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## Concomitant craniospinal injuries with maxillofacial trauma – a review of 266 cases.

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### Summary.

Maxillofacial injuries are fairly common and they are usually found in association with multiple injuries. The proximity of the face to the craniospinal axis results in significant association between maxillofacial trauma and craniospinal injuries. Previous studies have enumerated this association but the injury types, classifications and influences of the concomitant injuries on the outcome of management are sketchy. In this study, road traffic accident was the commonest cause of maxillofacial and concomitant craniospinal injuries; mild closed head injuries was the commonest concomitant injury occurring in almost 60% of the cases whilst mandibular fracture was the maxillofacial injury frequently encountered. The average duration of hospitalization in patients with maxillofacial trauma and concomitant mild head injury was 19 days but it was much higher (average 34.9 days) in patients with concomitant spinal injuries. The high incidence of head injury would suggest that maxillofacial units are best cited in hospitals with functional neurosurgical services.

**Keywords:** *Maxillofacial trauma, craniospinal injuries, road traffic accident, multiply injured*

### Résumé

Les blessures maxillofaciales sont moins communes et plus souvent associées avec plusieurs plaies. La proximité de la face à l'axe craniocéphalique résulte à une association significative entre le traumatisme maxillo-facial et les blessures craniocéphaliques. Dans cette étude les accidents routiers étaient la cause plus commune des blessures maxillo-faciales et craniocéphaliques, de blessure légère de la tête était commun chez 60% des cas alors que la fracture mandibulaire était la blessure maxillo-facial plus fréquemment enregistré. La durée moyenne d'hospitalisation ayant ce genre de traumatisme maxillo-facial et une légère blessures de la tête était de 19 jours. Cependant plus élevé (34.9 jours en moyenne) chez les patients ayant une blessure de la moelle épinière. L'incidence des blessures craniocéphaliques suggère que l'unité maxillo-facial sont plus cités dans les hôpitaux ayant des services neurochirurgie fonctionnel.

### Introduction

Trauma is the leading cause of death in patients under 40 years of age and accounts for 80% of deaths between the ages of 15-24 years annually [1]. Most deaths at the scene of an accident are usually caused by non-salvageable injuries such as aortic rupture and transection of the spinal cord, while haemorrhage and head injuries are the major cause of death in those patients that eventually arrive at the hospitals [2].

The face is an exposed part of the human body and the facial skeleton is made of small and fragile bones delicately knitted together [3]. Maxillofacial injuries are therefore fairly common in most accident and emergency units and in many instances they are rarely fatal. However, deaths at the scene of accidents following maxillofacial trauma are often commonly due to concomitant cranial injuries [4]. The proximity of the face to the cranium and the neck make concomitant craniospinal injuries a common occurrence in association with maxillofacial trauma. These craniospinal injuries range from simple loss of consciousness to severe head and neck injuries, which can lead to quadriplegia, coma and death. Moreover, these concomitant craniospinal injuries may not be obvious as the attending physician in the accident and emergency department may inadvertently overlook them thereby leading to a high morbidity [5].

In most instances, it is impracticable and frequently impossible to obtain a detailed history from polytraumatised patients with severe maxillofacial trauma. Consequently the attending physician or surgeon is forced to depend heavily on physical findings and supporting appropriate investigations to arrive at a reasonable diagnosis. Since the outcome of the management of maxillofacial injuries is influenced significantly by the type and mode of management of the associated system injuries, there is the need for more awareness and comprehensive evaluation of maxillofacial injuries in the multiply injured or polytraumatised patients [6].

The high incidence of craniospinal or neurological injuries in association with maxillofacial trauma is distinct and has been documented by various authors, but the injury types, classifications and influences of the concomitant injuries on the outcome of management of the maxillofacial injuries are sketchy [3,4,7]. However, these maxillofacial injuries do not in any way influence the frequency



of concomitant injuries but the mechanism of injury constitutes the most important factor in this regard [8].

This study therefore evaluates the incidence, pattern of craniospinal injuries and the influence of the management of concomitant craniospinal injuries on the length of hospital stay in patients with maxillofacial trauma seen in a tertiary teaching hospital.

**Patients and method**

This was a prospective study of consecutive patients with maxillofacial injuries seen at the Accident and Emergency Department of the University College Hospital, Ibadan over a 5 year period (June 1997 – May 2002).

The emergency room physician had carried out initial resuscitation and routine investigations before referral to the maxillofacial unit. The data acquired included the age and sex of the patients, the aetiology of the trauma, types of maxillofacial and concomitant craniospinal injuries. Information on the duration of hospital stay was subsequently documented in 137 of the 266 patients, since the others were discharged from the Accident and Emergency department after clinical observation or against medical advice.

**Results**

During the period of study, 266 patients with various maxillofacial injuries attended the Accident and Emergency Department of the University College Hospital, Ibadan. Ninety-nine concomitant craniospinal injuries were recorded in 83 patients with maxillofacial injuries, and of these injuries 82 (30.83%) were isolated cranial while 17(6.37%) were isolated spinal injuries giving a cranial to spinal injury ratio of 5:1. In some patients there were combined cranial and spinal injuries. Mild closed head injuries occurred in 57(57.58%) patients while stable cervical injuries were observed in 12(12.12%) patients (Table 1). There were 62 males and 21 females with a male to female ratio of 3:1 and the highest incidence of craniospinal injuries 38.55% occurring in the 20-29-age range (Table 2).

**Table 1:**

| Types of craniospinal injuries  | Frequency | %     |
|---------------------------------|-----------|-------|
| Fracture base of skull          | 15        | 15.15 |
| Cerebral injuries               | 57        | 57.58 |
| Depressed skull fracture        | 3         | 3.03  |
| Other skull fractures           | 6         | 6.06  |
| Acute subdural haematoma        | 1         | 1.01  |
| Traumatic paraplegia            | 1         | 1.01  |
| Penetrating neck injuries       | 1         | 1.01  |
| Traumatic quadriplegia          | 2         | 2.02  |
| Stable cervical spine fractures | 12        | 12.12 |
| Hemiplegia                      | 1         | 1.01  |
| Total                           | 99        | 100   |

**Table 2:** Sex and age distribution of patients with craniospinal injuries

| Age range | Male | Female | Total |
|-----------|------|--------|-------|
| 0-9       | 4    | 3      | 7     |
| 10-19     | 9    | 4      | 13    |
| 20-29     | 26   | 6      | 32    |
| 30-39     | 11   | 3      | 14    |
| 40-49     | 6    | 3      | 9     |
| >50+      | 6    | 2      | 8     |
| Total     | 62   | 21     | 83    |

In this study, the commonest maxillofacial fracture associated with concomitant craniospinal injury was mandibular fracture and was found in 35(42.17%) cases. This was followed by zygomatic fracture in 22 (26.57%) and Le fort fracture in 15 (18.07%) cases (Table 3).

**Table 3:** Distribution of maxillofacial fractures with craniospinal injuries

| Maxillofacial hard tissue injuries | Frequency | %     |
|------------------------------------|-----------|-------|
| Dentoalveolar                      | 9         | 10.84 |
| Zygomatic                          | 22        | 26.51 |
| Lefort fractures                   | 15        | 18.07 |
| Nasal bone                         | 2         | 2.41  |
| Mandibular fractures               | 35        | 42.17 |
| Total                              | 83        | 100   |

Road traffic accident was the commonest aetiological factor accounting for 79.5% of the maxillofacial (and concomitant) injuries followed by falls in 7.2% of the cases (Table 4).

**Table 4:** Aetiology of maxillofacial trauma with concomitant craniospinal injuries

| Aetiology  | No Patients | Cranial |            | Spinal     |    |      |
|------------|-------------|---------|------------|------------|----|------|
|            |             | %       | injuries % | injuries % | %  |      |
| RTA        | 66          | 79.5    | 53         | 63.8       | 13 | 15.6 |
| Industrial | 7           | 8.4     | 7          | 8.4        | 0  | 0.0  |
| Falls      | 6           | 7.2     | 6          | 7.2        | 0  | 0.0  |
| Assault    | 3           | 3.6     | 2          | 2.4        | 1  | 1.2  |
| Gunshot    | 1           | 1.2     | 1          | 1.2        | 0  | 0.0  |
| Sports     | 0           | 0       | 0          | 0          | 0  | 0.0  |
| Total      | 83          | 100     | 69         | 83         | 14 | 16.8 |

In 137 patients, a full documentation of the hospital stay and follow-up was recorded whilst the other patients were discharged from the accident and emergency department (following adequate resuscitation or against



medical advice). The average period of hospitalization in the patients with concomitant mild head injury was 19 days and 34.9 days in those with significant spinal injuries (necessitating urgent surgical intervention) (Figure 1). In most cases, the Gardner-Wells traction was used in the initial resuscitation of patients with displaced cervical spine injuries

**Figure 1: Duration of Hospitalization of Patients with Maxillofacial Trauma and Concomitant Injuries**

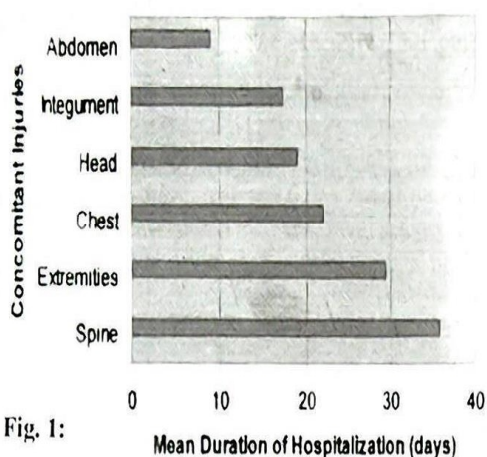


Fig. 1:

Mean Duration of Hospitalization (days)

### Discussion

Maxillofacial trauma is fairly common because the face is relatively uncovered and therefore easily fractured particularly in polytrauma. Down *et al.* have shown that maxillofacial injuries occur in a significant proportion of the multiply injured patients with significant trauma and Hutchison *et al.* also showed that at least half a million patients in the UK sustain facial injuries every year which are severe enough to require attention in the Accident and Emergency department [4,9].

Maxillofacial injuries hardly occur in isolation as they are often associated with other concomitant injuries. The incidence, patterns and types of concomitant injuries differ between locations and probably nations in keeping with peculiar socioeconomic factors, levels of industrialization and developments as well as the prevalent mode of transportation. Previous studies from various locations have shown a high frequency of craniospinal injuries in association with maxillofacial trauma [3, 8, 10, 11, 12, 13].

In our study road traffic accident accounted for 60.2% of the maxillofacial injuries and 81.9% of these had associated craniospinal injuries. The relatively low incidence of concomitant craniospinal injuries (37.2%) in this study is similar to the previous findings in the northern part of Nigeria [12] but much lower than the values reported by Baustein *et al.* (72.3%) and Down *et al.* (82%) [4,10]. There is no doubt that poor pre-hospital care is responsible for the high rates of trauma-related deaths but the lower incidence of craniofacial injuries in this study may be due to other factors. The reduced impact which

occurs in the vehicles involved in road traffic accidents in Nigeria consequent on the predominant poorly maintained old second hand vehicles and pot-hole laden roads ultimately slow the vehicles down compared to the expected relatively higher impact injuries in the developed countries.

The effect of these craniospinal injuries is that they greatly influence the management and eventual outcome of the maxillofacial injuries as they often delay early stable reduction and the mode of immobilization of maxillofacial fractures [14]. These delays often result in multiple surgeries and eventual prolongation of hospital stay in these patients.

Therefore the successful treatment of patients with complex maxillofacial injuries is highly dependent on the surgeon's appreciation of the presence of non-facial injuries as some of these injuries (including craniospinal injuries) may not be apparent at the time of initial evaluation in the busy accident and emergency resuscitation room [15].

### Conclusion.

In this report, the incidence of concomitant craniospinal injuries in maxillofacial trauma strongly supports the concept of citing maxillofacial units in hospitals with neurosurgical units on site. This study also strongly supports the early involvement of maxillofacial surgeons in the planning of trauma care units as advocated by Gwyn *et al.* [3].

Since craniospinal injuries are a cause of morbidity in patients with maxillofacial injuries, there is therefore a need for early neurological evaluation of patients with significant maxillofacial injuries and a team approach in the management of these patients is advocated.

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