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RETROSPECTIVE ANALYSIS OF INFRA ORBITAL NERVE INJURY IN FACIAL FRACTURES AT TERTIARY CENTRE OF GUJARAT.

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ABSTRACT:

INTRODUCTION:

Facial fractures are distributed in a fairly normal curve by age, with a peak incidence occurring between ages 20 and 40, and children under 12 suffering only 5–10% of all facial fractures. From amongst the facial fractures, Midfacial fractures account for a substantial proportion of maxillofacial injuries, predominantly presenting in young (20 to 40 year old) male patients. In the ZMC region the most common nerve to be involved is the infraorbital nerve injury

METHOD:

A retrospective analysis was done from the data gathered from the Medical records of Department of Oral & Maxillofacial Surgery of our tertiary care centre for the patients who were diagnosed with Midfacial, Pan-facial and le-fort fractures, as the fractures of this type usually involves the infraorbital nerve injury which innervates (sensory) the lower eyelid, upper lip, and part of the nasal vestibule. The neurosensory changes were evaluated with the help of two point discrimination method. The data obtained were statistically analyzed after thorough preliminary inspection and content analysis and results and observation and a conclusion was drawn from it.

RESULT:

Males have shown to be the most commonly affected gender than females. Also it showed that out of 102 patients 33, of them had sustained infraorbital nerve injury which caused neurosensory disturbances to the areas that it supplied

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CONCLUSION :

It was concluded that infraorbital nerve recover usually recovers within a span of 6 months if treated by open reduction and internal fixation surgery especially for the patients who are diagnosed with paresthesia of the Midfacial region

KEYWORDS: *Facial fractures, Infraorbital nerve injury.*

I. INTRODUCTION:

The face is vital to human appearance and function. Facial injuries can impair a patient's ability to eat, speak, interact with others, and perform other important functions. Studies suggest that disfiguring facial injuries can have severe psychological and social consequences. The treatment of facial injuries must first focus on threats to life, but important secondary considerations are function and long-term cosmesis. Head and brain injuries are commonly associated with facial trauma, particularly that of the upper face; brain injury occurs in 15%–48% of people with maxillofacial trauma. From amongst the facial fractures, Midfacial fractures account for a substantial proportion of maxillofacial injuries, predominantly presenting in young (20 to 40-year-old) male patients. Trauma to the midface regularly leads to lesions of the soft tissues, teeth and fractures of the aforementioned bone structures, consecutively the maxilla, zygomatic complex, nasal bone, naso-orbital-ethmoid complex, orbit and the supraorbital structures. The incidence of Midfacial fractures is reported to be in the range from 42.6–48.0% of all maxillofacial fractures. As per the literature ZMC constitutes about 45% of the Midfacial fractures and 25% of all the fractures of facial population. RTA's have remained the most often cause of ZMC fractures in developing countries. Ocular complications may also occur due to zygomatic fractures. Due to the relation of zygomatic bone to the orbit, zygomatico-orbital fractures may cause laceration of the external ocular muscles, resulting in diplopia.[2] In the ZMC region the most common nerve to be involved is the infraorbital nerve injury which accounts for about 95% of all the cases of ZMC fractures. The causation of injury could be either direct or indirect injury to the nerve, compression of the nerve, damage to the infraorbital canal etc. The damage occurred can produce sensory alteration including hypoesthesia, dysesthesia, paresthesia or anaesthesia of the mid facial structures including lower eyelid, cheek, upper lip, skin of nose, and intra-orally, includes anterior region of gingiva and teeth of affected side.Acute loss of sensory function of the infraorbital nerve following orbitozygomatic complex fractures is often seen because of its close proximity to the orbitozygomatic complex as it passes through the infraorbital sulcus in the floor of the orbit to exit through the infraorbital foramen. Traumatic injury to the infraorbital nerve may be due to compression, edema, ischemia or laceration. The incidence of maxillofacial injuries is on the rise due to motor vehicle accidents and increased incidence of violence in recent times. Our tertiary care Hospital is a major trauma center in district and a referral center for maxillofacial trauma. Despite numerous studies on Maxillomandibular fractures, studies on any infraorbital nerve injury are scarce.Considering all the above factors in mind the present study aims in retrospectively analyzing the incidence of injury or any kind of neurosensory damage to the infraorbital nerve in treated or non-treated patients of facial fractures in the past 3 years from 2016 – 2018 that have reported to the department of oral and maxillofacial surgery or have been referred from other hospitals.

II. METHODS:

The approval of study was given by the Institutional Ethical Board. The patients registered with the Department of Oral and Maxillofacial Surgery between January 2016 to December 2018 who got treated for their Maxillofacial Injuries were considered for this study and patients having Midfacial, Pan-facial and le-fort fractures, as the fractures of this type usually involves the infraorbital nerve injury which innervates (sensory) the lower eyelid, upper lip, and part of the nasal vestibule were then seggregated. Investigator standardized the collected data from patient's records. Patient's data had to be complete on all parameters to be included in the study. Cases with missing and inadequate data were excluded.The neurosensory changes were evaluated with the help of two point discrimination method in the preoperative, postoperative and subsequent follow up visits and were recorded. The data obtained were statistically analyzed after thorough preliminary inspection and content analysis and results and observation and a conclusion were be drawn from it.

III. RESULT:

From table no 1 it can be observed that the number of male patients are significantly more than that of female patients during all the 3 years. The total number of patients diagnosed with facial fractures is 102 during the 3 year period.It was observed that out of 102 patients diagnosed with facial fractures, 33 of them have sustained infraorbital nerve injury. It can be observed that in the year 2016, out of 29 facial fracture cases only 12 (41.37%) of them were diagnosed with infraorbital nerve injury. Then in 2017, out of 44 patients, 11 (25%) were diagnosed with infraorbital nerve injury. While in 2018, out of 29 patients only 10 (34.48%) were diagnosed with infraorbital nerve injury.It was observed that maximum number of patients diagnosed with infraorbital nerve injury were in the age range of 22-31 years of age followed by 42-51 and then in 12-21 years of age.It was observed that in maximum amount of patients diagnosed with facial fractures the causation of injuries was road traffic accidents.It was observed that the number of patients diagnosed with dysesthesia were more than that of paresthesia. The numbers of patients diagnosed with dysesthesia were 27 and that with paresthesia were 6 pre operatively.It was observed that the total number of patients recovered from dysesthesia after 1 week were 26 and 1 patient recovered after 15 days of undergoing open reduction and internal fixation. It was also observed that 2 patients recovered from paresthesia after 1 month of open reduction internal fixation surgery.

TABLE NO. 1: COMPLETE DATA OF THE STUDY PERFORMED

Total Number of Patients diagnosed with Facial Fractures	**MALES**	**FEMALES**	**TOTAL**	**Patients having infraorbital injury**
From Jan 2016- Dec2016	28	1	29	12

From Jan 2017- Dec2017	38	6	44	11
From Jan 2018- Dec2018	27	2	29	10
Total	93	9	102	33

IV. DISCUSSION:

Road traffic accidents are on the rise and have become the most common etiological factor in the causation of maxillofacial injuries. Accidental falls, sports injuries, occupational hazards and physical assaults are the other common causative factors. Males are more prone to maxillofacial injuries than females as most of the time in any road traffic accidents the vehicles are mostly driven by the male driver. Apart from the aforesaid mentioned etiological factors drink and drive cases, people not wearing helmets or not taking any other precautionary measures have also added to the causation of maxillofacial injuries. Zygomatico maxillary complex fracture has been an easy target amongst all of the maxillofacial injuries due to its prominent anatomy on whole of the facial region and also it's the second most common region from amongst the facial fractures. Worldwide the fracture to the facial regions are more common in males, the ratio may vary widely but males are more prone to maxillofacial trauma due to RTA, assaults, sports and war. Bakardjiev and Pechalova from Bulgaria reported a male to female ratio of 4.6:1. In China, the male to female ratio reported after a maxillofacial injury by Zhou and coworkers in 2013 was 3.35:1. Arslan et al from Turkey reported 2.8:1 male to female ratio.In our present study it was observed that out of 102 people diagnose with facial fractures only 9 (8.82%) were females while other 93 (91.17%) were male individuals. This shows that the ratio of male to female in facial fractures came out to be 10.3:1 which implies that there is a great difference in the ratio of males to females for maxillofacial injuries which may be due to greater percentage of male individuals prefer to drive the vehicle than the female individuals. Also it implies that males indulge in more of physical assaults, sporty accidents, and occupation related incidents than females. The present study also shows that out of 102 individuals, 33 of them had Midfacial fractures and were diagnosed to be having neurosensory disturbances with infraorbital nerve. Amongst the 33 people, only 1 female was observed to be having injury to the infraorbital nerve. The most common age groups affected were in the range of 22-31 years of age which accounts for almost 42.42 % of the total diagnosed with infraorbital nerve injuries. After that the second most age group affected were in the range of 42-51 years of age which accounts for about 21.21%. The mean age and standard deviation was observed as 27.34±2.17 with a range of 12-71 years.Also it was observed from the present study that out of 102 patients 85(83.33%) patients diagnosed with facial fractures had the causation of injury as road traffic accidents which accounts for almost 83.33% of all the etiological factors. This implies that road traffic accidents due to motorcycle and car accidents are on the rise in INDIA.Nerve injury following any accidental trauma may or may not be present along with various pathophysiology such as compression of the nerve, ischemia, nerve traction, physical nerve damage, pressure and inflammation. This could result in sensory neuropathy and damage in motor functioning of the involved nerve of the areas to which the nerve supplies both in the pre-operative and post-operative phases of trauma. A study from Iran assessed the sensorimotor nerve damage in patients with maxillofacial trauma and found that infra-orbital nerve damage was the second most common nerve damaged after trigeminal nerve. In

our study only ZMC fractures were analyzed and the infraorbital nerve that supplies mainly this area were assessed along with its functional nerve recovery if it as damaged. It was observed that out of 33(32.35%) patients diagnosed with infraorbital nerve injury, 6 (18.18%) were of them had paresthesia, 27(81.81%) had dysesthesia and 0 patients were having anesthesia. The results of the study are in agreement with other recorded incidence of infra-orbital nerve injury following ZMC fractures ranging from 18-83% in a study from Israel and 58 to 94% from India.[9]Open reduction and internal fixation is one of the most used and preferred method of fixation with desirable results. De Man and Bax from Netherlands stated that reduction and fixation were important factors in the recovery of sensory disturbances of the infraorbital nerve. Vriens and Moos also reported that open reduction and internal fixation had a better prognosis to infraorbital nerve recovery.Acute loss of sensory function following orbitozygomatic complex fracture is also a major complication due to its close proximity to orbitozygomatic complex as it passes through the infraorbital sulcus in the floor of the orbit to exit through the infraorbital foramen. The incidence of long-term neurosensory deficits in different studies varies from 10% to 50% (Lund, 1971; Momma and Pfeifle, 1975; Waldhart, 1975; Altonen et al., 1976; Hardt and Steinhiiuser, 1976; Nordgaard, 1976; Reuther et al., 1976; Tajima, 1977; Larsen and Thomsen, 1978; Finlay et al., 1984; Kristensen and Tveteras, 1986; Jungell and Lindqvist, 1987; de Man and Bax, 1988; Souyris et al., 1989; Zachariades et al., 1990; Rohrich and WatumulI, 199l ; Zingg et al., 1991; Taicher et al., 1993). Sequelae of orbitozygomatic complex fractures include effects on the orbital contents and facial aesthetics and are an indication for surgical treatment. Sensory disturbances in the distribution of the infraorbital nerve are almost always present in orbitozygomatic fractures (Rowe, 1985). The vast majority of patients will have neurosensory deficits in the function of the infraorbital nerve initially following orbitozygomatic complex fractures, because in 95% of orbitozygomatic fractures the fracture line involves the infraorbital foramen (Schilli, 1990).In the study conducted by Jungell and Lindqvist (1987) on 68 patients with zygomatic complex fractures, 9 patients (13.2 %) underwent surgery to the nerve and 6 patients experienced some improvement. In another study, results from neuromicrosurgery to the infraorbital nerve indicate a high degree of successful regeneration, with complete return of sensation in the distribution of the infraorbital nerve in 6 out of 7 cases (Mozsary and Middleton, 1983).In cases with a zygoma fracture who were treated only by bone elevation, 49% of all cases have permanent damage of the infraorbital nerve and at the same time > 50% of these patients have re-displacement of the zygoma as reported by Schindelhauer (1990). With regard to fixation of unstable zygomatic fractures in relation to sensory recovery of the infraorbital nerve, miniplate osteosynthesis is recommended as opposed to wire fixation in all unstable zygomatic bone fractures where there is displacement (De Man and Bax, 1988).The incidence of postoperative infraorbital nerve sequelae is diminished by 50 % in unstable zygomatic fractures when treated by osteosynthesis with miniplates (Champy et al., 1986). IN our present all of the 33 patients who were diagnosed with infraorbital nerve injury were treated for open reduction internal fixation and it was observed that the recovery of neurosensory disturbances were recovered within 1 week or at the most 1 month of the treatment.This gives a clear indication that open reduction internal fixation of the Midfacial fractures, orbitozygomatic complex fractures or zygomaticomaxillary complex fractures should be performed in patients who were diagnosed with infraorbital nerve injury no matter whether having displaced or undisplaced mid facial fractures.

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