

EFFECTIVENESS OF CLOSED REDUCTION IN THE TREATMENT OF NASAL BONE FRACTURES

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ABSTRACT

This study was conducted to investigate the effectiveness of closed reduction of nasal bone fracture according to severity. It was a retrospective study carried on 60 patients with mean age of 30.2 years (range 10-67 years) who have undergone a closed reduction of a nasal bone fracture at Gandaki Medical College Teaching Hospital from January 2017 to December 2019. The patient with nasal bone fracture who underwent surgical intervention with closed reduction under General anaesthesia were included in this study. Fracture severity was evaluated according to Hwang *et al.*'s classification method. All patients underwent closed reduction with external nasal splinting under General anesthesia. The patients were followed-up for at least three months to assess the complications, such as fracture recurrence and functional abnormality in the Department. The most common cause of nasal bone fracture was road traffic accidents 25 (41.6%) followed by physical assaults 18 (30%), fall injuries 12 (20%), other incidences 3 (5%), and industrial accidents 2 (3%). Forty-three (72%) cases underwent closed reduction within 24 hours of those who arrived within 4-6 hour of nasal injury in the hospital and the remaining 17 (28%) cases were reduced after 5 days of trauma. Concurrent fracture found in 8 (13%) cases and it included maxillary, zygomatic, orbital, frontal bone fracture. Nasal bone fracture mostly occurs in road traffic accidents. Closed reduction with good alignment is the preferred method. Septorhinoplasty and extracorporeal septoplasty should be applied in difficult and comminuted nasoseptal fracture.

KEYWORDS

Closed reduction, effectiveness, septorhinoplasty

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INTRODUCTION

The nasal bone is the most common facial bone fracture which accounts for 40% of all facial fractures.¹ The causative factors for nasal bones fracture include physical assaults, falls, sports injuries and road traffic accidents.^{2,3}

The closed reduction attempts to approximate and align the cartilaginous and skeletal nasal structures to their pre-trauma state and to improve the airway with minimal side effects. The management of displaced nasal bone fracture should be performed with a closed reduction in the acute setting within 1 to 2 weeks period.⁴ Long-standing traumatic nasal deformities require formal septorhinoplasty.

Although there is an abundant amount of research on nasal bone fracture reduction, it is difficult to adopt the same treatment in our population. Aim of the study is to observe the causes, pattern and effectiveness of closed reduction by patient satisfactions grading in the treatment of the nasal bone fracture in tertiary care hospital, Pokhara.

MATERIALS AND METHODS

This is a retrospective study done in sixty patients with mean age of 30.2 years (range 10-67 years) who have undergone a closed reduction of a nasal bone fracture at Gandaki Medical College Teaching Hospital from January 2017 to December 2019. Approval for the study was obtained from the Institutional Review Board. Patient's age, gender, cause of fracture, severity of fracture, concurrent fracture, the time elapsed until operation and time after fracture, postoperative complications, and patient satisfaction grading were reviewed from ENT OPD record, ENT ward, and operation note of medical record. The patient with nasal bone fracture who underwent surgical intervention with closed reduction under general anaesthesia were included in this study. Those with non-displaced nasal bone fracture, a previous history of nasal bone fracture after two weeks or who had undergone septoplasty, augmentation rhinoplasty, or corrective rhinoplasty were excluded from this study. Fracture severity was evaluated according to Hwang *et al.*'s classification method.⁵ Type I – simple, without displacement; type II – simple, with displacement/without telescoping (IIA – unilateral, IIAs – unilateral with septal fracture, IIB – bilateral, IIBs – bilateral with septal fracture); and type III – comminuted with telescoping or depression.

All patients underwent closed reduction with external nasal splinting under General anesthesia. After surgery, Merocele nasal tampon or ribbon gauze packing and external nasal splinting were maintained for four and seven days, respectively. The patients were followed-up for at least three months to assess the complications, such as fracture recurrence and functional abnormality in the Department. The subjective satisfaction of patients was performed by using questionnaires answered at OPD visits or in a telephone interview with patients.

0 = no improvement, 1= mild improvement, 2 = moderate improvement, 3 = good improvement, 4 = excellent improvement

Data was entered in an excel sheet and was calculated by using SPSS 26.0 version. Percentage and frequency will be calculated by using descriptive statistics.

RESULTS

A total of 60 patients with a nasal bone fracture who underwent closed nasal bone reduction were studied. The mean age was 30.2 ± 13.1 years. The male to female ratio was 2.3:1 with a range of 10 to 67 years. Most common fractures were found to occur in 21-30 year 26 (43.3%) followed by 31-40 years 14 (23.3%) (Table 1).

Table 1: Age wise distribution of patients

Age Group	n	%
1-10	1	1.7
11-20	10	16.7
21-30	26	43.3
31-40	14	23.3
41-50	4	6.7
51-60	2	3.3
>60	3	5.0
Total	60	100.0

The most common cause of nasal bone fracture was road traffic accidents 25 (41.6%) followed by physical assaults 18 (30.0%), fall injuries 12 (20.0%), other incidences 3 (5.0%), and industrial accidents 2 (3.0%). Forty-three (72.0%) cases underwent closed reduction within 24 hours of those who arrived within 4-6 hour of nasal injury in the hospital and the remaining 17 (28.0%) cases were reduced after 5 days of trauma. Type 2a is commonest fracture (Table 2). Concurrent fracture found in 8 (13.0%) cases and it included maxillary, zygomatic, orbital, frontal bone fracture.

Table 2: Nasal bone fracture according to Hwang Classification

Type	n	%
2a	21	35.0
2as	5	8.3
2b	17	28.3
2bs	10	16.7
3	7	11.7
Total	60	100

Table 3: Different closed surgical intervention for nasal bone fracture

Types of reduction	n	%
Closed reduction	38	63.3
Closed reduction septorhinoplasty	10	16.7
Closed Extracorporeal septorhinoplasty	7	11.7
Closed reduction with septoplasty	5	8.3
Total	60	100

Closed reduction of nasal bone with need of septoplasty and septorhinoplasty observed in Table 3.

Complication after treatment of nasal bone fracture 3 (5.0%) of cases olfactory disturbance, 2 (3.0%) of cases had nasal obstruction. No obvious postoperative deformities were observed. Thirty-nine (65.0%) cases experienced excellent improvement, thirteen (21.6%) reported to have good improvement, five (8.3%) had moderate improvement and three (5.0%) cases had mild improvement only.

DISCUSSION

Appropriate knowledge of anatomy, physiology, and pathology of the nose helps the surgeon to treat the nasal bone fracture properly. In absence of proper treatment, it may lead to functional and aesthetic abnormalities.^{6,7} From the middle age, closed reduction procedure has been described in detail.⁸ The ultimate goal is to restore aesthetic shape and function. Though the procedure seems simple, it has a post-reduction deformity from 14 up to 50 % cases. Rhinoplasty is needed to correct these irregularities which will increase the cost of the

patient and needs open surgical procedure.^{1,9} With a successful initial reduction of the deformity, post op complication can be avoided.

Nasal bone fracture was commonly seen among 21-30 years in our study. Similar finding was found in a study done by Park *et al*¹⁰ and Hwang *et al*¹¹ Male patients outnumbered females. This group are more active people in society and run high speed rides on poor quality of road. The most common cause of nasal bone fracture according to this study was road traffic accidents 41.6% followed by physical assaults 30%. But study by Kim *et al*¹² found 21.7% caused by RTA and physical assault 19.0% accounted for 38%, falls accounted for 31.0%, and accidents during exercise accounted for 17.0% of fractures. We know that road traffic accidents are a major problem for nasal bone fracture. Poor quality roads, potholes in the road and uneven road surface lead to more accident in our place.

With focus to fracture severity and range, we used Hwang's classification which is based on fracture severity, bone displacement, and the presence of septal fracture. Regarding the classification of nasal bone fracture, there are many different classifications like Harrison's classification¹³ based on associating bones and with/without displacement, and Murray *et al*'s classification¹⁴ based on the pathologic criteria. General anesthesia was given in all the cases. Reduction of nasal bone can be done under sedation¹⁵ however, closed reduction under general anesthesia leads to pain relief during surgery, and for more accurate nasal bone reduction.^{10,16}

Septorhinoplasty for acute nasal bone fracture is a new concept. In type II BS and III fracture, it's important to reduce and reconstruct, both lateral wall and septum. Corrective rhinoplasty was described with effective reduction and cosmesis by Kim *et al*.¹⁷ We did septorhinoplasty in those cases whose dorsum was not elevated by simply close reduction. Extracorporeal septoplasty has a role in nasal bone fracture where in situ fixation of septum was difficult.

Our study showed 65.0% cases have excellent improvement and 13 (21.6%) had good improvement. Study done by Lee *et al* had shown improvement as excellent for 37 (74.0%), good for 12 (24.0%) patients, after 1 month follow up.¹⁸ It is important to maintain nasal pyramidal configuration by properly reducing the nasal bone fragment with self-supporting force. The surrounding connective tissues and both layer of periosteum should be intact to obtain good outcomes.¹⁹

Many protective devices prevent nasal bone fractures caused by a small amount of external force; however, these devices are not effective against higher amounts of external force. As it is retrospective study, we recommend prospective study with large sample size.

In conclusion, nasal bone fracture mostly occurs in road traffic accidents. Most fractures occur in unilateral nasal bone fracture. Careful evaluation is of paramount

importance with its classification. Closed reduction with good alignment is the preferred method. Septorhinoplasty and extracorporeal septoplasty should be applied in difficult and comminuted nasoseptal fracture. It avoids future complications like external nasal deformities and crooked nose. For patients with nasal bone fracture, the concomitant reduction of the fracture and the septorhinoplasty may lead to better esthetic results through proper selection and consultation with the patient.

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