

Original Research Article

Epidemiology, surgical intervention and management of nasal trauma in the acute phase- clinical study in a tertiary centre

Kalpna Sharma, Devasree Kalita*, Dipjyoti Barman

Department of ENT and Head and Neck Surgery, Gauhati Medical College and Hospital, Guwahati, Assam, India

Received: 14 March 2024

Revised: 08 April 2024

Accepted: 24 May 2024

*Correspondence:

Dr. Devasree Kalita,

E-mail: kalitadevasree@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The anatomy and location of nose makes it prone to blunt trauma. Delayed treatment leads to secondary nasal deformities and chronic nasal obstruction with difficult day-to-day activities.

Methods: Institution-based prospective study done on 140 patients with recent trauma of nose coming to department of ENT, Gauhati medical college and hospital from August 2022-July 2023 to study different types of nasal trauma, clinical presentation, initial conservative and surgical management. Ethical approval taken from institutional ethics committee.

Results: Male: female ratio 1.8:1 with 34.2% in 21-30 age-group followed-by 11-20. Most-common mechanism being road-traffic-accidents (35.7%) followed-by self-fall (25.7%), presentation being nasal bleed (97.1%) controlled with anterior nasal packing (70%), followed by swelling of nose (95.7%). Lacerations (60%) of nasal alae or dorsum repaired, septal-hematoma (5%) incised drained and splinted. CSF-rhinorrhoea (11.5%) managed conservatively. The 74.2% with nasal-bone fracture, 4.8% presenting <6 hours emergency reduction done, 11.5% closed reduction, 6.7% septo-rhinoplasty with tragal, costal cartilage grafts under general-anaesthesia.

Conclusions: Injury to nose is common in male adolescents and adults due to RTAs. Prompt intervention necessary to prevent complications. Epidemiological facts advocate public health measures including strict traffic-rules, improving sports practices, interpersonal relationships, prevention of alcohol-intake while driving.

Keywords: Nasal trauma, Nasal fracture, Septorhinoplasty

INTRODUCTION

Because of the anatomical location of the nose, it is prone to injuries to the face and facial skeleton. With the increase in number of road traffic accidents facial injuries has become more common now. It might be soft tissue injury or bony injury or both.¹ The various aetiologies include physical assault, fall, contact sports injury, animal attack etc apart from road traffic accidents. These nasal injuries should be thoroughly assessed and prompt management should be done to avoid aesthetic, structural and functional sequelae including nasal airway compromise. This requires a thorough understanding of the unique anatomy of the region, initial history and

examination, time since injury, classification of nasal injury and subsequent treatment timing and options. Since the nasal bones are most fragile of the external facial bones having least amount of tolerance to impact force, hence little force is required to fracture the nasal bones (25 to 70 lb/inch). The signs and symptoms in a patient with nasal trauma include a visible deformity, swelling of the overlying soft tissue, abrasion, lacerations, avulsion of external nose, swelling or depression of nasal bridge, epistaxis, septal hematoma and abscess, nasal fractures, lateral dislocation, pain on pressure on nasal pyramid, nasal obstruction, headache, disorder of smell, CSF rhinorrhoea. The pathogenesis is any circumscribed trauma to the nose from front or from

the side. It can also be a part of a severe injury to the face and skull. The causes are road traffic accidents, work place accidents, blows, brawls, falls etc. Injuries are usually divided into closed and open type. In open injuries due to abrasions, cuts or stab wounds, the cartilaginous or bony structures of the nose are exposed.

In the actual practice the nasal injuries get treated only after the primary life-threatening conditions are taken care of in the emergency department. In adults the possibility of primary treatment is limited after 2-3 weeks and 5-7 days in children after which improper fixation of fractured segments take place. If patient reports in 6-8 hours after injury, the nasal fracture findings are masked by associated oedema.

Thus, early diagnosis and treatment is of paramount importance in nasal trauma. The majority of the cases are medicolegal in nature which necessitates proper documentation of the type and extent of the injuries and comment on the nature of objects that could have caused the injury.¹

The aim of the study is to assess different types of nasal trauma, their clinical presentation and initial conservative and surgical management done in the acute phase in patients presenting to a tertiary care centre.

METHODS

This study is an institution based-prospective study done in the dept. of otorhinolaryngology, Gauhati medical college and hospital, Guwahati. Ethical approval from the institutional ethics committee and review board was taken on April 2023. The Data for the study were collected from patients who presented with recent trauma to nose not more than a week, to the dept. of otorhinolaryngology, Gauhati medical college and hospital, Guwahati between August 2022 to July 2023.

Total 140 patients were included in the study. Patient with serious systemic diseases, head injury, low GCS, old nasal trauma or other maxillofacial injuries or any complications of the septum other than septal hematoma were excluded from the study.

Once patient presented-detailed history, clinical examination-anterior and posterior rhinoscopy, DNE after proper vasoconstriction, plain radiograph with lateral view and occipito-mental views, CT scan of nose PNS both coronal and axial sections done to look for naso-orbito-ethmoidal injuries; position, extent, comminution of the fracture to aid exact classification; information on integrity of osseous and cartilaginous septum along with status of the sinuses, nasolacrimal duct and orbits.

MS excel software was used to analyse the results. Initial conservative and surgical management done according to the type of injury and planned for definitive surgical procedures.

RESULTS

Among 140 patients with nasal trauma 90 (64.28%) were male and 50 (35.7%) female patients. Forty-eight (48) patients (34.2%) belonged to 21-30 years age group and 38 patients (27.1%) of 11-20 years age group (Table 1).

Out of 140 patients 50 (35.7%) patients had road traffic accidents, 36 (25.7%) patients had self-fall and 28 (20%) were subjected to physical assault. There were 16 cases of injury with sharp or blunt objects. There was total 10 cases which included dog bite, sports injury, failed extraction of foreign body nose etc. There were 4 cases of dog bite category 3 which were managed with anti-rabies vaccine, immunoglobulin and conservative treatment with regular dressing (Table 2).

Of the 140 cases, majority cases presented with nasal bleed (97.1%) and swelling of nose (95.7%) (Table 3).

Traumatic epistaxis was controlled conservatively with anterior nasal packing in 70% cases. In 30% cases, epistaxis was controlled with topical and intravenous hemo-coagulants. Lacerations of nasal alae or dorsum seen in 60% cases were thoroughly cleaned and repaired under local anaesthesia.

Alcohol intoxication was found in 58 (74%) cases of RTA and physical assault.

The 7 (5%) cases that presented with septal hematoma were put up for Incision and drainage under local anaesthesia and then the nasal cavity was packed with ribbon gauge or Merocel to prevent further collection. Intravenous antibiotics and anti-inflammatory medication were administered simultaneously.

The 2 cases with avulsion of the nasal pyramid were treated conservatively as there was loss of soft tissue.

The 12 cases (11.5%) of CSF rhinorrhoea were managed conservatively which resolved on their own without requiring definitive operative intervention.

Out of 104 (74%) nasal fractures, there were 24 (23%) displaced fractures, of which 5 (4.8%) cases presented within 6 hours of injury and they were taken up for emergency closed reduction under local anaesthesia or sedation.

Out of 104 cases, 12 (11.5%) cases were first treated conservatively for the control of inflammation and then were taken up for closed reduction under general anaesthesia after 1 to 2 months.

Out of 104 cases, 7 (6.7%) cases of traumatic external nasal deformity were planned for septo-rhinoplasty under general anaesthesia with tragal cartilage or rib cartilage grafting with CTVS assistance (Table 4).

Table 1: Age distribution according to sex.

Age group (in years)	Male	Female	Total, N (%)
0-10	14	8	22 (15.7)
11-20	22	16	38 (27.1)
21-30	30	18	48 (34.2)
31-40	14	4	18 (12.8)
>40	10	4	14 (10)
Total, N (%)	90 (64.28)	50 (35.7)	140

Table 2: Mechanism of injury with respect to various age groups.

Age groups (in years)	N	RTA	Self-fall	Assault	Injury with sharps/ blunt objects	Others
0-10	22	4	10	0	4	4
11-20	38	14	12	4	6	2
21-30	48	20	6	14	6	2
31-40	18	8	4	4	0	2
>40	14	4	4	6	0	0
Total, N (%)		50 (35.7)	36 (25.7)	28 (20)	16 (11.4)	10 (7)

Table 3: Distribution of various clinical presentations.

Clinical presentation	N	Percentages (%)
Nasal bleed	136	97.1
Swelling	134	95.7
Laceration	85	60.7
Septal hematoma	7	5
Loss of soft tissue	2	1.4
CSF rhinorrhoea	12	8.5

Table 4: Initial early and late surgical management undertaken.

Variables	Early (Emergency)	Late	
No. of patients	5 (4.8%)	12 (11.5%)	7 (6.7 %)
Time since injury at presentation	Early (<6 hrs)	Delayed (>6 hrs)	Early/delayed with external nasal deformity
Procedure	Emergency closed reduction	Closed/ open reduction ± osteotomies	Septo-rhinoplasty
Anaesthesia	Local anaesthesia/ sedation	General anaesthesia	General anaesthesia
Remarks		Initial conservative management for control of inflammation	Tragal/ rib cartilage graft, CTVS assistance

**Figure 1 : Nasal Dorsum swelling in nasal fracture.****Figure 2 (A and B): Before and after repair of nasal laceration.**



Figure 3: Case of dog bite.

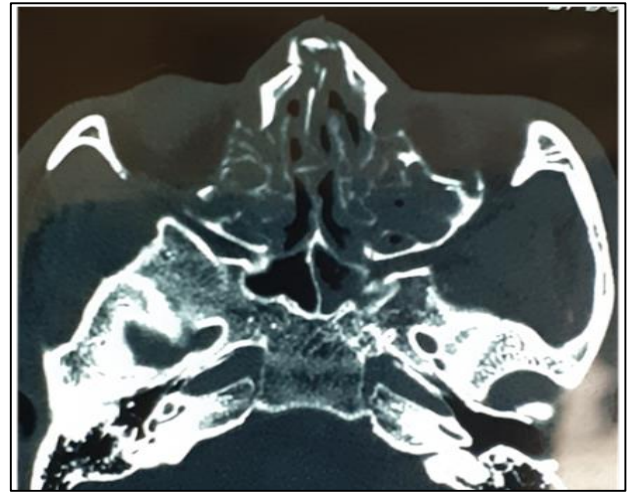


Figure 6: CT scan showing nasal bone fracture.



Figure 4 (A and B): Before and after repair of nasal dorsum injury with sharps.



Figure 5: Post-op case septorhinoplasty with POP cast.

DISCUSSION

Diagnosis of nasal trauma begins with history and examination. Assessment of the deformity, abnormal mobility of the external nose, soft tissue injuries over the nose, crepitation of the fragments on lateral pressure on the nose done and properly documented. Radiological investigation of nasal pyramid done and involvement of paranasal sinuses and anterior skull base must be ruled out. It is to be noted that a greenstick fracture in young patients or apparently harmless soft tissue injury on first examination may mask a fracture or severe skeletal injury. On suspicion of nasal bone fracture, thorough investigation is to be done for functional cosmetic and legal issues.

Abrasions are loss of superficial epithelium which were to be thoroughly cleaned with antiseptic solution and let it get epithelized.

Lacerations involve skin deeper to superficial skin usually with irregular edges, often contaminated with dirt, avulsion of skin edges and loss of soft tissue. Deeper lacerations may involve the nasal mucosa in which proper cleaning of the wound is to be done with removal of devitalized tissue and trimming of irregular skin margins and then repaired in layers with atraumatic sutures. Larger skin defects may require closure with local flap or a split skin graft. Broad spectrum antibiotics and anti-inflammatory analgesics are prescribed.

Traumatic epistaxis indicates injury to mucus membrane. If there is severe persistent bleeding, it would suggest capillary rupture and should be managed conservatively with anterior nasal packing or tamponade.

A septal hematoma is an accumulation of blood within the septum will require urgent drainage followed by splinting or nasal packing in order to prevent abscess formation due to secondary infection. Severe or gross deformities require early surgical intervention.

Avulsion of the nose can be from below upwards, above downwards or lateral to medial and usually associated with cartilage or bony injury. The wound should be closed in layers after proper cleaning with removal of devitalized tissue, mucosal closure and skin closure with adequate skin apposition to prevent subsequent nasal stenosis. Proper packing, stenting or splinting may prevent nasal stenosis.

Due to the proximity of the orbit to the nose and PNS, thorough examination should be done to look for ocular muscle movement, injuries to eyelid, cornea, conjunctiva, sclera, subconjunctival haemorrhage, status of the globe, foreign bodies in the eye, impaired visual acuity etc.

Asymptomatic un-displaced fractures can be managed conservatively. In case of a simple fracture, repositioning is best done within first 24 hours, 48 hours at most. Displaced fractures are managed with closed reduction under local anaesthesia depending on the time since injury. If the soft tissues have been extensively damaged with contamination, swelling or necrosis, treatment of compound nasal fracture need to be delayed for 8-14 days until acute infection have resolved. Cases of traumatic nasal deformity were planned for Septo-rhinoplasty with tragal cartilage or rib cartilage grafting with CTVS assistance.

Class 1 fracture: Fracture of nasal septum and the distal part of nasal bone. Simple manipulation with packing preferably in 1st two weeks may be sufficient. After which osteotomy may be required.

Class 2 fracture: Fracture of nasal bone also involving frontal process of maxilla along with class 1 fracture. Ethmoidal labyrinth is intact. Nasal bone manipulation should be accompanied by an open reduction of septal deformity. Nasal packing should be done along with a plaster of Paris splint applied for 3 days.

Class 3 fracture: Fracture has extended to include the ethmoidal labyrinth along with damage to lacrimal sac and nasolacrimal duct.

Complications include septal deviation, septal hematoma and abscess, synechiae formation in cases with delayed initial management or secondary infection. They might require plastic surgery intervention in later stages. High rate of post traumatic deformity and associated scarring in the mucosa make septal corrective surgery more difficult if done at later date. The method of osteotomy chosen is dependent on the structure of the bony deformity. In extensively wide nasal bone with a palpable open roof, lateral osteotomy should be conducted very wide laterobasally and extending far into the nasion. In case of broadening of nasal base extending into nasion, a paramedian oblique osteotomy would be necessary.

The aetiology of nasal trauma shows heterogeneity and the prevalence of its various mechanisms is analysed with

respect to various factors like age, sex etc. In this study male preponderance was seen with 64%. Majority of the cases belong to 21-30 years age group (34.2%) followed by 11-20 years age group (27.1%). The reason for this higher prevalence in this age group is may be due to the physical and psychological behaviour of the individuals who are in the most active phase of their life. Most common mechanism of nasal trauma is seen to be road traffic accidents (35.7%) followed by self-fall (25.7%) and physical assault (20%). Nasal fractures were detected in 74% of the cases with 77% of the being un-displaced fractures.

Kelley et al in their study stated that nasal fractures accounted for >50% of all facial fractures in adults. The most common mechanism of injury is blunt trauma to the midface, usually the result of motor vehicle collisions, sports-related injury, or physical altercations. The natural projection and the fragility of distal structures in the nose contribute to its propensity for injury. The bones and cartilage of the nose provide both aesthetic and structural support for the midface and airway; therefore, proper evaluation and management is necessary to prevent nasal deformity and nasal airway compromise.²

In a study done by Dawood et al on the epidemiology of nasal trauma, the findings were comparable to the current study. Male preponderance is 61% and majority cases seen in the age group of 21 to 30 years. The most common mechanism of injury was physical assault in contrast to road traffic accidents in the current study. Regarding septal hematoma incidence found to be 1.6% in contrast to 5% in the current study. The incidence of nasal fractures was 82% in contrast to 74% in the current study.³

In a retrospective study by Chou et al 329 patients were enrolled which included 199 males and 130 females (age range, 7-80 years; mean age, 32.14 years). The highest incidence occurred in the group aged 20-29 years followed by the groups aged 30-39 years. The most common causes of injury were traffic accident (49.5%), battery (22.5%), sports injury (20%), and slip and fall (8%). The most frequent physical examination findings in the emergency department were tenderness (98%), nasal bleeding (69%), nasal deviation (63%), depression (58%), swelling (31%), and facial abrasion/laceration (18%).⁴

In a study by Latifi et al they found 74.8% were men and 25.2%, were women the most affected age group to be 10 - 21 years. The most common causative factor was found to be due to fall (34%), 33.4% due to struggles and fracas, 12.3% due to sport accidents, 14.6% due to car accident, 5.7% motor-bike accident.⁵

Allam et al found incidence of nasal fractures showing male preponderance (83.9%) in the mean age of 23±13 years with RTA as the most common mechanism of injury (53.8%), followed by assault (24.7%). Incidence of

septal hematoma (4.3%) was comparable to the current study (5%). Soft tissue lacerations of the nose accounted for 28% in contrast to 60% in the current study.⁶

Koh et al in their study stated that during assessment of traumatic nasal injuries, it is essential to exclude a septal haematoma, which requires urgent drainage. Undisplaced nasal fractures without functional symptoms can be managed conservatively. Displaced fractures should be referred for reduction. Traumatic nasal injuries encompass a wide range of potential complications, where prompt recognition and timely management are key to good functional and aesthetic outcomes.⁷

Gupta et al found in a retrospective clinical study of nasal fractures with male preponderance with 2.1: 1 most commonly in age group of 21-30 years of age with most common mechanism of injury to be assault followed by RTA.⁸

In a study by Carvalho et al most of the patients are young adult men with a male:female ratio of 4:1. Interpersonal violence is the most prevalent cause of facial trauma (27.9%), followed by motor vehicle accidents (16.6%) which is in contrast to the current study. The mandible is the most prevalent facial bone fractured (44.2%), followed by nasal fracture (18.9%), 41.1% of the patients consumed alcohol with a male:female ratio of 11.2:1. Seventy-seven percent of the patients required surgical intervention and 84.5% were hospitalized.⁹

Ozgur et al found incidence of septal hematoma to be 4.76%.¹⁰

In a study by Brasileiro et al 1024 patients presenting with maxillofacial fractures were with mean age=28±16.4 years. The ratio of men to women was 4:1. Most fractures were caused by traffic accidents (45%), followed by assaults (22.6%), falls (17.9%), sports accidents (7.8%), and work accidents (4.5%). The prevalent anatomic regions of facial fractures were the mandible (44.2%), the zygomatic complex (32.5%), and the nasal bones (16.2%). Patient management was considered to be conservative in 47.9% patient and surgical therapy was performed in (48.1%), of whom 399 (80.9%) were treated with open reduction and rigid internal fixation.¹¹

Byun et al in their study found that male patients were 3.3 times greater than the number of female patients, and twenties were the most common age range. Violence was the overall most common cause of injury, while slip down was the most common cause for females.¹²

In a study by Borghese et al patients were predominantly male (75.7%), with a male to female ratio of 3.1:1. The highest number of cases was observed in 21- to 30-year-olds, and the majority of fractures (31.8%) were caused by physical aggression. Closed reduction was performed

on all patients under local and topical anaesthesia after an average of 8 days.¹³

Hwang et al in their study did a systematic review of the aetiology of nasal bone fractures and found that in adults, the most common cause were fights (36.3%), traffic accidents (20.8%), sports (15.3%), and falls (13.4%) whereas in children, the most common cause were sports (59.3%), fights (10.8%), traffic accidents (8.3%), collisions (5.0%), and falls (3.3%).¹⁴

The findings of these studies are more or less comparable to the present study.

The main limitation of this study is that we included patients within 1 week of trauma not more than that. Since our institution is a tertiary care centre, many patients were referred from peripheral centres after primary management. There were several cases of loss to follow-up during pre-op preparation for septorhinoplasty. We have excluded patients with concomitant faciomaxillary fractures and unstable patients with other comorbidities.

CONCLUSION

Injury to nose is common in young male adults and adolescents due to road traffic accidents and alcohol intake during driving. The surgical management depended on the time since injury and amount of inflammation that has set in. Early presentation, prompt and timely intervention, either conservative or surgical, helps to prevent complications like nasal deformity, synechiae with chronic nasal obstruction, septal perforation. The obligation on the part of society is to ensure public health measures including strict traffic-rules, safe driving and sports practices, improving interpersonal behavioural relationships and most importantly measures to reduce and prevent alcohol intake while driving.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Hazarika P, Nayak DR, Balakrishnan R. Textbook of Ear Nose Throat and Head-Neck Surgery, 5th edition; Chapter 38, Maxillofacial Trauma. 2022;280.
2. Kelley BP, Downey CS, Samuel S. Evaluation and reduction of nasal trauma. *Seminars Plastic Surg.* 2010;24(4):339-47.
3. Dawood MR. Epidemiological Analysis of the Nasal Trauma. *Int J Sci Res.* 2016;5(7):774-8.
4. Chou C, Chen C, Wu Y, Ko-Kang C, Su-Shin L. Refinement treatment of nasal bone fracture: A 6-year study of 329 patients. *Asian J Surg.* 2015;38(4):191-8.

5. Latifi H, Mikaili P, Samarei R, Nasr-Arkan D, Latifi K. The etiological evaluation of the nasal bone fracture in the patients admitted in Imam Hospital of Urmia, Northwestern Iran. *J Am Sci.* 2011;7(9):92-6.
6. Allam KA, Bakry UM, Abdelmegeed AG. Analysis of Nasal Bone Fractures: Etiological and Demographic Characteristics. *Egypt J Plast Reconstr Surg.* 2021;45(2):67-70.
7. Koh JH, Bhatti O, Mahmood A, Agar N. Traumatic nasal injuries in general practice. *The Royal Australian College of General Practitioners.* 2016;45(9):650-53.
8. Gupta A, Mahajan V, Jamwal PS. A Clinical Study of Nasal Bone Fractures: A Retrospective Study. *Int J Scientific Study.* 2019;6:122-5.
9. Carvalho TB, Cancian LR, Marques CG, Piatto VB, Maniglia JV, Molina FD. Six years of facial trauma care: An epidemiological analysis of 355 cases. *Braz J. Otorhinolaryngol.* 2010;76(5):565-74.
10. Ozgur A, Selcuk A, Gurbuz D. Analysis of simple nasal bone fracture and the effect of it on olfactory dysfunction. *KBB-Forum.* 2008;7(2):68-70.
11. Brasileiro BF, Passeri LA. Epidemiological analysis of maxillofacial fractures in Brazil: A 5-year prospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2006;102(1):28-34.
12. Byun IH, Lee WJ, Roh TS, Hong JW. Demographic Factors of Nasal Bone Fractures and Social Reflection. *J Craniofac Surg.* 2020;31(1):169-71.
13. Borghese B, Calderoni DR, Passeri LA. Retrospective analysis of the approach to nasal fractures at Unicamp Clinical Hospital. *Rev. Bras de Cir Plast.* 2011;26(4):608-12.
14. Hwang K, Ki SJ, Ko SH. Etiology of Nasal Bone Fractures. *J Craniofac Surg.* 2017;28(3):785-8.

Cite this article as: Sharma K, Kalita D, Barman D. Epidemiology, surgical intervention and management of nasal trauma in the acute phase- clinical study in a tertiary centre. *Int J Res Med Sci* 2024;12:2064-70.