ORIGINAL ARTICLE

Frequency and Etiology of Different Types of Nasal Bones Fracture Reporting at a Tertiary Care Centre, Lahore

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ABSTRACT

Objective: To describe different types of nasal bones fracture, to identify associated factors of different types of nasal bone fractures and to describe clinical demographic features of these cases.
Study design: Descriptive case series
Setting: Department of ENT at Avicenna Medical College/Hospital.
Duration of study: The study was completed in one year i.e., from 15.07.2011 to 14.08.2012.
Subjects and methods: Hundred cases of fracture nasal bones both males and females up to sixty years of age neither suffering from chronic pathology nor operated judged by history, clinical examination and investigations like x-ray nasal bones, coming to emergency and OPD were registered.
Results: Type II fracture was most frequent, observed in 52 patients (52%) followed by Type I fracture in 43 patients (43%) and Type III fracture in 5 patients (5%). The most common etiology was RTA (52%) followed by falls (25%), assaults (12%), occupational injuries (9%) and sports injuries (2%).
Conclusion: Type II fracture is most frequent and road traffic accidents is most common cause of fracture nasal bones.
Key words: Nasal bones, fractures, maxillofacial injuries, and facial injuries.

INTRODUCTION

The nasal bones fracture is a common problem in all age group in both sexes in every country and throughout the year[3,6]. Nasal bones fracture is the most common type of facial fractures[17].The common presentation was swelling and tenderness in all patients followed by deformity (30.5%) nasal obstruction (40%), and deviated nasal septum (15%)[2]. Negative x-ray finding was noticed in 30%[2].In a study of 164 patients, most of the injuries were in nasal region (50%) and nasal bones fracture was the commonest (26%)[7]. The incidence of nasal bones fracture is higher in males than in females[7]. In a study male predominance was observed (78%) with peak age between 20 and 39 years[7].

In most developing countries road traffic accidents are the leading cause of maxillofacial injuries[65]. Road traffic accidents cause severe facial injuries and are frequently associated with injuries to other organ systems[66]. Road traffic accidents, assaults, fights, falls and sports are the major causes of nasal bones fracture. In a study of 164 patients nasal bones fracture comprise 11.6%[7]. Major causes were interpersonal violence (48.1%) falls (26.2%) runovers (6.4%) sports (5.4%) car accidents (4.2%) motorcycle accidents (3.1%) non-fall impacts (2.4%) occupational injuries (1.8%) gunshot wounds (1.2%) unspecific (1.2%)[7]. Domestic injuries are frequently seen in younger children while older children are mostly involved in motor vehicle accidents (MVA)[57].

A common condition due mainly to road accidents, sport injuries, and physical confrontations[9]. Fractures of the nasal pyramid are among the most common injuries to the skull[49]. As the most prominent facial feature, the nose carries an increased risk of traumatic injury[11]. Nasal fracture is the most common bone injury of the adult face and frequently results from motor vehicle accidents, sports-related injuries, and altercations[11]. Although often initially considered minor, nasal fracture may eventually result in significant cosmetic or functional defects[11].

Nose injuries are of great importance in ENT and medicolegal practice. Nasal injuries are common conditions treated in Otolaryngology[26]. The importance lies in the frequency of injuries, diverse approaches to diagnosis, treatment and qualification of injuries used in legal proceedings in court[10]. The nasal bones fracture can be diagnosed by plain x-rays of nasal bones lateral and waters views, CT scans and high-resolution ultrasonography (USG).

USG is a useful tool for the diagnosis of nasal bones fracture and the evaluation of medical treatment[21]. In assessment of the nasal pyramid, USG can be considered an alternative to radiography, with equivalent diagnostic performance[13]. Early diagnosis is confirmed by CT

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scan using the simple classification system described[61].

Accurate preoperative understanding of the fracture type and postoperative evaluation by x-ray and CT are necessary to obtain good results and to decrease secondary deformity caused by poor primary reduction[25].

The complications of nasal bones fracture are sagging, depression and instability of nasal bones[21]. The degree of septal displacement and presence of nasal tip deviation were associated with persistent nasal deformity following nasal fracture reduction[33]. For nasal fracture presenting saddle nose deformity[33]. Septal haematoma after nasal trauma is a complication that can lead to septal abscess if unrecognized or early intervention is not performed. It can cause compression and thereby necrosis that evolve to a septal abscess in which cultures reveal saprophyte bacteria[30].

In world as well as in Pakistan the nasal bones fracture is treated by closed reduction (CR), open reduction (OR), septrohinoplasty and CR with accurate, firm stabilization of the fractured nasal bones by using external pins[64]. Nasoorbitoethmoid (NOE) fractures are complex and often challenging to repair[48]. Open reduction and internal fixation of the central fragment and the nasoethmoid complex was used[15]. Treatment of the acutely fractured nose involving an individually tailored protocol of CR, septoplasty, osteotomies, release of upper lateral cartilage fracture of the anterior extensions of the perpendicular plate of ethmoid and camouflaging cartilage graft yields straighter noses then treatment by CR alone[23]. Fractures that demonstrate displacement or movement on examination require OR and stabilization[61]. Identifying the extent and type of fracture pattern and associated injuries determines the exposure and method of fixation needed[61].

Patients with nasal fractures and associated septal deviation requiring septoplasty, RRs may be notably reduced by using an open approach to the nasal pyramid at the time of the initial repair[22].

The chosen surgical technique depends upon type of fracture and requirement of patient i.e., the correction of cosmetic deformity or management of epistaxis, nasal obstruction, crusting of exposed part of septum[3,23,64].

"If thou examinest a man having a break in the column of his nose, his nose being disfigured, and a depression being in it, while the swelling that is on it protrudes, he has discharged blood from both his nostrils. Thou should say concerning him: 'one having a break in the column of his nose. An ailment which I will treat.'" Ancient Egypt, Edwin Smith Surgical Papyrus, 3000 BC.

Although nasal bones fracture is the most common facial fracture, they often go unnoticed by both physicians and patients. Facial trauma has presented an increasing occurrence in the last four decades, due especially to the growth of accidents with automobiles as well as to the urban violence. Both of which continue being the main cause of such traumas.[1] Patients with nasal bones fracture usually present with some combination of deformity, tenderness, hemorrhage, edema, ecchymosis, instability, and crepitation; however, these features may not be present or may be transient. To further complicate the matter, edema can mask underlying nasal deformity, crepitation, and instability; thus, many physicians and patients fail to pursue further diagnosis and appropriate treatment. If untreated, nasal bones fracture can result both in unfavorable appearance and in unfavorable function, especially when the underlying structural integrity of bone and cartilage is lost.

Untreated nasal fractures account for the high percentage of rhinoplasty and septoplasty procedures performed months to years after the initial trauma occurs. Thus appropriate treatment is best rendered in a timely manner, before scarring and soft tissue changes occur. As always, thorough history taking and physical examination should precede radiographic evaluation. If radiographic evaluation is warranted, it is best used when other facial fractures are suspected in combination with a nasal fracture, because isolated nasal fractures are treated on the basis of the physical examination alone. The fact that patients may have displaced nasal fractures and normal-appearing plain radiographic findings should be emphasized.

The nasal bones and underlying cartilages are susceptible to fractures because the nose maintains a prominent position and central location on the face and because it has a low breaking strength. Patterns of fracture are known to vary with the momentum of the striking object and the density of the underlying bone. As with other facial bones, younger patients tend to have larger nasoseptal fracture segments, whereas older patients are more likely to present with more-comminuted fracture patterns.

Weak areas are noted in the cartilage framework at junctions of the upper lateral cartilages with the nasal bones and the septal cartilage at the maxillary crest. The weak areas account for an increase in the rate of fracture/dislocation after nasal trauma. A lateral force of only 16-66 kPa and a greater frontal force of 114-312 kPa can displace the bony dorsum. A large force in any direction can cause comminution of the nasal bones with an associated C-shaped deformity of the nasal septum. The C-shaped deformity usually begins under the dorsum of the

nose and extends posteriorly and inferiorly through the perpendicular plate of the ethmoid and ends with an anterior curve in the cartilaginous septum approximately 1 cm above the maxillary crest.
Murray et al reported that almost any deviation of the fractured nasal bones involves a concomitant fracture of the septal cartilage. Cartilage fracture lines are often oriented vertically in the caudal septum and horizontally in the posterior portions.

Lateral impact injuries are the most common type of nasal injury leading to fracture. Lateral injury produces a depression of the ipsilateral nasal bone that usually involves the lower one half of the bone, the nasal process of the maxilla, and a variable portion of the pyriform margin. Nasal fracture and displacement without septal fracture usually occur with weaker applied forces; however, with increased force, displacement of the bilateral nasal bones can be noted, and the septum is usually dislocated and fractured as well.

Other injuries that are commonly associated with nasal fractures include midface injuries involving the frontal, ethmoid, and lacrimal bones; nasoorbital ethmoid fractures; orbital wall fractures; cribriform plate fractures; frontal sinus fractures; and maxillary Le Fort I, II, and III fractures.

Fracture of nasal bones is the most common site-specific bone injury of the facial skeleton. Nasal fractures account for 39-45% of all facial fractures[7].

The morbidity of nasal fractures includes nasal airway obstruction due to dorsal nasal collapse, septal deviation, valvular collapse, epistaxis, or a poor cosmetic outcome. Perhaps the worst morbidity results from septal hematoma, leading to septal perforation and necrosis, which causes severe nasal collapse and deformation. The male-to-female ratio in nasal fractures is greater than 2:1[7].The incidence is increased in patients aged 15-30 years. A small but significant increase in the number of nasal fractures is noted in the elderly population because of a higher rate of falls. Most nasal bones fracture in young adults are related more to altercations and sporting injuries and less to motor vehicle accidents; however, these rates vary according to the location of the conducted study and the association with alcohol.

Our society is progressively becoming more and more violent and impatient so the frequency of patients reporting in emergency with nasal bones fracture is increasing and I wanted to determine this frequency and etiology of different types of nasal bones fracture so that problem can be properly addressed regarding frequency, management and prevention.

MATERIAL AND METHODS

This descriptive cases series was conducted in the Department of ENT at Avicenna Medical College/Hospital for a period of one year. Hundred cases of nasal bones fracture judged by history and clinical examination coming to emergency and OPD were included. Sampling technique was purposive non probability sampling. All cases of both genders with nasal bones fracture upto 60 years were included in the study. All those cases with history of chronic pathology, old deformity and already operated were not included.

Hundred cases with clinically confirmed nasal bones fracture coming via OPD and emergency were registered. An informed consent was obtained from them for using their data in my research (in case of children consent was obtained from their parents).The demoghraphic information was recorded including name, age, sex, address etc. The history of their current problem was obtained regarding symptoms, severity and duration. They were examined for positive signs, types and severity. Routine investigations like CBC, X-RAY nasal bones lateral and water views were carried out. Special investigations like CT scan was carried out where necessary. Type of nasal bones fracture was determined i.e., Type I (Simple without displacement) Type II (Simple with displacement/without telescoping) Type II A (Unilateral) Type II As (Unilateral with septal fracture)Type II B (Bilateral) Type II Bs (Bilateral with septal fracture Type III (Comminuted with telescoping or depression). The confounding effects of age, sex, injury description of patient and examiners experience were removed by stratification.

All collected information was entered in SPSS version 10.0 and analyzed through it. The variables of demography were presented as frequency and proportion. The age, duration being quantitative were given as mean and standard deviation. The variables of current clinical history were presented as types of symptoms, their frequency and proportion. The variables of examination were listed as types of signs, their frequency and proportion. The outcome of routine investigations was presented as either negative or positive in proportion. Special investigations like CT scan was presented as revealing or ruling out any type of fracture nasal bones.

RESULTS

Following tables shows the frequency, ratio and etiology of different types of nasal bone fracture

Table 1: Distribution of cases according to mode of admission (n=100)

Mode of admission	Male	Female
OPD	3(3%)	3(3%)
Accident & Emergency	74(74%)	20(20%)

Table 2: Percentages of male patients according to mode of admission (n=100)

Mode of admission	Male pts.	%age
OPD	3	3
Accident & Emergency	74	74

Table 3: Percentages of female patients according to mode of admission (n=100)

Mode of admission	Female pts.	%age
OPD	3	3
Accident & Emergency	20	20

Table 4: Distribution of cases according to sex (n=100)

Gender	n=	%age
Male	77	77
Female	23	23

Male: Female = 3:1

Table 5: Distribution of cases according to frequency of different types of NBF (n=100)

Type of fracture	Male	Female
Type I	34(34%)	9(9%)
Type II	40(40%)	12(12%)
Type III	3(3%)	2(2%)

Table 6: Predisposing factors of NBF (n=100)

Etiological factors	Type I	Type II	Type III
Road traffic accidents	20(20%)	28(28%)	4(4%)
Falls	14(14%)	11(11%)	0
Assaults	7(7%)	4(4%)	1(1%)
Sports injuries	0	2(2%)	0
Occupational injuries	2(2%)	7(7%)	0

Table 7: Distribution of cases according to age and sex (n=100)

Age in years	Male	Female
1-10	06	05
11-20	20	03
21-30	28	07
31-40	12	03
41-50	05	04
51-60	06	01

Table 8: Distribution of cases according to age, sex and percentages (n=100)

Age in years	Male	Female
1-10	06(6%)	05(5%)
11-20	20(20%)	03(3%)
21-30	28(28%)	07(7%)
31-40	12(12%)	03(3%)
41-50	05(5%)	04(4%)
51-60	06(6%)	01(1%)

Table 9: Distribution of cases according to number (n=100)

Type of fracture	n=
Type I	43
Type II	52
Type III	05

Table 10: Distribution of cases according to age (n=100)

Age in years	=n
1-10	11
11-20	23
21-30	35
31-40	15
41-50	09
51-60	07

Table 11: Distribution of male patients according to age

Age in years	Male pts
1-10	6(6%)
11-20	20(20%)
21-30	28(28%)
31-40	12(12%)
41-50	5(5%)
51-60	6(6%)

Table 12: Distribution of female patients according to age

Age in years	Female pts
1-10	5(5%)
11-20	3(3%)
21-30	7(7%)
31-40	3(3%)
41-50	4(4%)
51-60	1(1%)

Table 13: Predisposing factors of Type 1 nasal bones fracture (n=100)

Etiological factors	Type I
Road traffic accidents	20(20%)
Falls	14(14%)
Assaults	7(7%)
Sports injuries	0
Occupational injuries	2(2%)

Table 14: Predisposing factors of Type II nasal bones fracture (n=100)

Etiological factors	Type II
Road traffic accidents	28(28%)
Falls	12(11%)
Assaults	4(4%)
Sports injuries	2(2%)
Occupational injuries	7(7%)

Table 15: Predisposing factors of Type III nasal bones fracture (n=100)

Etiological factors	Type III Fractures
Road traffic accidents	4(%)
Falls	0
Assaults	1(1%)
Sports injuries	0
Occupational injuries	0

DISCUSSION

NBF is a common problem in E.N.T[17]. In a study of 164 patients most of the injuries were in nasal region (50%) and NBF was the commonst (26%)[6]. The incidence of NBF is higher in males than in females[7]. In a study male predominance was observed, 78% in males and 22% in females[7]. In present study also male predominance was observed, 77% in males and 23% in females. In a study peak age of NBF was between 29 and 39 years[7]. In present study peak age was between 21- 30 years.

A common condition due mainly to road accidents, sport injuries, and physical confrontations[9], in most developing countries RTAs are the leading cause of maxillofacial injuries[65]. Road traffic accidents, assaults, fights, fall and sports injuries are the major causes of NBF.

In a study of 164 patients NBF comprise 11.6%. Major causes were interpersonal violence (48.1%), falls (26.2%), runovers (6.4%), sports (5.4%), car accidents (4.2%) motorcycle accidents (3.1%) non-fall impacts (2.4%), occupational injuries (1.8%), gunshot wound (1.2%), unspecific (1.2%)[7]. In present study major causes were RTA 52%,falls 25%,assaults 12%,sports injuries 2%,occupational injuries 9%.

The common presentation was swelling and tenderness in all patients followed by deformity (30.5%) nasal obstruction (40%), and deviated nasal septum (15%)[2]. In present study, common presentation was swelling, tenderness and epistaxis followed by deformity, nasal obstruction and deviated nasal septum.

The NBF can be diagnosed by plain x-rays of nasal bones lateral and waters views, CT scans and high-resolution USG[21]. In present study most cases were diagnosed by clinical examination and plain x-rays of nasal bones lateral and water views.

The complications of NBF are sagging, depression and instability of nasal bones[21]. For nasal fractures presenting saddle nose deformity[33] .In present study the above-mentioned complications observed in patients who presented late especially about two to four weeks after trauma. In world as well in Pakistan the NBF is treated by CR, OR, septorhinoplasty and CR with accurate, firm stabilization of the fractured nasal bones by using external pins[64]. Treatment of the acutely fractured nose involving an individually tailored protocol of CR, septoplasty, osteotomies, release of upper lateral cartilage fracture of the anterior extensions of the perpendicular plate of ethmoid and camouflaging cartilage graft yields straighter noses then treatment by closed reduction alone[23]. The chosen surgical technique depends upon type of fracture and requirement of patient i.e., correction of cosmetic deformity or management of epistaxis, nasal obstruction, crusting of exposed part of septum[3, 23,64]. In present study, most patients were treated by CR.

Our society is progressively becoming more and more violent and impatient so the frequency of patient reporting in emergency with NBF is increasing. In the present study the frequency and etiology of different types of NBF in Lahore general hospital was determined so that problem can be properly addressed and proper steps can be taken to prevent the problem and if problem occurs it can be managed properly.

CONCLUSION

Among all types of fracture nasal bones Type II is the most common type and among all causes of fracture nasal bones road traffic accidents is the most common etiology of fracture nasal bone. Proper legislation and implementation of traffic rules can prevent road traffic accidents and decrease the incidence of fracture nasal bones. Early diagnoses and treatment can prevent complications like sagging, depression and instability of Nasal bones.

REFERENCES

1. Montovani JC, de Campos LM, Gomes MA, de Moraes VR, Ferreira FD, Nogueira EA .Etiology and incidence facial fractures in children and adults. Rev Bras Otorrinolaringol (Engl Ed). 2006 Mar-Apr; 72(2): 235.
2. Ashoor AJ, Alkhars FA Nasal bone fracture. Saudi Med J. 2000 May; 21(5): 471-4.
3. Hwang K, You SH, Kim SG, Lee SI. Analysis of nasal bone fractures; a six-year study of 503 patients. 1: J Craniofac Surg. 2006 Mar; 17(2): 261-4.
4. 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 Jul; 102(1): 28-34. Epub 2006 Mar 22.
5. Rusetskiĭ Iulu, Chernyshenko IO, Bogatishchev VI, Buianov AP, Sapargalieva KZ. [Epidemiological aspects of nasal bones fractures in an industrial city today] Vestn Otorinolaringol. 2007;(3): 27-9.
6. Khan AR, Arif S. Ear Nose and throat injuries in children Ayub Med Coll Abbot bad 2005Jan- Mar; 17(1): 54-6.
7. Wulkan M, Parreira JG, Botter DA. Epidemiology of facial trauma. Rev Assoc Med Bras.2005 Sept-Oct; 51:290-5.Epub 2005 Oct 31.
8. Department of Radiology, Mayo hospital Lahore. Medicolegal aspects of nasal Bone fracture. Ann King Edward Med Coll Dec2003; 9(4): 270-1.
9. Mondin V, Rinaldo A, Ferlito A. Management of nasal bone fractures. Am 2005 May-Jun; 26(3): 181-5.
10. Pilija V, Buljcik M, Mihalj M, Savović S, Stojiljković G. Classification and qualification of nose injuries--clinical and forensic aspects] Med Pregl. 2005 Jan-Feb; 58(1-2): 33-6.

11. Higuera S, Lee EI, Cole P, Hollier LH Jr, Stal S. Nasal trauma and the deviated nose. Plast Reconstr Surg. 2007 Dec; 120 (7 Suppl 2): 649-759.
12. Sargent LA Nasoethmoid orbital fractures: diagnosis and treatment Plast Reconstr Surg. 2007 Dec; 120(7 Suppl 2): 16S-31s
13. Thiede O, Krömer JH, Rudack C, Stoll W, Osada N, Schmäl F. Comparison of ultrasonography and conventional radiography in the diagnosis of nasal fractures. Arch Otolaryngol Head Neck Surg. 2005 May; 131(5): 434-9
14. Agrawal N, Brayley N. Audit of nasal fracture management in accident and emergency in a district general hospital. J Eval Clin Pract. 2007; 13(2): 295-7.
15. Young PA, Rice DH. Management of a type II nasoethmoid orbital fracture and near-penetration of the intracranial cavity with transnasal canthopexy Ear Nose Throat J. 2007 Jun; 86(6): 344-7, 360.
16. Friedrich RE, Heiland M, Bartel-Friedrich S. Potentials of ultrasound in the diagnosis of midfacial fractures*. Clin Oral Investig. 2003 Dec; 7(4): 226-9. Epub 2003 Sep 30.
17. Rhee SC, Kim YK, Cha JH, Kang SR, Park HS. Septal fracture in simple nasal bone fracture. Plast Reconstr Surg. 2004 Oct; 114(5): 1357-8; author reply 1358.
18. Lascaratos JG, Segas JV, Trompoukis CC, Assimakopoulos DA From the roots of rhinology: the reconstruction of nasal injuries by Hippocrates. Ann Otol Rhinol Laryngol. 2003 Feb; 112(2): 159-62.
19. Fernandes SV. Nasal fractures: the taming of the shrewd. Laryngoscope. 2004 Mar;114(3):587-92.
20. Wild DC, El Alami MA, Conboy PJ. Reduction of nasal fractures under local anaesthesia: an acceptable practice? Surgeon. 2003 Feb; 1(1): 45-7.
21. Kishibe K, Saitou S, Harabuchi Y. [Significance of ultrasonography for nasal fracture] Nippon Jibiinkoka Gakkai Kaiho. 2005 Jan; 108(1): 8-14.
22. Reilly MJ, Davison SP. Open vs. closed approach to the nasal pyramid for fracture reduction. Arch Facial Plast Surg. 2007 Mar-Apr; 9(2): 82-6.
23. Staffel JG. Optimizing treatment of nasal fractures. Laryngoscope. 2002 Oct;112(10):1709-19.
24. Khwaja S, Pahade AV, Luff D, Green MW, Green KM. Nasal fracture reduction: local versus general anaesthesia. Rhinology. 2007 Mar; 45(1): 83-8.
25. Yabe T, Ozawa T, Sakamoto M, Ishii M. Pre- and postoperative x-ray and computed tomography evaluation in acute nasal fracture. Ann Plast Surg. 2004 Dec; 53(6): 547-53.
26. Courtney MJ, Rajapakse Y, Duncan G, Morrissey G. Nasal fracture manipulation: a comparative study of general and local anaesthesia techniques. Clin Otolaryngol Allied Sci. 2003 Oct; 28(5): 472-5.
27. Rajapakse Y, Courtney M, Bialostocki A, Duncan G, Morrissey G. Nasal fractures: a study comparing local and general anaesthesia techniques. ANZ J Surg. 2003 Jun; 73(6): 396-9.
28. Koch KU, Gano L, Kjeldsen AD. [Reposition of nose fractures under local or general anaesthesia. A retrospective patient satisfaction survey] Ugeskr Laeger. 2007 Jun 11; 169(24): 2322-5.
29. Potter JK, Muzaffar AR, Ellis E, Rohrich RJ, Hackney FL. Aesthetic management of the nasal component of naso-orbital ethmoid fractures. Plast Reconstr Surg. 2006 Jan; 117(1): 10e-18e.
30. Calderón R, Miralles G, Rodríguez Urcelay P, Berenguer B, González Meli B, Enríquez de Salamanca J, Cervera J. [Complications and sequelae after nasal trauma] Cir Pediatr. 2007 Apr; 20(2): 125-8.
31. Davis RE, Raval J. Powered instrumentation for nasal bone reduction: advantages and indications. Arch Facial Plast Surg. 2003 Sep-Oct; 5(5): 384-91.
32. Leong SC, Abdelkader M, White PS. Changes in nasal aesthetics following nasal bone manipulation. J Laryngol Otol. 2008 Jan; 122(1): 38-41. Epub 2007.
33. Kucik CJ, Clenney T, Phelan J. Management of acute nasal fractures. Am Fam Physician. 2004; 70(7): 1315-20.javascript:PopUpMenu2_Set(Menu15508543);
34. Siritongtaworn P. Management of life threatening hemorrhage from facial fracture. J Med Assoc Thai. 2005 Mar; 88(3): 382-5. javascript: Pop Up Menu 2_Set(Menu15962648);
35. Robinson JH. Airway obstruction following closed reduction of nasal fractures. Plast Reconstr Surg. 2004 Oct; 114(5):.1357-8; author reply 1358.
36. Yabe T, Muraoka M. Treatment of saddle type nasal fracture using Kirschner wire fixation of nasal septum. Ann Plast Surg. 2004 Jul; 53(1): 89-92.
37. Gunter JP, Cochran CS. Management of intraoperative fractures of the nasal septal "L-strut": percutaneous Kirschner wire fixation. Plast Reconstr Surg. 2006 Feb; 117(2): 395-402.
38. Zhen H, Gao Q, Cui Y. [Replacement of nasal bone fracture under nasal endoscope] Lin Chuang Er Bi Yan Hou Ke Za Zhi. 2003 Apr; 17(4): 203-4.
39. Fernandes SV. Nasal fractures. ANZ J Surg. 2004 Apr; 74(4): 285; author reply 285-6.
40. Fan XQ, Fu Y, Li J, Zhou HF, Liu HY. [Late management of medial canthal deformities after naso-orbital-ethmoid fractures] Zhonghua Yan Ke Za Zhi. 2006 Jul; 42(7): 611-5.
41. Spielmann PM. Nasal fracture manipulation under local anaesthetic without injections. Clin Otolaryngol. 2007 Dec; 32(6): 503.
42. Zagólski O, Strek P. [Ultrasonography of the nose and paranasal sinuses]Pol Merkur Lekarski. 2007 Jan; 22(127): 32-5.
43. Chin T, Sakata Y, Amenomori S, Yamamoto Y, Hyakusoku H. Use of a bioabasorbable bone pin fixation for nasal fractures. J Nippon Med Sch. 2005 Jun; 72(3): 179-81.
44. Gruber R, Chang TN, Kahn D, Sullivan P. Broad nasal bone reduction: an algorithm for osteotomies. Plast Reconstr Surg. 2007 Mar; 119(3): 1044-53
45. Maitra S, Hobbs CG, Evans KL. Foreign body mimicking a nasal bone fracture. J Laryngol Otol. 2007 Mar; 121(3): 271-3. Epub 2006 May 19.
46. Kriukov AI, Turovskiĭ AB, Tsarapkin GIu. [Use of intranasal splints in acute septoplasty in the treatment of composite nasoseptal fractures] Vestn Otorinolaringol. 2007;(2): 51-3.
47. Salonen EM, Koivikko MP, Koskinen SK. Multidetector computed tomography imaging of facial trauma in

accidental falls from heights. Acta Radiol. 2007 May; 48(4): 449-55.
48. Herford AS, Ying T, Brown B. Outcomes of severely comminuted (type III) nasoorbitoethmoid fractures. J Oral Maxillofac Surg. 2005 Sep; 63(9): 1266-77.
49. Pingoud R, Moehrlen U. [Conventional radiological examination of the nasal bone--helpful or superfluous? Case histories and literature survey] Unfallchirurg. 2007 Feb; 110(2): 183-6.
50. Uraloğlu M, Erkin Unlü R, Ortak T, Sensöz O. Delayed assessment of the nasolacrimal system at naso-orbito-ethmoid fractures and a modified technique of dacryocystorhinostomy. J Craniofac Surg. 2006 Jan; 17(1): 184-9.
51. Das UM, Nagarathna C, Viswanath D, Keerthi R, Gadicherla P. Management of facial trauma in children: A case report. J Indian Soc Pedod Prev Dent. 2006 Sep; 24(3): 161-3.
52. Morita R, Shimada K, Kawakami S. Facial protection masks after fracture treatment of the nasal bone to prevent re-injury in contact sports. J Craniofac Surg. 2007 Jan; 18(1): 143-5.
53. Moumoulidis I, Mani N, Patel H, Leong P. A novel use of photo messaging in the assessment of nasal fractures. J Telemed Telecare. 2007; 13(8): 387-90.
54. Ferreira PC, Amarante JM, Silva PN, Rodrigues JM, Choupina MP, Silva AC, Barbosa RF, Cardoso MA, Reis JC. Retrospective study of 1251 maxillofacial fractures in children and adolescents. Plast Reconstr Surg. 2005 May; 115(6): 1500-8.
55. Roofe SB, Murakami CS. Childhood nasal trauma with previous rhinoplasty and persistent deformity. Facial Plast Surg Clin North Am. 2006 Nov; 14(4): 389-91; vii.
56. Nwadinigwe CU, Ihezie CO, Iyidiobi EC. Fractures in children. Niger J Med. 2006 Jan-Mar; 15(1): 81-4.
57. Rahman RA, Ramli R, Rahman NA, Hussaini HM, Idrus SM, Hamid AL. Maxillofacial trauma of pediatric patients in Malaysia: a retrospective study from 1999 to 2001 in three hospitals. Int J Pediatr Otorhinolaryngol. 2007 Jun; 71(6): 929-36. Epub 2007.
58. Lessa A, de Souza SM Broken noses for the gods: ritual battles in the Atacama Desert during the Tiwanaku period. Mem Inst Oswaldo Cruz. 6 Dec 5; 101 Suppl 2:133-8.
59. Thomas L, Lee MK. Nasal fracture manipulation: a comparative study of general and local anaesthesia techniques. Clin Otolaryngol. 2005; 30(1): 77.
60. Locke MM, Spiekermann BF, Rich GF. Trigeminovagal reflex during repair of a nasal fracture under general anesthesia. Anesth Analg. 1999 May; 88(5): 1183-4.
61. Sargent LA. Nasoethmoid orbital fractures: diagnosis and treatment. Plast Reconstr Surg. 2007 Dec; 120(7 Suppl 2): 16S-31S.
62. Kishibe K, Saitou S, Harabuchi Y. Significance of ultrasonography for nasal Fracture. Nippon Jibbinkoka Gakkai Kaiho.2005 Jan; 108(1): 8-14.
63. Staffel JG. Optimizing treatment of nasal fractures. Laryngoscope.2002 Oct; 112(10): 1709-19.
64. Won Kim S, Pio Hong J, Kee Min W, Wan Seo D, Kyu Chung Y. Accurate, firm stabilization using external pins: a proposal for closed reduction of unfavorable nasal bones fracture and their simple classification. Plast Reconstr Surg.2002 Oct; 110(5): 1240-6
65. Akama MK, Chindia ML, Macigo FG, Guthua SW. Pattern of maxillofacial and associated injuries in road traffic accidents. East Afr Med J. 2007 Jun; 84(6): 287.
66. Batstone MD, Monsour FN, Pattel P, Lynham A. The patterns of facial injury suffered by patients in road trafficaccidents: a case controlled study. Int J Surg. 2007 Aug; 5(4): 250-4. Epub 2006 Oct 24.
67. Khan SU, Khan M, Khan AA, Murtaza B, Maqsood A, Ibrahim W, Ahmed W. Etiology and pattern of maxillofacial injuries in the Armed Forces of Pakistan J Coll Physicians Surg Pak. 2007 Feb; 17(2): 94-7.
68. Kühne CA, Krueger C, Homann M, Mohr C, Ruchholtz S. [Epidemiology and management in emergency room patients with maxillofacial fractures] Mund Kiefer Gesichtschir. 2007 Sep; 11(4): 201-8.