

Nasal bone fractures: our perspective and review of literature

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ABSTRACT

OBJECTIVE: Nasal bone fractures constitute about 40% of all facial fractures. Since nose is in the centre of the face any deformity after an injury is most noticeable and greatly affects the appearance. Hence an attempt is made to study the incidence, types, treatment and outcome of nasal bone fractures.

MATERIALS AND METHODS: This prospective study was done in the department of Otorhinolaryngology and Head & Neck Surgery in AJ Institute of Medical Sciences. 110 cases of isolated nasal bone fractures were included in the study.

RESULTS AND ANALYSIS: Of the 110 patients, 93 (84.5%) were males and 17 (15.5%) females. The mean age of the patients ranged from 18 to 73 years with a mean age of 36 years. Road Traffic Accidents were a major etiology accounting to 72 (65.4%) of the cases, sports injury in 20 (18.2%), physical violence in 15 (13.6%) and falls in 3 (2.8%). 56 (50.9%) underwent closed reduction and 54 (49.1%) went for open reduction. Among them 44 (40.0%) underwent septoplasty, 2 (1.8%) osteotomies and septorhinoplasty was performed on 8 (7.3%).

CONCLUSION: Nasal bone fractures are an important component of facial trauma. A thorough clinical examination, diagnosis and appropriate treatment is essential for management of such cases.

Key words: nasal bone fracture, trauma, closed and open reduction

1. INTRODUCTION

Nasal bone fracture reduction is one of the most frequent services performed by otorhinolaryngologist. The most frequent causes are interpersonal violence, physical activities, falls, car crashes, motorcycle accidents, impact not relating to fall, occupational accidents and unspecified etiology (Forenazieri et al. 2008; Kucik et al. 2004). In cases of facial trauma, nasal fractures account for approximately 40 % of bone injuries. There are a few works that address the nasal trauma separately; such theme is generally approached along with facial trauma. Our prospective study is an attempt in the directive of diagnosis, management and outcomes of isolated nasal bone fractures.

2. MATERIALS AND METHODS

This prospective study was conducted in the Department of ENT and Head & Neck Surgery in AJ Institute of Medical Sciences, Mangalore from March 2011 to March 2012. Ethical committee clearance was obtained for the study. 110 patients who were diagnosed to have isolated nasal bone and septal fractures were included in the study.

Inclusion criteria – Patients above 18 years diagnosed to have isolated nasal bone fractures or septal fractures as well.

Exclusion criteria –

1. Patients less than 18 years of age.
2. Patients who had concurrent head injury.
3. Patients who were haemodynamically unstable.

A detailed clinical examination was done and the diagnosis was confirmed by computed tomography. Photographic evaluation was done pre and post operatively in terms of deviation, symmetry, irregularity and overall improvement. Patient satisfaction was assessed with regard to aesthetic assessment, severity of obstructive symptoms and change in health status. The results were analysed and discussed as follows.

3. OBSERVATION AND RESULTS

Of the 110 patients, 93 (84.5%) were males and 17 (15.5%) females. The mean age of the patients ranged from 18 to 73 years with a mean age of 36 years. Road Traffic Accidents were a major etiology accounting to 72 (65.4%) of the cases, sports injury in 20 (18.2%), physical violence in 15 (13.6%) and falls in 3 (2.8%). The latency period for reduction ranged from 2 hrs to 18 hrs with an average of 6 hrs. The nasal bone fractures were classified as follows- (Table 1)

56 (50.9%) underwent closed reduction and 54 (49.1%) went for open reduction. Among them 44 (40.0%) underwent septoplasty, 2 (1.8%) osteotomies and septorhinoplasty was performed on 8 (7.3%). The post operative results were assessed by Surgeon Photographic Evaluation. Pre operative assessment was done by two surgeon consultants of the department of Otorhinolaryngology and Head & Neck Surgery. The deviation and symmetry was evaluated. 46 (41.8%) had gross deviation, 28 (25.4%) severe, 20 (18.2%) moderate, 16 (14.6%) mild. Post operative assessment revealed non deviation in 72 (65.4%) and mild deviation in 38 (34.6%). The overall improvement was graded as 25% in 2 (1.8%), 50% in 29 (26.6%), 75% in 56 (50.9%), 100% in 23 (20.7%). Patient Satisfaction Survey revealed that out of the 110 patients studied, 75 (68.2%) felt they absolutely had no problem (Grade 1), 32 (29.0%) had very mild problem (grade 2), 3 (2.8%) felt they had moderate problem.

Table 1

Classification of nasal bone fractures

Type - 1	2 (1.8%)
2 - 2A	8 (7.3%)
2As	12 (10.9%)
2B	36 (32.7%)
2Bs	23 (20.9%)
3	29 (26.4%)

4. DISCUSSION

Nasal bone fracture is common between 15 – 25 yrs of age but after 60 yrs a second peak in incidence is observed (Bremke et al. 2009). In general, young people are more susceptible to fractures and displacement but in elderly, comminuted fractures are more common. 80% of nasal bone fractures occur between the middle third and inferior part of nose (Mohammadi et al. 2009). The projection of the nose on the face makes it more vulnerable and some authors have reported 39% of facial fractures involve the nose (Park et al. 2007). In a severely traumatised patient



Figure 1
Pre operative appearance of fracture nasal bones



Figure 2
Intra operative closed reduction



Figure 3
Post operative appearance

with life threatening injuries, it is not unusual for a nasal fracture to go unrecognised. The pathophysiology of nasal bone fractures were first described by Murray (Figure 1).

A relatively greater force is needed from a frontal impact to produce a fracture because the nasal bones are buttressed by the frontal process of maxilla, the nasal spine and perpendicular plate of ethmoid. The inciting factor leading to the deviation is the combination of fracture both to the nasal bones, cartilaginous and bony septum. A C shaped fracture in the septum results in deviation (Perkens et al. 2002). Force applied from a frontal direction may cause an injury as simple as the infraction of the lower margin of the nasal bones which are thinner than the upper portion or a severe flattening of the nasal bones and septum. Splaying of the nasal bones with widening of the nasal width may occur. Lateral forces may cause only a depression of the ipsilateral nasal bone or may also be forceful enough to out fracture contralateral nasal bone. Splaying of the nasal bones with widening of the nasal width may occur. When twisting or buckling of the nose is present the fractured bony and or cartilaginous fragments are often interlocked. The septum is often fractured and may be dislocated off the maxillary crest. The fracture pattern of the septum varies according to the location of the fracture. Anterior fractures tend to be vertical while posterior are usually horizontal (Mondin et al. 2005). Nasal bone fractures are classified into six types (Hwang et al. 2006).

- I -- Simple without displacement
- II -- Simple with displacement / without telescoping
- II A -- Unilateral
- II As – Unilateral with septal fracture
- II B -- Bilateral
- II Bs – Bilateral with septal fracture
- III -- Comminuted with telescoping or depression

In our series, 2 (1.8%) had type I nasal fractures, 8 (7.3%) had type 2A, 12 (10.9%) had unilateral with septal fracture. 36 (32.7%) were categorised to type 2B, 23 (20.9%) to 2Bs, and 29 (26.4%) to type 3 nasal fractures.

The surgeon must conduct a careful physical examination because the decision as to whether treatment is required, which technique to choose (open or closed) and which type of anaesthesia is appropriate all depend on the clinical findings such as degree of deviation and airflow obstruction (Ridder et al. 2002). A thorough clinical examination was done to identify step deformities, presence of crepitus, sharp edges and bony mobility. Any mucosal tears, exposed cartilage and or bone were identified. The reduction of the fracture is best done within 2 to 3 hrs prior to the onset of oedema because following this period of time camouflaging the nasal fracture and making aesthetic judgements would be more difficult (Figure 2), (Perkens et al. 2002; Mondin et al. 2005).

The reductions of the nasal fractures were done within 2 hrs to 7 days with an average latency of 8 hrs in our patients. It is also favourable to reduce fracture after 5 – 10 days after injury when the effect of local soft tissue trauma has begun to resolve and bony units are still mobile. This is prior to the beginning of fibrous union of the fractured bones which occur in the two to three week period (Perkens et al. 2002). Closed reduction was done in 56 (50.9%) of the cases and open reduction in 54. Septoplasty was done in 44 (40%), osteotomies in 2 (1.8%) and septorhinoplasty in 8 cases. All cases were done under general anaesthesia. Closed reduction is defined as repositioning portions of displaced nasal bones with manipulation. A complete nasal bone fracture sustained from a lateral force without a septal fracture resulting in unilateral concavity is most amenable to successful reduction. Motion is upward and outward with the opposite hand on nasal dorsum moulding the bone into proper position. The open reduction involves exposing the septum and or correcting deviation without osteotomies and correcting the septum through hemitransfixation (Perkens et al. 2002). The offending trauma which created a dislocated or deviated nasal septum disrupts the traditional nasal support

mechanism. Furthermore this deformity can result in loss of support and lead to internal and external nasal valve collapse. External Rhinoplasty was done in 10 patients via a inverted W shaped transcolumellar incision and extending to margins of the nasal alae. Flap elevated and medial osteotomies were done with guarded osteotomes. Osteotomies were performed in two of the patients. In rest of the patients septorhinoplasty was performed. Anterior nasal packing was done with antibiotic smeared ribbon gauze and Plaster of Paris cast applied for a week. Post operative evaluation was done after 1 week, 1 month after surgery (Figure 3).

Post operative results were analysed by Surgeon Photographic Evaluation (Michael et al. 2009). Pre operative and post operative photographs were reviewed in a blinded fashion via an electronic visual survey. Two faculty members in the division of Otorhinolaryngology and Head & Neck division were made to assess with regard to Symmetry, Deviation and Overall Improvement. Survey questions were adapted from multiple sources including Crowther and O'Donoghue study of nasal bone fractures, Nasal Obstructive Symptom Scale and selected questions from Glasgow Benefit Inventory. Most questions were based on a five point Likert Scale.

- Deviation 1 – Gross
 2 – Very moderate
 3 – Moderate
 4 – Slight
 5 - None
- Symmetry
Irregularity
- Overall Improvement- 1- 0%
 2- 25%
 3- 50%
 4- 75%
 5- 100%

According to the Surgeon Evaluation, 46 (41.8%) had gross deviation, 28 (25.4%) severe, 20 (18.2%) moderate, 16 (14.6%) mild deviation of the external nasal framework from the midline. Post operatively, the Surgeons were of the opinion of non deviation in 72 (65.4%) and mild deviation in 38 (34.6%). The overall improvement was graded as 25% in 2 (1.8%), 50% in 29 (26.6%), 75% in 56 (50.9%), 100% in 23 (20.7%).

Patient Satisfaction Survey (Michael et al. 2009)

I Aesthetic Assessment –

1. Is the appearance of your post operative nose similar to your preinjury nose?
2. Are you satisfied with the shape of your nose?
3. If unhappy would you consider re operation?

II Severity of Obstructive Symptoms-

- Nasal Congestion
- Nasal blockage
- Trouble Breathing
- Trouble Sleeping
- Inability to move air through nose
- Overall Severity

III Change in health status

1. Affected the things you do.
2. Change in the level of embarrassment in a group
3. Change in self confidence
4. Change in the amount of time to go to the doctor
5. Change in self confidence
6. Change in the level of self confidence about job opportunities
7. Change in the amount of time to go to the doctor
8. Change in level of self consciousness
9. Changes in the amount of medicines needed since procedure
10. Overall change

Grading in Patient Satisfaction Survey –

- 1 – No problem
- 2 – Very mild problem
- 3 – Moderate problem
- 4 – Fairly bad problem
- 5 – Severe problem

According to the Patient Satisfaction Survey Questionnaire, 75 (68.2%) felt they absolutely had no problem (Grade 1), 32 (29.0%) had very mild problem (grade 2), 3 (2.8%) felt they had moderate problem in the post operative follow up.

5. CONCLUSION

Nasal trauma is very common in Otorhinolaryngology practice due to increased incidence of RTA, sports injuries and interpersonal violence. Closed reduction is an effective method of treatment as long as careful attention is paid to the key regions in the nasal complex including the septum at the time of treatment. Ideal results are obtained when surgery is performed within two weeks of initial injury (Fattahi et al. 2006). Factors such as timing of surgery, status of the nasal septum, delay in treatment and other associated injuries may influence the overall result.

CONFLICTS OF INTEREST

None declared

REFERENCES

1. Forenazieri MA, Yamaguti HY, Moreira JH. Fractures of Nasal Bone ; An epidemiological Analysis. *International archives Of Otorhinolaryngology*, 2008, 12(4), 562-64
2. Kucik CJ, Clenney T, Phelan J, Management of acute nasal fractures. *Am Fam Physician* 2004, 70(7), 1315-20
3. Bremke M, Gedon H, Windfuhr JP, Werner JA, Serterhenn AM. Nasal bone fractures, Etiology Diagnosis, Treatment & Complications. *Laryngorhinotalgie*, 2009, 88(11), 711-16
4. Mohammadi A, Javadrashad R, Pedram A, Masudi S. Comparison of Ultrasonography and Conventional Radiography in the diagnosis of Nasal bone fracture. *Iran J Radiology* 2009, 6(1), 7-11
5. Park CH, Kwon TK, Lee JH, Hong SJ, Joung HH, Kim HS, Endoscopically assisted reduction of nasal bone fractures. *Rhinology* 2007, 301-304
6. Perkins SW, Dayan SH. Management of Nasal Trauma. *Aesthetic Plastic Surgery*, 2002, 4307-5
7. Mondin V, Rinaldo A, Ferito A. Management of Nasal bone fractures. *Am J Otolaryngol* 2005, 26(3), 181-5
8. Hwang K, You SH, Kim SG, Lee SL. Analysis Of nasal bone fractures; a six year study of 503 pts. *J Craniofac Surg* 2006, 17(2), 261-4
9. Ridder GJ, Boedeker CC, Fradis M, Schipper J. Technique and timing for closed reduction of isolated nasal fractures; A retrospective study. *Ear Nose Throat J*, 2002, 81(1), 49-54
10. Michael PO, Lindsay L, Dezfoli S, Fedok FD. The treatment Of Nasal bone fractures; A changing paradigm. *Arch Facial Plast Surg*, 2009, 11(5), 296-302
11. Fattahi T, Steinberg B, Fernandes R, Mohan M, Reuter E. Repair of nasal complex fractures and the need for secondary septorhinoplasty, *J of Oral & Maxillofacial Surgery*, 2006, 62(12), 1785-89