Epidemiology

Maxillofacial trauma or injuries are commonly encountered in the practice of emergency medicine and are presenting one of the most challenging problems to the attending surgeons or physicians in the emergency out patients' department. Fractures of the facial skeleton are associated with variable morbidity, disfigurement and functional deficits. More than ٥٠٪ of these patients have multi-system trauma requiring coordinated management between physician, rhinolaryngologist,trauma surgeon, ophthalmologist, dentist, oral and facio-maxillary surgeon and neurosurgeons altogether. Maxillofacial trauma includes injuries to any of the bony or fleshy structures of the face. A fractured nose or jaw may affect the ability to breathe or eat. Any maxillofacial injury may also prevent the passage of air or be severe enough to cause a concussion or more serious brain damage ***(Gassner R.et al ٢٠٠٣).***

Road traffic accidents are reported to be the most common causes in developing countries whereas interpersonal violence is the leading causes in the developed countries .With regards to the anatomical sites, mandibular and zygomatic complex fractures account for the majorities among all types of facial fracture .Males are more predominant sufferer than females. Their occurrence varies according to the mechanism of injury and demographic factors like sex, age, race, geographic

distribution, culture, socioeconomic status and road safety regulations. The trauma to this region is very much concerned with function of the various special organs like eyes, ear, nose, mouth, and vital structures of head and neck .Also the psychological impact of disfigurement after the injuries can be devastating ***(LaskinDM, ٢٠٠٠).***

Pathophysiology

A) Nasal Fractures

The following points should be borne in mind before attempting to understand the pathophysiological factors that lead to fractures involving nasal bones ***(Thiagarajan and Ulaganathan, ٢٠١٣):***

- Nasal bones and underlying cartilage are susceptible for fracture because of their more prominent and central position in the face.
- These structures are also pretty brittle and poorly withstand force of impact.
- The ease with which the nose is broken may help to protect the integrity of the neck, eyes, and brain. Thus, it acts as a protective mechanism.
- Nasal fractures occur in one of two main patterns from a lateral impact or from a head on impact. In lateral trauma, the nose is displaced away from the midline on the side of the injury, in head on trauma, the nasal bones are pushed up and splayed so that

- the upper nose (bridge) appears broad, but the height of the nose is collapsed (saddle-nose deformity). In both cases, the septum is often fractured and displaced.
- The nasal bone is composed of two parts: A thick superior portion and a thin inferior portion. The intercanthal line demarcates these two portions. Fractures commonly occur below this line.
- Nasal bones undergo fracture in its lower portion and seldom are the upper portion involved in the fracture line. This is because the upper portion of the nasal bone is supported by its articulation with the frontal bone and frontal process of the maxilla.
    - Because of the close association between nasal bone and the cartilaginous portions of the nose, and the nasal septum it is quite unusual for pure nasal bone fractures to occur without affecting these structures.

Classification of nasal bone fractures:

Stranc Robertson classification :

Stranc and Robertson suggested that lateral forces accounted for the majority of nasal bone fractures. Stranc and Robertson came out with their classification of nasal bone fracture based on the direction of impact and the associated damage. In this classification they also took into consideration the degree of damage to nasal bones and the nasal septum. This classification was based on the clinical examination of the nose and face, but it did not take into

account the diological findings ***(Thiagarajan and Ulaganathan, ٢٠١٣).***

TypeI injury:

Fractures due to this type of injury does not extend behind the imaginary line drawn from the lower end of nasal bone to the anterior nasal spine. In this type of injury the brunt of the attack is borne by lower cartilaginous portion of the nasal cavity and the tip of the nasal bones. This type of injury may cause avulsion of upper lateral cartilages, and occasionally Bony fractures of the nose may involve one or both nasal bones, the frontal process of the maxilla, the bony septum, and in severe trauma-the nasal-orbital-ethmoid complex. However, the most likely area of fracture of the nasal bones is the thinner lower two thirds. Simple nasal fractures must be separated from the more serious naso-orbito-ethmoid fracture (NOE fracture) where the fracture extends into the nose through the ethmoid bones. These fractures may cause injury to the dura and a subsequent cerebrospinal fluid leak ***(Cox, ٢٠٠٠)***.

Because of the close association between nasal bone and the cartilaginous portions of the nose, and the nasal septum it is quite unusual posterior dislocation of septal and alar cartilages ***(Thiagarajan and Ulaganathan, ٢٠١٣)***.

Type II injury:

This type of injury involves the external nose, nasal septum and anterior nasal spine. Patients with this type of injury manifest with gross deviations involving the dorsum of the nose including

splayingof nasal bones, flattening of dorsum of nose and loss of central support of the nose ***(Thiagarajan and Ulaganathan, ٢٠١٣).***

Type III injury:

This injury involves orbit and intracranial structures ***(Thiagarajan and Ulaganathan, ٢٠١٣).***

The clinical points towards the diagnosis of fractures involving nasal bones: ***(Kang, ٢٠١١)***

Injuries involving middle third of face.

History of bleeding from the nose following injury.

Edema over the dorsum of the nose.

Tenderness and crepitus over nasal bone area.

Eyelid edema.

Subcutaneous emphysema involving eyelids.

Periorbital ecchymosis.

Clinical examination:

suspect a naso-orbito-ethmoid fracture when the patient has telecanthus (widening of the nasal bridge with a detached medial canthus). These patients will often have either CSF rhinorrhea,epistaxis, or both. Epistaxis is commonly associated with nasal trauma and is easily explained by the dense vascular network (Kiesselbach’s plexus) that supplies the nose. Bleeding can also

riginate from other locations within the nose when the nose isfractured. Anterior nasal bleeding can originate from the anterior ethmoid artery (a branch of the ophthalmic artery) and posteriorly from a branch of the sphenopalatine artery. Thus, packing the nose usually controls this hemorrhage. However if packing fails to control the bleeding, consultation with an otolaryngologist is appropriate as specific vessel ligation may be needed ***(Baril and Michael, ٢٠١٣).***

B) Orbital Fractures

Orbital fractures are a consequence of middle third facial trauma and occur as a result of the application of forces that overcome the resistance of bone structures forming the orbital cavity. These fractures are very frequently associated with damage to the surrounding soft tissue and they sometimes damage the orbital cavity contents or communicate the orbit with adjacent structures (cranial cavity, paranasal sinuses ornasal cavity) ***(LeeHJ,etal, ٢٠٠٤).***

Although orbital fractures are not themselves life-threatening,they may be associated with intracranial or ocular injuries that require emergency management . They are usually part of complex mid facial trauma and can be managed by different specialists . CT scan is currently the gold standard for assessing orbital fractures and imaging specialists have a key role in the assessment of the extent of bone and soft tissue damage, characterization by different criteria and identification of potential causes of post-traumatic complications ***(Cruz and Eichenberger , ٢٠٠٤) .***

Orbital fractures have been reported to occur more commonly among adult and adolescent males . Thus, in a retrospective study of ٩٢ adults with orbital fractures, ٧٢٪ of cases were male and the mean age was ٣٢ years ***(Manolidis , ٢٠٠٢) .***

A special type of fracture of the orbital floor is the blow-out fracture (Figs.١.٢) The term to describe the loss of continuity of the orbital floor or medial wall generated by a direct impact that increases intra orbital pressure causing bone rupture and displacement of orbital contents to the maxillary or ethmoid sinus while the orbital rim remains intact With the subsequent decrease in intraorbital pressure, herniated orbital tissue moves backward and becomes entrapped in between the fractured fragments,causing restrictive strabismus ***(Bidaguren Urbieta A,et al ٢٠١٢).***

Because the infraorbital nerve passes through the orbital floor, hypesthesia often occurs in its sensory distribution with orbital floor fractures ***(Rose and David, ٢٠١١).***

Orbital roof fractures in adults are uncommon and are usually associated with high impact injuries to the head and face. Multiple facial and neurological complications are common in these injuries. On the other hands, in children, orbital roof fractures are seen with lesser force ***(Tse et al., ٢٠٠٧).***