oral intake within six hours. Cayonu et al. (2014)[7] reported that bilateral totally occlusive nasal packing increased the risk of immediate respiratory distress compared with internal splints or trans-septal sutures. Zayyan et al. (2010)[3] also demonstrated that totally occlusive packing could adversely affect arterial oxygenation and cardiac parameters, particularly in susceptible patients. Preservation of the nasal airway may therefore explain the favourable breathing, sleeping and swallowing outcomes recorded in the current study.

Satisfaction with postoperative comfort was reported by 88.8% of patients, and 95.0% were willing to recommend the technique. Plasencia et al. (2016)[9] found significantly less pain and headache with trans-septal suturing than with packing. Naik (2015)[8] likewise reported reduced pain and discomfort when packing was replaced by trans-septal splint suturing. The meta-analysis by Wang and Dong (2017)[11] confirmed that trans-septal suturing was associated with less pain and headache, greater satisfaction and better postoperative quality of life than nasal packing.

Postoperative complications

At least one postoperative complication occurred in 17.5% of patients; however, most events were minor and self-limiting. Minimal bleeding occurred in 6.3%, whereas bleeding requiring additional intervention occurred in only 2.5%. These findings are comparable to those of Mane et al. (2013)[4], who reported minimal bleeding in patients managed without packing. Banglawala et al. (2013)[5] found no evidence that routine nasal packing reduced postoperative haemorrhage, suggesting that meticulous surgical haemostasis and flap approximation may be more important than mechanical compression by a pack.

No patient developed septal haematoma. Although the absence of this complication is encouraging, it should be interpreted with consideration of the sample size and the upper 95% confidence limit of 4.6%. Quilting sutures likely prevented haematoma by closing the dead space between the mucoperichondrial flaps. Kim and Kwon (2017)[10] found that trans-septal sutures and septal splints prevented postoperative complications without the need for non-absorbable packing. Wang and Dong (2017)[11] similarly reported no significant difference between suturing and packing in the occurrence of septal haematoma.

Crusting was observed in 15.0% of patients on postoperative day 2 but persisted in only 3.8% at two weeks. This reduction suggests that early crusting was predominantly part of the normal healing response. Naik (2015)[8] followed patients for bleeding, pain, crusting and synechiae and showed that trans-septal suturing could be used without an unacceptable increase in these complications. Regular saline irrigation and endoscopic cleaning may have contributed to the resolution of crusting in the present study.

Synechiae developed in 2.5% of patients. This low occurrence may be related to limited endoscopic dissection, preservation of the opposing mucosal surfaces and accurate flap approximation. Wang and Dong (2017)[11] found a significantly lower incidence of adhesion with trans-septal suturing than with nasal packing. Packing may produce mucosal abrasion and pressure injury, potentially promoting adhesion formation rather than preventing it.

Local infection and postoperative sinusitis each occurred in only 1.3% of patients. Banglawala et al. (2013)[5] reported that packing provided no overall postoperative benefit and could be associated with an increased risk of infection. Avoiding retained foreign material within the nasal cavity may reduce secretion retention and bacterial colonization. However, the low number of infectious events in the current study did not permit a detailed analysis of associated risk factors.

No septal perforation was observed. Residual septal deviation occurred in 3.8% of patients, but none required revision surgery within three months. The magnified endoscopic view may have facilitated targeted removal of posterior deformities while limiting bilateral mucosal trauma. Nevertheless, three months is a relatively short period for evaluating recurrent deviation and late revision surgery. Longer follow-up would be necessary to confirm the durability of these outcomes.

Conclusion

Endoscopic septoplasty with trans-septal quilting sutures and without routine postoperative nasal packing was a safe, effective and well-tolerated technique for treating symptomatic deviated nasal septum. It provided precise correction with limited blood loss, satisfactory haemostasis, short hospitalization and substantial improvement in nasal obstruction. Postoperative pain declined rapidly, patient comfort and satisfaction were high, and clinically important complications were uncommon. Trans-septal quilting sutures may therefore be considered a practical alternative to routine nasal packing in appropriately selected patients.

Limitations

This study had several limitations. It was a single-centre study with a relatively small sample of 80 patients, which limited the generalizability

and precision of uncommon complication estimates. The absence of a concurrent control group undergoing septoplasty with conventional nasal packing prevented direct comparison of pain, bleeding, functional improvement and complications. Consecutive sampling may have introduced selection bias, while the involvement of a limited number of surgeons could have influenced the outcomes. Some endpoints, including pain, nasal obstruction, comfort and satisfaction, were patient-reported and therefore susceptible to reporting bias. Blinding was not feasible, and objective nasal-airflow measurements such as rhinomanometry or acoustic rhinometry were not performed. Follow-up was limited to three months, so delayed complications, recurrent deviation and long-term revision requirements could not be adequately assessed. Potential confounders such as allergic rhinitis, turbinate hypertrophy, smoking and the type or severity of septal deviation were not evaluated separately.

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