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Factors affecting pattern of zygomatic arch fractures in patients with Craniofacial trauma: An institutional study in a teritiary care hospital

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Introduction: Facial trauma deserves prompt attention because of its enormous functional and cosmetic importance**.** Aim of the study was to study the causes and treatmentof patients admitted with Zygomatic fractures and to evaluate the pattern for surgicaltreatment . To highlight on the indications for closed and open reduction.

Material and Methods: This is a prospective study which was done on 32 patients over a period of 20 months. Patients with isolated zygomatic fractures, both sexes and all age groups were included.

Results: This study encompassed a total number of 32 patients with Zygoma fractures 30(96.15%) patients were Male and 2 (3.85%) patients were Female with Male to Female ratio of 26:1. Most common age group involved in this study was 20-30years (57.69%). Most common risk factors identified in this study was Road traffic accidents which accounted for majority of the cases (83%) followed by interpersonal violence cases (10%) and accidental falls (7%). In our study out of 32 Zygomatic bone fractures. The most prevalent fractures were on right side. In our study the commonest presenting feature is subconjuctival haemorrhage (92%) followed by circum orbital echymossis (90%), Trismus (61%), malar flattening (60%) and numbness in the infra orbital nerve distribution (5%). In our study 18 patients underwent closed reduction by Gilles method and 10 patients underwent open reduction and internal fixation with miniplates and screws. 2 patients were treated with both Gilles elevation and ORIF. Zygomatic Arch fractures were 18 and Zygomatic comlex fractures were 12 Single point fixation was done in 17 patients at Zygomaticomaxillary buttress and 3 patients had 2 point fixation at ZygomaticoMaxillary and Zygomatico Frontal sutures. Single point fixation in the ZM area in Zygomatic complex fractures can avoid unsightly scars and give high satisfaction with surgical outcomes in selected patients with fracture displacement.

Conclusion: It was concluded that the high frequency of Zygomatic fractures due to RTA in our population highlights the need for the strict enforcement of traffic rules and regulations. In view of the avoidable morbidity and mortality due to inadequate treatment, we advocate the establishment of regionalized, efficient, and focused trauma centers in various parts of the state particularly for acute trauma

Introduction:

The maxillofacial region occupies the most prominent position in the human body and rendering it vulnerable to injuries quite commonly. Maxillofacial injuries are commonly encountered in the practice of emergency medicine and are often associated with high morbidity resulting from increased costs of care and varying degrees of physical, functional and cosmetic disfigurement. The etiology of maxillofacial injuries varies from one country to another and even within the same country depending on the prevailing socioeconomic, cultural and environmental factors, so also the management. This study aims to see the patterns of Isolated Zygomatic bone fractures and their management. The common etiologies of Zygomatic fractures, across the world, are road traffic accidents, falls, assaults, firearm injury, sports and industrial accidents. Road traffic accident is reported to be the leading cause of Zygomatic fractures in developing countries while interpersonal violence is the leading cause in developed countries. The causes and pattern of Zygomatic injuries reflect trauma patterns within the community and, as such, can provide a guide to the design of programs geared toward prevention and treatment. Maxillofacial injuries involve soft and hard tissues injuries of face extending from frontal bone superiorly to mandible inferiorly and vary from soft tissue lacerations to complex fractures of Maxillofacial skeleton.The pattern of these injuries depends on the mechanism of injury, magnitude and direction of impact force and anatomical site. Multiple trauma is a medical term used to describe a condition of a patient who sustained poly trauma and is defined by injury severity score equal to greater then 16. In the developing countries the most common cause of such injuries are road traffic accidents while as in the developed countries the cause is violence followed by fall and other reasons. Injuries and violence are the leading cause of mortality worldwide. A Substaintial portion of these injuries involve maxillofacial region[2]. Such injuries can often result in unrecoverable brain damage. Patients with maxillofacial trauma are at increased risk for head injuries due to close anatomic proximity of the facial skeleton and cranium. Varying rates of head injuries associated with maxillofacial fracture have been reported in studies; a rate as high as 86 % has been noticed in some [2,3]. Brain injuries can occur at the site of impact but can occur on the opposite side as well due to countercoup effect. If the injury caused the movement of head the severity of injury may be worsened because the brain may richochet inside the skull causing additional impact. Types of brain injuries includes: traumatic subdural hematoma, a bleeding below the dura mater which may develop slowly; traumatic epidural hematoma, bleeding between the dura mater and the skull; traumatic subarachnoid hemorrhage; brain contusion, a bruise of the brain; concussion, a loss of function due to trauma; diffuse axonal injury that may lead to coma or death; Shaken baby syndrome, a form of child abuse.

Timely recognition of head injuries is an important part of initial assessment and treatment planning in maxillofacial trauma patients which can significantly minimize morbidity and mortality associated with such fatal injuries.

Study was aimed to assess the causes and management of patients admitted with Zygomatic fractures evaluate the protocol for surgical management and to emphasise on the indications for closed and open reduction.

Material and Methods:

This is a prospective study which was done on 32 patients with zygomatic fractures admitted in department of Maxillofacial Surgery, GMC baramulla over a period of 20 monthsInformed consent from the patients and ethical clearence from the institute was taken before the start of the study.

Inclusion Criteria: Patients with isolated zygomatic fractures, both sexes and all age groups were included.

Exclusion Criteria: Patients with other associated fractures were excluded.A detailed history with respect to sex, age, aetiology, nature and type of injury and fractures of the Zygomatic region their management and complications were analyzed. Fractures of the Mandible, Maxilla, Nasal bones and pan facial fractures and fractures of the orbit and frontal bones are excluded from this study. Diagnosis was based on detailed history and a thorough clinical examination, confirmed by radiographic investigations like digital x-rays, OPG, CT scan

Statistical analysis was performed using descriptive analysis, Pearson's chi-squared test, Fisher's exact test, and the Student's t-test, as applicable. A p-value of less than 0.05 was considered statistically significant. Odds ratios and 95 % confidence intervals were calculated to analyze relationship of different variables to cranial trauma. It was also followed by logistic regression analysis to obtain the predictive ability of any variable in the presence of other factors.

RESULTS

This study encompassed a total number of 32 patients with Zygoma fractures 30 (96.15%) patients were Male and 2 (3.85%) patients were Female with Male to Female ratio of 26:1. Most common age group involved in this study was 20-30years (57.69%) followed by 31-40 years (26.92%), least No. of cases recorded in above 50 years age group (5.76 %) and the patients age group ranged from 20 to 65 years. Most common risk factors identified in this study was Road traffic accidents which accounted for majority of the cases (83%) followed by interpersonal violence cases (10%) and accidental falls (7%). In our study out of 32 Zygomatic bone fractures. The most prevalent fractures were on right side. In our study the commonest presenting feature is subconjuctival haemorrhage (92%) followed by circum orbital echymossis (90%), Trismus (61%), malar flattening (60%) and numbness in the infra orbital nerve distribution (5%).In our study 318 patients (61.53 %) underwent closed reduction by Gilles method and 10 patients (38.47%) underwent open reduction and internal fixation with miniplates and screws. 2 patients were treated with both Gilles elevation and ORIF. Among studied patients two patients had persistent paraesthesias in infra orbital nerve distribution. In our study out of 32 patients with zygoma fracture 30 are males and 2 are female with M:F ratio of 26:1.

In our study most common age group involved in the Zygomatic fractures was in the 2nd decade (57.69%) of life followed by 3rd decade (26.92%). In our study most common aetiology for zygomatic fractures was assaults followed by RTA and accidental falls. In our study 32 patients with Isolated Zygomatic arch fracture was most prevalent. In our study right side fractures are more common than left side fractures. In our study Out of 32 patients with Zygomatic fractures, Isolated fracture of the Zygomatic arch was found to be most prevalent.

In our study most common clinical features are subconjuctival haemorrhage followed by circum orbital ecchymosis, Trismus and Malar flatenning**.** Out of 32 Zygoma fractures in our study, 18 patients were treated by closed reduction (Gilles method) and 10 patients by open reduction and internal fixation.

Age in Years	**No. of Patients**	**Percentage**
20-30	18	57.69 %
31-40	8	26.92 %
41-50	5	9.61 %
51-60	1	1.92 %
61-70	0	0
Anatomical Location		
Isolated Zygomatic Arch	18	56.25
Zygomatic Complex	14	43.75
Total	32	100%

Table-1: Shows age distribution, anatomical location, method of fracture reduction

Figure-2: Shows clinical features in zygoma fractures.

ORIF 38.46%

Closed Reduction 61.54%

Gilles reduction	18	51.92%
ORIF Single point fixation	2	32.69%
ORIF Two point fixation	2	15.39%
Total	32	100%

Table-2: Anatomical site of fracture

DISCUSSION

This was an prospective, clinical study carried out on 32 patients, with Zygomatic fractures. A detailed history and examination with respect to sex, age, aetiology, nature and type of injury and clinico-symptomatology, management and complications were analysed. In our study there is clearly male predominance (96.15%) with a male to female ratio of 26:1, it is in concordance with the study of Yahya A. Ali[1] (82.60%), Ozay ozkaya[2] (75.5%), Kamulegeya A[3] (88.6%), Phillipo L Chalya et al[4] (72.7%), Chandra Sekhar BR (83%) and also with other studies Males are at greater risk due to their greater participation in high risk activities which increases their exposure to risk factors such as

driving vehicles and social life. In our study most no of zygoma fractures occurred in the age group of 21-30years (57.69%), it is similar to the study done by Suneel kumar Punjabi et. al[5] (45.15%) and Col PK Chattopadhyay et.al[6] and Qadeer-ul-hassan et.al[7] (47.6%).

In this study patients (51.92%) were reported due to inter personal violence, which is the most common cause in our study, it is similar to Z.Haider et al[10] and much higher than Chandrasekhar BR (16.3%), Philipo L Chalya et al[4] (16.2%), Bernardo Ferreira Brasileiro et al[8] (22.6%), Jefferson Viapiana Paes et al[9] (14.9%). The most likely explanation to this increase in fractures due to fist fights might be a reflection of the prevalence of violence in todays society.[10] In this study assaults were associated with fights under influence of alcohol, poverty. The present study shows that the second common cause of maxillofacial injuries was Road traffic accidents[10,11] (42.30%) was in consistent with other study.[12] The increasing number of RTA's in developing countries like INDIA may be attributed to many factors like sharing of road ways by pedestrians and animals with fast moving and slow moving vehicles on road, low driving standards, large number of over loaded buses and autos responsible for increasing RTAs in recent times. Driving under the influence of alcohol was contributing to high no of admissions with facial fractures which are reducing over weekends due to strickter implementation of law.

In our study falls (5.78%) were the third most common risk factor. It is similar to Ozay Ozakaya et al[2] (12.3%) Chandrasekhar BR (13.6%), Philipo L Chalya et al[4] (14.3%), Bernardo Ferreira Brasileiro et al[8] (17.9%). In all the above studies falls was the third most common cause. In our study the majority of zygoma fractures are due to assaults (51.92%), compared to the study done by Col PK Chattopadhyay et.al (80%) by Atta-ur-Rehman et al[12] (76.5%) zahur qayyum et al[13] (52.5%), suneel kumar Punjabi et al[5] (50%). In our study right side (51.92 %) fractures are more than left side (48.07%), this is more than that in Z. haider et al[10] (42.59%) similar to study done by suneel kumar et al (Rt 55%, Lt 45%). In our study Isolated Zygomatic arch fractures were higher 51.92% compared to 10.51% in Petrus Pereira Gomes et al.[17]

Gilles technique was used to elevate Zygomatic fracture in 61.54% of patients compared to 95.3% in P.Mcloughlin et al.[14] There was infraorbital nerve hypoaesthesia in 8% of patients with Zygomatic complex fractures compared to 10% in Rafael et al.[15] There was complete recovery in these patients by 6 weeks. Closed reductions of zygoma fractures were done in 61.54% of patients Knight and North type II, and ORIF was done in Knight and North Group IV and V in 48.08% in our study. The threshold for fixation of displaced Zygomatic complex was slightly higher (80% operated) compared to P.Mcloughlin et al 75%.[14] There were two patients with Diplopia which improved after release of entrapped muscle by open reduction compared to Tymour Fourazanfar etal where Orbital floor reconstruction was needed. Single point fixation was done in 17

patients at ZygomaticoMaxillary buttress and 3 patients had 2 point fixation at Zygomatico-Maxillary and Zygomatico-Frontal sutures.[15-18] Satisfactory alignment was noted in moderately displaced fractures Knight and North Group IV fractures with even single point fixation. Over all complication rate (wound infection) in 20 patients treated by Open reduction and internal fixation was 5% compared to 8.6% in study by Robert Chuong etal.[16] Among studied patients with Isolated Zygoma fracture 2 patients had infraorbital nerve paraesthesias which settled by 6 weeks. One patient with Group II Knight and North classification had mild Malar flattening post op but patient was not keen to pursue surgery. Post operatively patients were followed up in out patient clinic for upto 12 weeks.

CONCLUSION

The high frequency of Zygomatic fractures due to RTA in our population highlights the need for the strict enforcement of traffic rules and regulations. Also there is the need for repair of bad roads and the resuscitation of the rail transport system as an alternative to road transport for man and goods. In view of the avoidable morbidity and mortality due to inadequate treatment, we advocate the establishment of regionalized, efficient, and focused trauma centers in various parts of the state particularly for acute trauma.

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