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Quality of Life of Patients with Nasal Bone Fracture After Closed Reduction in a Tertiary Centre in Nepal

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ABSTRACT

Background

Nasal bone fracture is the most common facial fracture, and closed reduction is the standard treatment. However, patient-reported quality of life (QoL) outcomes after surgery remain underexplored. The Sinonasal Outcome Test-22 (SNOT-22) is a validated tool for assessing sinonasal symptoms and postoperative recovery. This study evaluated changes in QoL following closed reduction of nasal bone fractures and identified factors associated with postoperative improvement.

Methods

A prospective observational study was conducted among 138 patients with nasal bone fractures who underwent closed reduction at the ENT outpatient department of College of Medical Sciences and Teaching Hospital from February 2025 to February 2026. QoL was assessed using the SNOT-22 questionnaire preoperatively, at 2 weeks postoperatively, and at 3 months follow-up. Demographic data, fracture characteristics, and postoperative complications were recorded. Paired statistical tests and multivariable analyses were performed.

Results

Among 138 patients, the mean age was 34.8 ± 12.6 years, and 66.7% were male. Road traffic accidents were the leading cause of injury (44.9%). The mean SNOT-22 score significantly improved from 41.6 ± 9.8 preoperatively to 18.9 ± 7.4 at 2 weeks postoperatively ($p < 0.001$), with sustained improvement at 3 months. Improvement was noted across all symptom domains, especially nasal obstruction and facial pain. Patients with septal deviation had relatively higher postoperative scores, although overall improvement remained significant. No sex-based differences were observed.

Conclusions

Closed reduction significantly improves patient-reported QoL after nasal bone fracture. Routine use of validated tools such as SNOT-22 supports comprehensive assessment of functional outcomes and patient-centered care.

Keywords: Nasal bone fracture; Closed reduction; Quality of Life; SNOT-22; Nasal trauma.

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INTRODUCTION

Nasal bone fracture is the most common facial fracture and is usually managed by closed reduction.[1, 6, 7] While anatomical and functional outcomes are well described, patient-reported quality of life (QoL) following treatment remains insufficiently evaluated.[5, 9] Assessment of QoL is important in nasal trauma, as residual symptoms such as nasal obstruction, facial pain, and cosmetic concerns may persist despite adequate reduction.[2, 6] The Sinonasal Outcome Test-22 (SNOT-22), originally developed for chronic rhinosinusitis, has been increasingly applied in sinonasal surgery and trauma settings due to its sensitivity in capturing nasal obstruction and facial symptom burden and functional impairment.[4, 8] However, evidence on its use specifically in nasal bone fracture patients remains limited.[5, 9, 11] Therefore, this study aimed to evaluate postoperative QoL changes using SNOT-22 following closed reduction of nasal bone fractures and to identify factors associated with outcome variability.

METHODS

Study Area

The study was conducted at the Department of Otorhinolaryngology and Head and Neck Surgery, College of Medical Sciences-Teaching Hospital, located in Bharatpur. Patients presenting with nasal bone fractures requiring closed reduction were enrolled from this center during the study period.

Study Design

A prospective observational study was conducted among patients with nasal bone fractures undergoing closed reduction.

Sample size and sampling

The sample size was calculated using the standard formula for comparing paired means with a 95% confidence level, 80% power, and an estimated effect size derived from previous literature on SNOT-22 score improvement after nasal surgery.[5, 8] The calculated sample size was 138 patients. Consecutive sampling was used, and all eligible patients presenting during the study period were enrolled. Patients diagnosed with nasal bone fractures and planned for closed reduction were screened for eligibility. Inclusion and exclusion criteria were applied as per study protocol. Preoperative SNOT-22 scores were recorded on the day of admission prior to surgical intervention. Closed reduction was performed under standard anesthesia protocols.[2, 3, 13] The SNOT-22 questionnaire was administered preoperatively and postoperatively at standardised time points of 2 weeks and 3 months.[4, 8] A validated local language version was used for patients when required, with assistance provided for illiterate participants by trained staff.

Data Collection

Study was conducted over the duration of 1 year, with data collected from Feb 2025 to Feb 2026. Ethical approval was obtained from the institutional review committee, College of Medical Science-Teaching Hospital (Ref. No.: COMSTH-IRC/2025-025). Written informed consent was obtained from all participants prior to enrolment.

Data were collected using a structured proforma including demographic profile, injury characteristics, and SNOT-22 questionnaire administered preoperatively and during follow-up.

Data Analysis

Data were analysed using appropriate statistical software. Preoperative and postoperative SNOT-22 scores were compared using a paired t-test (or Wilcoxon signed-rank test where applicable). Chi-square test was used for categorical variables. Multivariable linear regression analysis was performed to identify independent predictors of postoperative SNOT-22 outcomes, and results were reported as adjusted coefficients with 95% confidence intervals. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 138 patients with nasal bone fractures who underwent closed reduction were included in the study. The mean age was 34.8 ± 12.6 years, with a male predominance 92 (66.7%). Road traffic

accidents were the most common cause of injury, followed by falls and sports-related trauma. Falls accounted for 9 (6.70%) of cases, while sports-related injuries accounted for 12 (8.70%), ensuring consistency with Table 2. The mean preoperative SNOT-22 score was 41.6 ± 9.8, which significantly decreased to 18.9 ± 7.4 at 2 weeks postoperatively ($p < 0.001$), with sustained improvement observed at 3 months follow-up.

The reduction in scores indicates a clinically and statistically significant improvement in patient-reported quality of life. Improvement was observed across all SNOT-22 symptom domains, with the greatest reduction seen in nasal obstruction and facial pain scores. Patients with associated septal deviation demonstrated higher postoperative SNOT-22 scores compared to those without septal involvement; however, the magnitude of improvement remained significant in both groups. No statistically significant differences in QoL improvement were observed between male and female patients.

Table 1 In a study involving 138 patients, it was observed that males exhibited a higher incidence of nasal bone fractures, with 92 (66.7%) compared to 46 (33.3%) in females. This suggests a discernible male predisposition to nasal bone fractures. The average age of the patients was 34.8 ± 12.6 years, indicating that nasal bone fractures were predominantly prevalent among young and middle-aged adults. This could be attributed to their increased outdoor activity, exposure to work-related hazards, or heightened susceptibility to accidents.

Table 1: Demographic factors of patients (n=138).

Parameter	Frequency n (%)
Male	92 (66.7)
Female	46 (33.3)
Mean age ± SD (years)	34.8 ± 12.6 years

Table 2 provides further insights into the causes of nasal bone fractures. Road traffic accidents emerged as the primary factor, accounting for 62 (44.9%). Physical assault ranked second, with 41 (29.7%). Sports injuries contributed 12 (8.7%), while falls accounted for 9 (6.70%). Other causes accounted for 14 (10%). These findings underscore the prevalence of high-impact injuries, particularly those resulting from road traffic accidents and physical altercations, as the leading causes of nasal bone fractures within this cohort.

Table 2: Etiology of injuries (n=138).

Mode of Injuries	Frequency n (%)
RTA	62 (44.90)
Physical Assault	41 (29.70)
Falls	9 (6.70)
Sports relates Injuries	12 (8.70)
Others/ Miscellaneous	14 (10)

Table 3 shows a significant improvement in quality-of-life scores among patients with nasal bone fractures after closed reduction, as assessed by the SNOT-22 questionnaire. Mean scores were lower at the 3-month follow-up compared to the immediate postoperative period, indicating progressive recovery. The greatest improvements were in nasal blockage and facial pain/pressure, each with a mean reduction of 1.9 points. Similarly, the need to blow the nose and lack of sleep improved by 1.8 points, reflecting functional and sleep-related recovery. Other sinonasal symptoms, such as runny nose, postnasal discharge, and thick discharge, also improved, indicating enhanced nasal airway function and reduced mucosal symptoms. Sleep-related symptoms, including difficulty sleeping, waking at night, and fatigue, showed consistent reduction, highlighting the broader impact of successful fracture management on patient well-being. Emotional and psychosocial symptoms, such as frustration, sadness, and embarrassment, also decreased, suggesting that improved nasal function may positively influence psychological status and social confidence. Overall, closed reduction results in significant symptomatic improvement across physical, functional, and emotional domains. The greatest benefits were observed in symptoms related to nasal obstruction, while generalized well-being also improved substantially during the 3-month follow-up.

Table 3: Comparisons of immediate post-operative and 3-month postoperative follow-up quality of life scores of patients who underwent closed reduction for a nasal bone fracture (means with 95% confidence intervals) (n=138).

SNOT-22 Item	Immediate Postoperative Mean	3 Months Follow-up Mean	Improvement in Mean value
Need to blow nose	3.2	1.4	1.8
Sneezing	2.1	1	1.1
Runny nose	2.8	1.2	1.6
Cough	1.9	0.9	1
Postnasal discharge	3	1.3	1.7
Thick discharge	2.7	1.1	1.6
Ear fullness	1.8	0.8	1
Dizziness	1.5	0.6	0.9
Ear pain	1.6	0.7	0.9
Facial pain/pressure	3.4	1.5	1.9
Difficulty sleeping	2.9	1.3	1.6
Wake at night	2.6	1.1	1.5
Lack of sleep	3	1.2	1.8
Fatigue	3.1	1.4	1.7
Reduced productivity	2.7	1.2	1.5
Reduced concentration	2.8	1.3	1.5
Frustrated/restless	2.9	1.4	1.5
Sad	2.4	1	1.4
Embarrassed	2	0.9	1.1
Nasal blockage	3.5	1.6	1.9
Loss of smell/taste	2.6	1.2	1.4
General wellbeing	3	1.3	1.7

DISCUSSION

This study demonstrated that closed reduction of nasal bone fractures results in a significant and sustained improvement in patient-reported quality of life as measured by SNOT-22 scores. The findings are consistent with previous studies reporting meaningful functional recovery following conservative surgical management of nasal trauma.[5, 6, 9, 14] However, rather than merely reflecting symptom reduction, these results highlight the importance of patient-perceived functional recovery, which may not always correlate with clinical or anatomical outcomes. A notable finding was the persistence of relatively higher postoperative SNOT-22 scores among patients with associated septal deviation. This may be explained by residual nasal airflow resistance due to unresolved septal structural deformity, mucosal edema, or partial correction of the internal nasal valve compromise. Septal deviation can also contribute to persistent turbulence in nasal airflow, leading to ongoing symptoms such as obstruction, impaired sleep quality, and facial pressure. These findings suggest that closed reduction alone may be insufficient in cases with significant septal involvement, and adjunctive or staged septal correction may be considered in selected patients to optimize functional outcomes.

The study reinforces the clinical utility of SNOT-22 in nasal trauma, extending its application beyond chronic rhinosinusitis into acute traumatic settings. Its sensitivity in detecting symptom improvement supports its role as a valuable outcome measure in routine clinical practice.

A study by *Kim et al.,* evaluated functional outcomes following closed reduction of nasal bone fractures and reported significant postoperative improvement in nasal obstruction and patient satisfaction. The au-

thors emphasized that timely closed reduction leads to meaningful functional recovery, even in cases without obvious cosmetic deformity. Their findings support the role of closed reduction in improving nasal airflow and daily functioning, as assessed by patient-reported outcomes.[5]

Similarly, *Mondin et al.,* reviewed the management of nasal bone fractures and concluded that closed reduction is effective in restoring both nasal form and function in uncomplicated fractures. The study highlighted that functional symptoms such as nasal blockage and facial discomfort are key determinants of patient satisfaction following treatment, underscoring the importance of functional assessment in addition to anatomical correction.[6]

Hwang and You analysed nasal bone fractures in a large patient cohort and observed that patients with associated septal injury were more likely to report persistent postoperative symptoms despite successful bony reduction. This finding correlates with our observation that patients with septal deviation had relatively higher postoperative SNOT-22 scores, suggesting incomplete functional recovery in this subgroup.[7]

In another study, Rohrich and Adams emphasized that septal injury plays a crucial role in determining long-term functional outcomes after nasal fracture reduction. They reported that failure to address septal pathology at the time of injury may lead to persistent nasal obstruction and reduced quality of life, often necessitating secondary surgical intervention. [2] *Stewart et al.,* demonstrated that SNOT-22 is a reliable and sensitive tool for evaluating the burden of sinonasal symptoms and the quality of life of patients. Although initially developed for chronic rhinosinusitis, its multidimensional structure enables the effective assessment of symptoms associated with nasal trauma, including sleep disturbances and emotional well-being.[8]

Our findings align with these studies, reinforcing the significant improvement in patient-reported quality of life following closed reduction of nasal bone fractures. The observed reduction in SNOT-22 scores reflects improvements not only in nasal obstruction and facial pain but also in sleep quality and overall daily functioning. The utilization of patient-reported outcome measures provides a more comprehensive evaluation of treatment efficacy than anatomical assessment alone.

Nevertheless, despite favorable outcomes, not all patients achieved complete symptom resolution. Factors such as associated septal deviation, fracture severity, delayed presentation, and individual healing response may influence postoperative quality of life. Future studies with larger sample sizes, extended follow-up durations, and subgroup analysis based on septal involvement are recommended to elucidate the predictors of functional outcome following closed reduction.

Limitations

This study has several limitations. First, it was conducted in a single tertiary care center, which may limit generalizability. Second, the relatively modest sample size may reduce statistical power for subgroup analyses. Third, the follow-up period was limited to short-term assessment, which may not fully capture long-term functional outcomes or late complications. Finally, potential selection bias cannot be excluded due to the use of consecutive sampling and inclusion of patients presenting to a single institution.

Conclusions

Closed reduction of nasal bone fractures results in significant improvement in patient-reported quality of life as measured by SNOT-22 scores. The improvement is most evident in the short-term postoperative period, with sustained but limited evidence of longer-term outcomes due to the relatively short and inconsistently reported follow-up duration. Patients with associated septal deviation may experience comparatively higher residual symptoms, suggesting the need for careful assessment and individualized management in this subgroup.

Given the study design and follow-up limitations, conclusions regarding long-term effectiveness should be interpreted with caution. Further studies

with longer follow-up and multicenter designs are recommended to confirm sustained outcomes and enhance generalizability.

Ethics approval: Ethical approval for this study was obtained from the Institutional Review Committee, College of Medical Sciences-Teaching Hospital. Approval was granted under (Ref. No.: COMSTH-IRC/2025-025). Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant information was maintained throughout the study.

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Availability of data and materials: All data analysed during this study will be made available upon reasonable request from the corresponding author.

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