



THE INFLUENCE OF HELMETS AND PATTERN OF MAXILLOFACIAL TRAUMA IN ROAD TRAFFIC ACCIDENTS: A PROSPECTIVE STUDY

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ABSTRACT

The leading cause of facio-maxillary injuries is road traffic accident which is either low or high velocity trauma. This study analyzes the pattern of facio-maxillary trauma in motorcyclists involved in RTA's and the efficacy of various helmets in preventing facio-maxillary injury.

This descriptive cross sectional study was conducted in Government Rajaji Hospital, Madurai from January 2016 to January 2018. All patients with facio-maxillary injury from 2 wheeler RTA's were included in the study. The data collected were patient demographics, type of injury, pattern of fracture in facial bones, type of helmet and subsequent management of fractures.

A total of 336 cases were included in this study of which only 36 patients wore helmet. The most common pattern of facio-maxillary injury was "lower face injury". The most common age group involved was "21 to 30" with a male predominance. The pattern of injury was predominantly low velocity trauma with an average speed of 50-60km/h. Most common isolated bony injury was fracture of mandible. All types of facial fractures were remarkably low in patients who wore full-face helmet. Open face helmet offers no protection against facial injury. Fracture mandible is the most common facial fracture in patients wearing helmet. Educational campaigns and use of appropriate helmet is necessary to decrease the number of facial injuries in such accidents.

KEYWORDS : Faciomaxillary injury, Helmets, Road traffic accident, Facial fractures

INTRODUCTION:

The incidence and pattern of maxillofacial fractures varies depending on prevailing geographical, social, cultural and environmental factors¹. In developing countries and western world, road traffic accident and inter personal violence are the most common causative factors^{2,3}. Road traffic accident is an unplanned event occurring suddenly, unexpectedly and inadvertently in an unforeseen circumstance⁴.

Data from Transport Research wing under Ministry of Road Transport & Highways, Government of India, has revealed that the states of Uttar Pradesh and Tamil Nadu have accounted for maximum number of deaths in 2016, with 12.8% of total road accidents. The state of Uttar Pradesh recorded highest RTA's, followed by Tamil Nadu (11.4%). Statistics reveal a 10% increase in 2016 due to motorcycle related deaths in Tamilnadu. Chennai ranks 2nd next to Delhi in motorcycle related deaths. Chennai recorded 7,486 accidents in 2016, followed by Delhi which recorded 7,375 accidents. Speeding led to 66.5% of all road accidents and 61% of deaths, usage of cellular phones caused 5000 accidents and over 2000 deaths.

Face remains the most exposed part while riding two-wheelers. Facial trauma includes skeleton components, dentitions as well as soft tissues of the face. Concomitant injuries involving the head, chest, limbs and spine are common in high velocity trauma^(4,7,8).

Motorcycles remain the preferred/affordable mode of transportation in lower and middle socioeconomic classes. With introduction of high speed motorcycles reaching a 100-120km/hr the rates of RTA related morbidity has escalated. Despite stringent rules being implicated on wearing compulsory helmet, people still ride without helmets. Contributory factors in road traffic accidents include⁽⁸⁻¹⁰⁾

1. Rash and negligent driving
2. Use of alcohol & drugs
3. Mobile phones usage
4. Excessive speeding
5. Not wearing protective gear
6. Fatigue
7. Poor road conditions & poor light

Although the efficacy of helmet use on the reduction of head injuries during motorcycle accidents is well known, the impact of

their use on facial injuries is not well documented. The aim of our study was to analyze the pattern of maxillofacial injuries among different types of helmet users, influence of helmet on the pattern of maxillofacial trauma, and to study the effectiveness of each type of helmet.

METHODS:

This cross-sectional and prospective study was done in the Department of Plastic Surgery, Government Rajaji Hospital, and Madurai from August 2015 to January 2018. Detailed history was taken from patients and attendants regarding place, mode of accident and possible cause of accident. Information was obtained from clinical notes, surgical records of each patient using a standardized data collection form that was specifically developed to investigate the epidemiologic features of maxillofacial trauma. Detailed clinical examination of the patient was done and findings noted in a proforma. Computed tomography with 3-dimensional reconstruction of the facial bones was done for all patients with facial injury. Final diagnosis was correlated with examination findings and radiological assessment.

The proforma includes-

1. Patient age
2. Gender
3. Diagnosis
4. Use of helmet
5. Type of helmet
6. Associated factors (Mobile/Alcohol/Speed)
7. Soft tissue lesions
8. Pattern of facial fracture
9. Mode of treatment
10. Complications

Exclusion criteria:

- 1) Patients who had concomitant head injury leading to death
- 2) Comatose patients were excluded.

The patients were classified as riders with helmet and without helmet.

The helmet worn was classified according to the type of helmet as

- full-face helmet
- open-face helmet
- Helmet with visor.

Injuries were classified as

- 1) Soft tissue injuries of face,
- 2) Skeletal injuries
- 3) Both.

The injury sites were classified as three areas of the face:

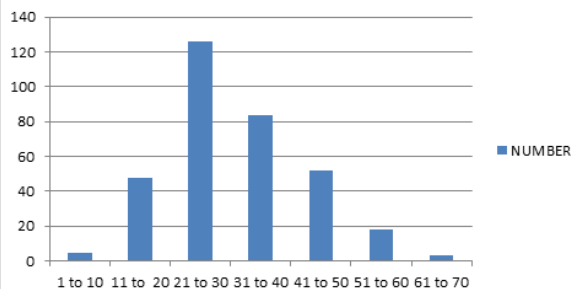
- Upper (frontal bone),
- Middle (maxilla, zygoma, zygomatic arch naso-orbito-ethmoidal, nasal)
- Lower (mandible).

Mandible fractures were divided into specific sites: condyle, ramus, angle, body, parasymphysis, symphysis and dentoalveolar. Abrasion and laceration with tissue loss were classified as soft tissue injuries. Diagrams of injuries were recorded in data sheet. Data was entered into Microsoft Excel software. Simple descriptive statistical, chi-square test and Kruskal-Wallis test was applied as appropriate. Statistical significance was inferred as $p < 0.05$.

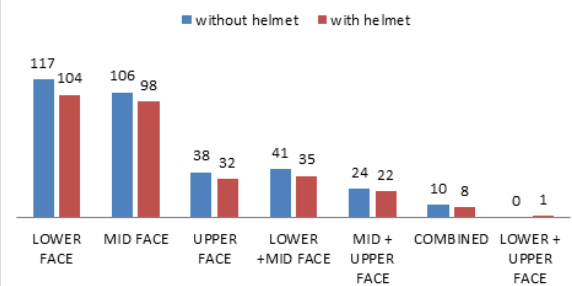
RESULTS:

A total of 336 cases were recorded in the study. Only 36 patients wore helmet. There was a male predominance with male: female ratio of 13:1. Road traffic accidents were more predominant in the 21 to 30 age group with an average of 25.4yrs. Low velocity trauma was more common than high velocity injuries. The most common isolated facial bone fracture was mandible. Combined fractures most commonly involved the zygoma and mandible. Irrespective of wearing helmet lower and mid face injuries were significantly higher. However there was 1 patient wearing full face helmet who sustained a panfacial fracture due to high velocity injury. In patients who wore helmet the most common facial bone fracture was mandible. On comparing the pattern of soft tissue injuries, post traumatic defects around the lateral canthi was more common followed by eyelid and lip injuries. Soft tissue injury predominantly involved the zone IV and V periorbital region as classified by Spinelli & Jelks. All patients with bony injuries with indications for fixation such as trismus, malocclusion, step deformity, nerve entrapment etc were treated with open/closed reduction with/without maxillo-mandibular fixation. Fracture floor of orbit with rectus entrapment and diplopia was reconstructed using conchal cartilage or rib cartilage. Attempts to repair soft tissue injuries under local anesthesia were made in the trauma ward. Larger defects were treated with skin graft/flap. There was one case of globe injury combined with panfacial fracture and one case of facial nerve injury.

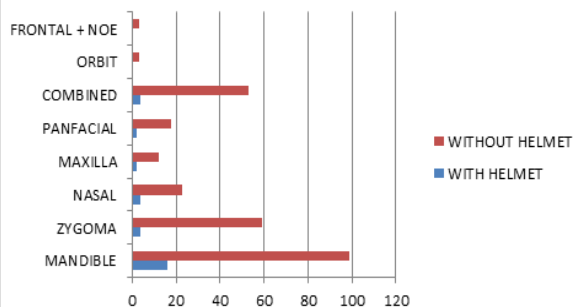
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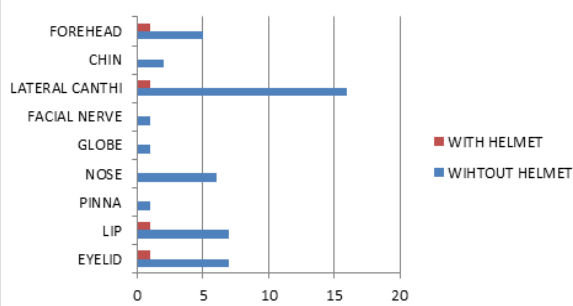
PATTERN OF FACIAL INJURY



PATTERN OF FRACTURES



SOFT TISSUE INJURIES



DISCUSSION:

The common causes for facial injuries are:

- 1) Road traffic accidents
- 2) Domestic violence
- 3) Work-spot injuries

The leading cause of facial bone fracture is RTA. Though strict rules on wearing helmets have been made mandatory, people wearing helmets are significantly low. Young males suffer facial injuries more as a result of rash and negligent driving combined with the non-compliance to wear helmet^{4,5}. Most of the patients belong to the age group of 21-30. 92.8% of cases were male patients. The rest were female patients who were mostly pillion riders. Trivedi and Seth found that 78.3 % of the fatal accidents involved males and According to Tavis et al overall male to female ratio is 4:3.

In our study of 336 cases, only 36 patients had worn helmet during the time of accident. 25 patients had worn open face helmet which is ineffective in protecting from facial injuries. Fractures of both zygoma and mandible are significantly more in patients irrespective of wearing head gear. Isolated fractures of mandible were significantly higher in our study.

On analyzing the pattern of injury, involvement of lower and mid face was significantly higher in the study group. In high velocity trauma and patients without helmet severe injury to the face including pan-facial fractures, globe injury and facial nerve injury was observed. Alcohol intake, poorly lit roads were additional factors contributing to the accidents.

CONCLUSION:

- Young adult males were the commonest victims of road traffic accidents.
- The youth of our country should be made aware of the safety measures to be followed while driving.
- Strict laws should be enforced against drunken driving
- Mandatory wearing of helmet to reduce facial injuries due to road traffic accidents.
- Awareness programs for the general population regarding helmet safety should be conducted by city and state authorities.
- Local governing bodies should imply stringent rules on manufacturing of standard full face helmet for safety



Figure 1 : Zone IV and V injuries



Figure 2 : Fracture mandible with malocclusion

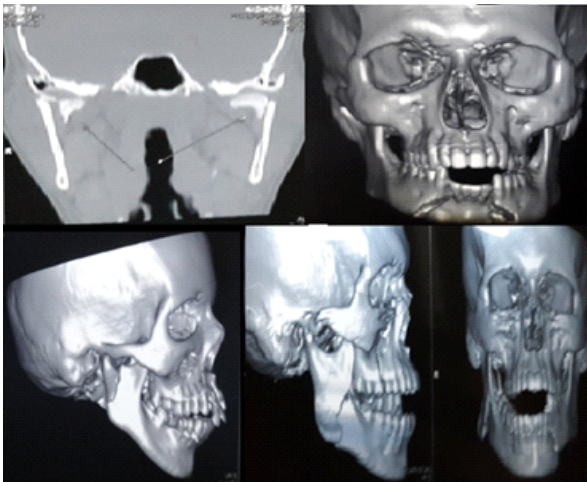


Figure 3: Fracture Mandible

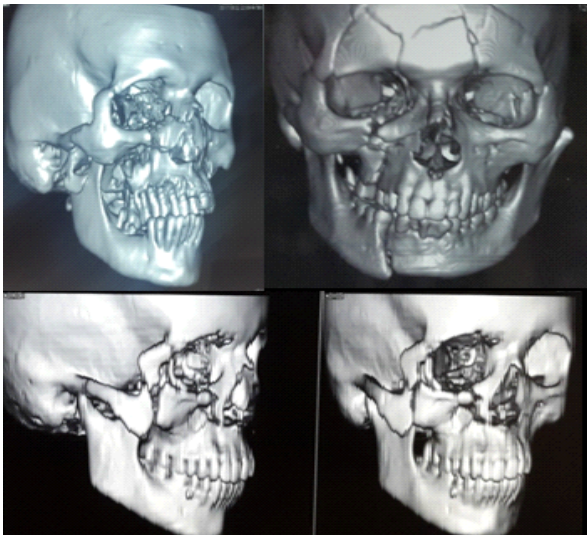


Figure 4: Fracture Zygoma-maxillary complex & Pan facial fracture

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