ORIGINAL ARTICLE

# ASSESSMENT OF CERVICAL SPINE INJURIES ASSOCIATED WITH MAXILLOFACIAL TRAUMA

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## ABSTRACT

*The objective of the study was to determine the frequency of cervical spine injuries in maxillofacial trauma patients & the type of maxillofacial trauma. This cross sectional study assessed the frequency of cervical spine injuries and pattern of maxillofacial injuries seen at the Liaquat University Hospital, Hyderabad, Pakistan from January 2015 to December 2015. A total of 169 patients of both genders (male and female) formed the study group. Their age ranged 10 to 60 years with mean age 33.43±12.09 years. 101 were males and 68 were females. Road traffic accidents were the leading cause (46.15%) while assault represented (25.44%). 37% were pan facial fractures. 11 were Lefort I, 21 Lefort II, 19 Lefort III, 34 Zygomatic Bone Complex and 8 were Naso-ethmoid. Regarding anatomical location of mandibular fractures, 21 occurred at condyle, 4 at ramus, 59 at angle, 54 at the body, 49 parasymphysis, 43 symphysis, and total 7 cases were with cervical spine injury. Road traffic accident was the major cause. Mandibular fracture has been the most common maxillofacial fracture. Cervical spine level C2 (3) fractures were the most common associated injuries with maxillofacial trauma. Prompt recognition is of prime importance, as repair of facial injuries in the presence of occult cervical spine injury or fractures may exacerbate the injury.*

**Key Words:** *Frequency, Cervical Spine Injuries, Maxillofacial Trauma.*

## INTRODUCTION

Life-threatening injuries to the head and cervical spine with devastating consequences cannot be missed by reconstructive surgeons during evaluation of facial trauma.[1] Those anguish high velocity injuries, such as motor vehicle accidents, are supposed to be at greater risk for cervical spine injuries vs. low velocity trauma to the head and neck region.[2] Facial trauma customaries as injuries with increased risk for parallel cervical spine or spinal cord injury.[3] The existence or nonexistence of a cervical spine injury has significant inference in trauma patients, persuading airway management methods, selection of diagnostic imaging studies, surgical approach, and timing for repair of associated facial fractures.[3]

Though cervical spine injury is seldom coupled with maxillofacial fracture, it should be alleged when injuries exceed the clavicle bone, as recommended in Advanced Trauma Life Support Manual.[4] Prompt recognition of cervical fractures is of prime importance, as repair of facial injuries in the presence of occult cervical spine injury or fractures may exacerbate the injury.[5] Hence, a detailed cervical spine evaluation is necessary when there are maxillofacial trauma. Moreover, management of cervical spine injuries takes precedence over repair of facial injuries, and failure to diagnose such injuries carries a considerable risk of causing major abnormalities and even death.[5]

It is acknowledged that there is an incidence of cervical spine injury in the presence of facial trauma of 1.3-4%.[6,7,8] nonetheless, when the facial injuries examined, they were restricted to those protracted in road traffic accidents (RTA), the figures for parallel cervical spine injury increases to 5.5%.[8] There have also been reports of cervical spine injuries being diagnosed after maxillofacial surgery. The overall incidence of

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cervical spine injury was 3.69%. The vast population of patients anguish cervical spine injury was related with automobile accidents, moreover a passenger or driver in motor vehicle 58% or walker 21% struck during an accident; the lingering injuries were the consequences of falls, assault and industrial accidents.[6,7,9]

Prompt recognition of cervical fractures in patients with facial fractures is of prime importance, as failure to diagnose such injuries carries a significant risk of causing neurologic abnormalities, long-term disabilities, and decease. The aim of the present study was to determine the different patterns of combinations of maxillofacial and cervical spine (C-spine) injuries to provide guidance in diagnosis and care of patients with combined injuries.

Although studies have been done globally but the data is lacking particularly with regard to this study in this country, so present study will positively contribute towards the availability of local data and will also be helpful in the treatment planning and management of maxillofacial trauma patients with associated cervical spine injury.

## METHODOLOGY

This cross sectional study was carried out from 1st January 2015 to 31st December 2015 among patients seen at Oral and Maxillofacial Surgery Department and Emergency Department of Liaquat University Hospital, Hyderabad/Jamshoro, Pakistan. An informed consent was taken from the study subjects before enrolment in the study. Patients of both genders between 10 to 60 years of age with signs and symptoms (Clinically and Radiological) evident of maxillofacial trauma and cervical spine injury were included. Patients with malunited fractures and patients associated with upper limb or lower limb skeletal injuries were excluded.

The cause of injury was divided into RTA, assaults, falls, and sport injuries. Pattern / type of maxillofacial fractures was diagnosed and classified as mandible fractures, dento-alveolar, Lefort I, Lefort II, Lefort III, Zygoma, Orbital fracture, Naso-ethmoid fracture and frontal bone fracture. The mandibular fractures further classified as Symphysis, Parasymphysis, body, angle, Condylar, coronoid and ramus.

Diagnosis of Cervical spinal injuries were confirmed by clinical presentation and radiographic evaluation with or without neurologic deficits, the commonly radiographs were included orthopantograms, Para-nasal sinuses view, posterio-anterior views of the mandible, lateral and anterio-posterior views of cervical spine and where appropriate Computerized Tomography. All demographic, clinical history and relevant information were included in a structured Proforma by the researcher himself.

Data compilation and analysis were done using statistical package for social sciences (SPSS). Quantitative variable i.e. age was presented as mean±SD. Frequencies and percentages were calculated for qualitative variables i.e. gender, age groups, causes of fracture, type of fracture, anatomical location of middle third fracture, and anatomical location of mandibular fracture.

## RESULTS

A total 169 patients among them 101 were male and 68 were female patients. The age ranged from 10 to 60 years. Table 1 represented the frequency distribution of gender and age groups. The mean age of study subjects was 33.43±12.09 years.

Road traffic accidents was the foremost common cause 46.15% (n=78) while assault represented 25.44% (n=43) followed by fall 20.71% (n=35), Firearm injuries (FAI) 2.95% (n=5), Sports 4.7% (n=5). Out of total study subjects, 37% were pan facial fractures and the rest 63% were isolated fractures.

Regarding anatomical location of middle third fractures, 11 were Lefort I, 21 Lefort II, 19 Lefort III,

TABLE 1: AGE GROUP DISTRIBUTION ACCORDING TO GENDER

| Total (n=169) | | Frequency (n) | Percentage |
|---|---|---|---|
| Gender | Male | 101 | 60.0 |
| | Female | 68 | 40.0 |
| Age groups | 10-20 | 27 | 15.97 |
| | 21-30 | 51 | 30.17 |
| | 31-40 | 44 | 26.0 |
| | 41-50 | 26 | 15.38 |
| | 51-60 | 21 | 12.42 |

TABLE 2: ANATOMICAL LOCATION OF MIDDLE THIRD AND MANDIBULAR FRACTURES

| Total (n=169) | | Frequency (n) |
|---|---|---|
| Anatomical Location of Middle Third Fractures | Lefort-I | 11 |
| | Lefort-II | 21 |
| | Lefort-III | 19 |
| | Zygomatic Bone Complex | 34 |
| | Naso-ethmoid | 8 |
| Anatomical Location of Mandibular Fractures | Symphysis | 43 |
| | Parasymphysis | 49 |
| | Body | 54 |
| | Angle | 59 |
| | Condyle | 21 |
| | Ramus | 4 |
| | Coronoid | 2 |

TABLE 3: DISTRIBUTION OF CERVICAL SPINE INJURIES LOCATION DEPENDING UPON THE ETIOLOGICAL AGENT

| Etiology | Percentage | C Spine Injury | Percentage |
|---|---|---|---|
| Road Traffic Accidents | 46.15% | 04 | 2.36% |
| Assault | 25.44% | 01 | 0.59% |
| Fall | 20.71% | 02 | 1.18% |
| Firearm Injuries | 2.95% | 00 | 00% |
| Sports | 4.7% | 00 | 00% |

TABLE 4: MAXILLOFACIAL INJURIES AND DISTRIBUTION OF CERVICAL SPINE INJURIES LOCATION

| Maxillofacial Trauma | Cervical Spine Injuries |
|---|---|
| Mid Face Trauma | 03 |
| Mandibular Trauma | 04 |

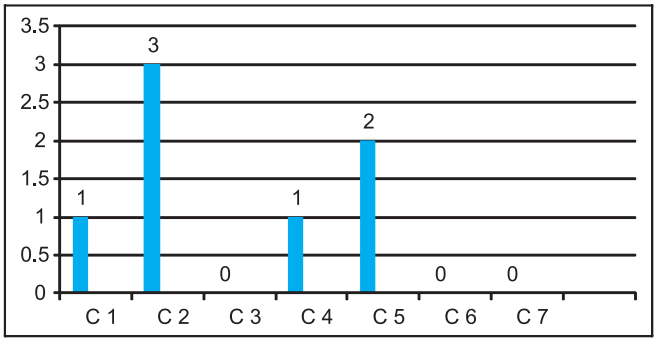


Fig 1: Anatomical locations of c spine fractures

34 Zygomatic Bone Complex and 8 were Naso-ethmoid. Regarding anatomical location of mandibular fractures, 21 occurred at condyle, 4 at ramus, 59 at angle, 54 at body, 49 parasymphysis, 43 symphysis, and about cervical spine injury as shown in Table 2. Fig 1 represented the distribution of anatomical locations of C Spine fractures. Table 3 represented the distribution of Cervical Spine injuries location depending upon the etiological agents. Table 4 represented the maxillofacial injuries and distribution of Cervical Spine injuries location.

## DISCUSSION

Cranio-maxillofacial injuries have long been documented as a risk factor for cervical spine injuries. İts occurence, along with any consequetional characterization of facial trauma prototype, mechanisms of trauma, location of injury, and management, however, have been feebly defined and remain vague. Abundant information has materialized in the journalism over the past some decades with varying reports of differing numbers. Various studies centralized the meticulous types of facial trauma or group all facial injuries altogether.[10]

Rarely , cervical spine injuries are of great interest to maxillofacial surgeons, as the neck is frequently mobilized during anesthesiology procedures to certain airway patency in patients undergoing surgery and during procedures to condense facial fractures.[10] Hence prior to these procedures the condition of the cervical spine must be cleared in patients with maxillofacial trauma. In road traffic accidents there is greater occurrence of cervical spine injuries associated maxillofacial fractures.[6,11,12]

Although Jamal BT et al, claimed that fall was the most frequent cause of C-spine injury with facial fractures and C spine level 2 fractures remained the most common fracture with facial fractures accounting for 45.5% of the injuries.[5] Hackl et al studied 4,907 patients with cervical spine injury and observed that 2.1% of them had suffered a concomitant facial injury.[6] With increasing severity of cervical spine trauma, the risk of facial injury increased. The prevalence of C spine injuries in facial trauma patients was reported to be less than 10% of all cases, with an average of 3% to 4%.[6,13,14] As Robertson et al reported, cervical spine injuries are frequent in car accidents than in motor bike accidents, which are commonly related with thoracic or lumbar spine injuries.[15] Babcock stated that the stresses requisite to fracture the cervical spine emerge to be directed towards the upper third of the face.[16] Lalani Z et al, and Peled M et al depicted a distinctive cervical spine injury model in association with the maxillofacial fracture area. They deemed that injuries to the upper part of the cervical spine are related with trauma of the lower third of the face, mainly mandibular fractures, whereas trauma to the lower part of the cervical spine are linked with fractures of the middle third of the face.[3,17] Jamal BT et al Confined his study to cervical spine fracture related with mandibular injuries and noted 2.6 percent incidence from 424 patients and 90 percent of cervical spine injuries occurred at the C1 to C2 and C5 to C7 sites. 5 Merritt RM et al reviewed 1750 facial trauma patients over a 10-year period and diagnosed 32 cases associated with cervical spinal injuries, for a frequency of 1.8 percent.[18]

A thorough clinical examination will elicit suspicious signs of an injury that would warrant further radiographic evaluation. Although C-spine imaging should be done in emergency departments to rule the injuries at immediate basis which may decrease the morbidity of trauma patients.

## CONCLUSION

Maxillofacial trauma can occur at any age in amplified social settings. Maxillofacial fracture treatment

is challenging sometimes in emergency room. Proper diagnosis of concomitant non facial injuries and there patterns are important for emergency management. Coupled injuries with maxillofacial fractures could be life-threatening if not noticed promptly and managed proficiently. Absence of allied injuries could be missed due to improper diagnosis. Maxillofacial poly-trauma patients need a coordinated, integrated team approach for the best management and outcome.

It was concluded that most of the patients were young adults. Road traffic accident was the major cause of these injuries. Mandibular fracture has been the most common maxillofacial fracture. Cervical spine C 2 level fractures (n=3) were the most widespread associated injuries in maxillofacial trauma patients.

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| **2 Abdul Rauf Memon** | Data collection/results |
| **3 Syed Mustansir Hussain Zaidi** | Proof reading / editing |
| **4 Priya** | Discussion/conclusion. |