



## International Journal of Health Research and Medico-Legal Practice

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### RESEARCH PAPER

# Nasal bone fracture and its sequelae, our experience in a tertiary care hospital

#### Manuscript ID: 582

Borah S<sup>1</sup>, Sangma R<sup>2</sup>, Mahanta P<sup>3</sup>

Address for correspondence:

<sup>1</sup>Post Graduate Trainee (Corresponding Author)

<sup>1</sup>Email: shankhborah@gmail.com

Mobile: +918471931126

<sup>2</sup>Professor and Head

Email: rupanjitasangma11@gmail.com

Mobile: +917002623184

Department of ENT

Assam Medical College and Hospital,

Dibrugarh, Assam

<sup>3</sup>Professor Head

Email: drpmahanta@gmail.com

Mobile: +919435017802

Department of Forensic Medicine and Toxicology

Nalbari Medical College

Email: drpmahanta@gmail.com

ORCID ID: 0000-0002-2716-4879

Article received: 28-08-2023

Received (revised): 30-09-2023

Editorial approval: 06-11-2023

Checked for plagiarism: Yes

Peer-reviewed article: Yes

Peer review comments: Six

Editor who approved: Prof. AJ Patowary

#### ABSTRACT

**Background and aims:** The most frequent type of facial bone fracture is a nasal bone fracture. The nose is the facial feature that anatomically protrudes the most and, hence, is more vulnerable to physical trauma. It accounts for almost half of the facial fracture cases. Physical assault, road traffic accidents, falls, and some idiopathic causes are most frequently linked to nasal fractures. Nasal bone fractures may result in deformity, septal deviation, or nasal obstruction. The present study aims to study the pattern of nasal bone fracture, its manifestations and outcomes among patients attending a tertiary care hospital. **Methods:** The present retrospective study was done for one year, from January 2022 to January 2023. A total of 280 cases were recorded. Diagnosis was made based on clinical examination and radiological investigation. All collected data was analysed using SPSS v.20 and Epi Info 2000. **Results:** The most involved age group was 21-30, with a male-to-female ratio 1.7. Road traffic accidents comprised 53.6% of cases. Nearly 82.1% of cases had undisplaced fractures. About 230 cases were managed conservatively, of which 21.7% resulted in malunion. **Conclusion:** Nasal bone fracture is an unavoidable circumstance following trauma. Road traffic accidents and physical assault are the most common causes of nasal bone fracture. Although most undisplaced fractures can be managed conservatively, they are not free from adverse outcomes. Hence, Early detection and skilful management are necessary for achieving aesthetic outcomes.

**Keywords:** Nasal bone; Trauma; Jaraway fracture; Chevallet fracture.

**Cite this article:** Borah S, Sangma R, Mahanta P. Nasal bone fracture and its sequelae, our experience in a tertiary care hospital. *Int J Health Res Medico Leg Prae.* 2023 Jul-Dec;9(2):28-34. Doi: 10.31741/ijhrmlp.v9.i2.2023.4

### INTRODUCTION

Nasal bone fracture is the most common facial fracture, comprising almost half of the facial fracture cases.<sup>1</sup> Among all the facial bones, the nose sustains the most fractures due to its prominence among the facial components. The most common causes of nasal fractures are physical assault, road traffic accidents, falls, and other iatrogenic causes.<sup>2</sup> Swelling in the dorsum of the nose, epistaxis, nasal crepitus, septal

deviation, and deviation of the Cottle's line are some of the significant features of nasal fractures.<sup>3</sup> Developed from 1'st branchial arch, nasal bones form the upper 1/3'rd of the bony framework of the nose. It also gives an aesthetic value and supports the framework of the nose. The significance of nasal bones in regulating the air current through internal valves cannot be ignored.<sup>4</sup> A blow from the front (Jaraway) or from below upwards (Chevallet) can fracture the cartilaginous framework of the nose.<sup>5</sup>

Fracture management depends upon the type and extent of injury. For undisplaced non-communicated fracture, two weeks of conservative management with antibiotics, analgesics (trypsin, bromelain, rutoside, aceclofenac), calcium supplements, antihistamines, steroid nasal spray ensures proper healing, if not manipulated. However, closed/open reduction with Asch and Walsham forceps under sedation is essential for displaced, comminuted fractures, followed by plaster of Paris cast placement and injectables.<sup>6</sup>

Synechia, malunion, and septal deviation are reasonably expected outcomes following the fracture of nasal bones. Proper douching with sodium bicarbonate/chloride mixed with steroid and persistent use of nasal splint (internal/ external) for a period helps in wound healing and maintaining its osteocartilaginous framework.<sup>3,5</sup>

The present study aims to find the pattern of nasal bone fracture, its manifestations, and outcomes at a tertiary care hospital in northeast India.

## MATERIALS AND METHODS

The present study was a retrospective hospital-based study conducted for a period of 1 year, from

January 2022 – January 2023. A total of 280 patients with trauma presenting with nasal bone fractures were included in the study. Diagnosis was made based on clinical examination and radiological investigation. The Institutional Ethics Committee approved the study.

The comminuted fractures were treated with open reduction, while undisplaced fractures were treated with conservative management. Patients were followed up for two weeks for assessment of post-management complications like fracture malunion, synechia, and septal deviation. Data was analysed using the Statistical Package for Social Sciences (SPSS) version 20.0 software (SPSS, Chicago, Illinois, USA). The categorical variables are summarised as frequencies and percentages.

## RESULTS

In our study, the most frequently affected age group was the 3rd and 4th decade of life, comprising almost 50% of the cases. The least affected age group was 1<sup>st</sup> decade of life, with only 2% of the cases. Male preponderance with male: female ratio of 1.7 was observed (**Table 1**).

**Table 1** Demographic distribution of cases

Variable	Age in years	Frequency	Percentage
Age-group	1-10	5	2
	11-20	45	16
	21-30	70	25
	31-40	65	23
	41-50	55	20
	>50	40	14
Sex	Male	180	64
	Female	100	36

Road traffic accident was the most common cause of trauma, with 53.6% of the cases, followed by physical assault (42.9%). Jaraway fracture comprised 71.4% of the cases. The majority, 82.1%, of the cases had undisplaced fractures (**Table 2**).

**Table 2** Etiology, mode and pattern of injury

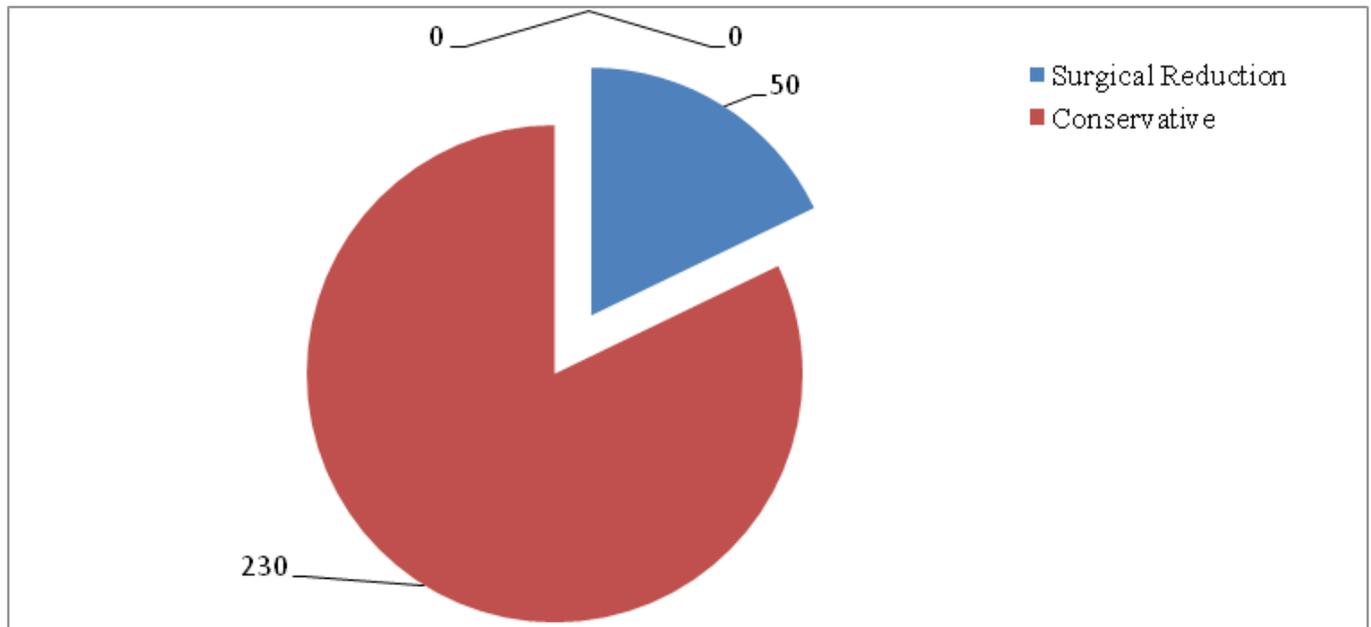
	<b>Aetiology</b>	<b>Number of cases</b>	<b>Percentage (%)</b>
Aetiology of Injury	Road traffic accident	150	53.6
	Physical assault	120	42.9
	Falls	10	3.5
Mode of Injury	Chavellet	80	28.6
	Jaraway	200	71.4
Pattern of Injury	Displaced	40	14.3
	Undisplaced	230	82.1
	Comminuted	10	3.6

**Table 3** describes the clinical manifestations of the cases. Epistaxis is the most common clinical feature (35.7%) among the cases, with external deviation in 26.8% of cases.

**Table 3** Clinical manifestations

<b>Clinical features</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Swelling in dorsum	65	23.2
Epistaxis	100	35.7
Nasal obstruction	40	14.3
External deviation	75	26.8

Out of 280, most cases (82%) were managed conservatively, while the rest needed surgical intervention. (Fig 1).

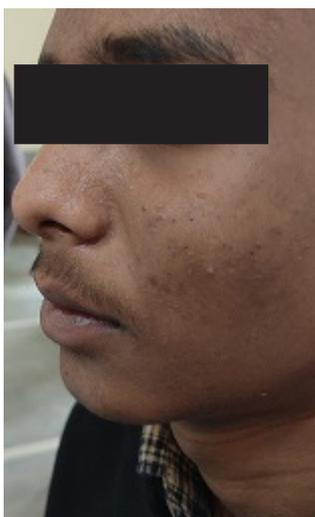


**Figure 1** Type of management

Out of the 230 cases that were managed conservatively, 21.7% were reported with malunion, followed by 15.2% with septal deviation (Table 4).

**Table 4** Complications after management

Complication	Number of cases	Percentage (%)
Synechiae	15	6.5
Septal deviation	35	15.2
Malunion	50	21.7



**Figure 2** Successful nasal fracture reduction after fall from height



**Figure 3** Follow-up case of a successful post-operative nasal fracture reduction without any complication

## DISCUSSION

The nose, the most prominent feature of facial anatomy, is highly vulnerable to external trauma and nasal bone fractures. Nasal trauma can result in soft tissue injury, unilateral or bilateral non-displaced fracture, displaced fracture and closed or open comminuted fracture, depending upon the sternness of the injury. Almost 10% of nasal bone fractures lead to deformity, septal deviation, or nasal blockage after surgery.<sup>3</sup> Following nasal trauma, a septal haematoma is a condition that, if ignored or treated late, can develop into a septal abscess.<sup>7</sup> Management of the nasal bone fracture must be carefully assessed and carried out, as the complications of initial reduction may necessitate further intrusive surgery.

A study conducted among patients no older than 21 years reported 18-21 as the most common age group.<sup>8</sup> Various studies observed that most patients with nasal bone fractures were in their twenties.<sup>9,10</sup> In the present study, the most frequently involved age group was the 2<sup>nd</sup> and 3<sup>rd</sup> decade of life, which agrees with a recent study's findings.<sup>11</sup> In our study, there were more male casualties than females, similar to various other studies.<sup>8-11</sup> Nasal fractures are reported to be three times more likely to be observed among males than females.<sup>9</sup> Male predominance among nasal bone fractures may be because males are more susceptible to physical violence and motor vehicle accidents.

Road traffic accidents comprised the bulk of the trauma cases (53.6%) in the present study, comparable to other investigations.<sup>11</sup> In contrast to our findings, a recent systematic review stated physical assault in adults (36.3%) and sports trauma in children (59.3%) as the most typical cause of nasal bone fractures. It

was documented that the causes of trauma varied geographically. Fight was reported as the most common cause of nasal bone fractures in Asian regions, Europe and South America. In contrast, traffic accidents were mainly reported in North America as the most typical cause.<sup>12</sup> In India, road traffic accidents are a significant health concern, resulting in severe fatalities and deaths. Poor road conditions, low usage of protective devices and driving under the influence of alcohol are some of the contributory factors of road traffic accidents in this region.<sup>13</sup>



**Figure 4** Linear undisplaced fracture of bilateral nasal bone



**Figure 5** Comminuted fracture of the bilateral nasal bone

Most cases were found with Jaraway fracture (71.4%). The findings are discordant to another similar study where chavellet fracture deformity was most prominent.<sup>14</sup> Jaraway fractures result from a blow from the front and lead to comminuted fractures, even involving the nasal septum. In contrast, chavellet fractures occur from a blow from below upwards, leading to linear fractures most of the time. Most of the various injury patterns were undisplaced fractures (**Figure 4**). Comminuted fractures were the least observed in the present study (**Figure 5**). The findings are comparable to other research findings of a similar kind.<sup>15,16</sup>

Epistaxis was the most common clinical feature (36%) of cases, followed by external deviation in 27%. This was discordant with another recent research where the most common presentation was tenderness, followed by swelling and nasal deformity [11]. However, our findings agree with a retrospective review of the National Trauma Data Bank (NTDB) between 2007 and 2015, which suggests the statistically significant association of epistaxis with nasal bone fracture.<sup>15</sup>

A thorough physical examination helps determine the best course of treatment (open vs. closed reduction), when to perform it, and the type of anaesthesia needed for each patient. The history of each patient, including the origin of any trauma, prior face injuries, nasal deformities, or obstruction, must be taken into account before planning treatment strategies.<sup>17</sup> In our study, 230 patients were treated conservatively while the rest underwent surgical reduction. In contrast to our study, a retrospective review from March 2012 to February 2020 reported closed reduction as the preferred treatment method.<sup>18</sup> Malunion, followed by septal deviation and synechiae, were the most commonly attended complications after conservative management, which agrees with another study where external/ septal deviation was the chief presenting complaint after conservative management.<sup>19</sup>

The external force applied to the nasal bone might also result in coexisting fractures of neighbouring bony structures.<sup>20</sup> Incorrect fracture recognition and interpretation, inadequate surgical planning resulting

in under-correction or overcorrection, and inability to undertake effective septum management. Difficulties connected to nasal packing and removal, post-operative management, and patients' satisfaction in light of probable complications may lead to less satisfied post-operative outcomes.<sup>21</sup>

Nasal bone fractures are frequent and can result in aesthetic and functional problems. The goal of treating nasal bone fractures is to return the nose to its pre-trauma state regarding appearance and function.<sup>21</sup> Early detection and skilful management of the nasal bone fracture is the key to aesthetic outcome. However, regular nasal douching and keeping nasal splints in situ for two weeks prevents post-operative complications. Strict routine medication and avoiding unnecessary manipulation in conservative care lead to successful outcomes. Appropriate assessment of patient satisfaction and complications following surgery helps decide additional treatment options for any deformities and functional concerns.<sup>19</sup>

## CONCLUSION

Nasal bone fracture is an unavoidable circumstance following trauma. It is more frequent among adult males. Road traffic accidents and physical assaults frequently lead to nasal bone fractures. Undisplaced fractures can be successfully managed

by the conservative method. However, conservative management may sometimes lead to post-operative complications like malunion, Synechiae and septal deviation.

Being the most protruding feature of the facial anatomy and an integral part of the respiratory system, the nose has significant functional and aesthetic significance. Along with early detection and skilful management of nasal bone fractures, appropriate follow-ups may be required for assessing post-operative complications and deciding future treatment strategies.

**Contribution of Authors:** 1) All author(s) have contributed. 2) The article is original with the author(s) and does not infringe copyright or violate any other third party's rights. 3) The article has not been published (whole or in part) elsewhere in any form except as provided herein. 4) All author(s) have reviewed the final version of the above manuscript and approved it for publication.

**Compliance with ethical standards:** Done

**Ethical Approval:** Taken.

**Conflict of interest:** None declared.

**Source of funding:** None declared.

**Informed consent in the manuscript:** Taken.

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