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Original Research Article

Clinical and radiological profile of cervical spine injuries in maxillofacial trauma patients reporting to a tertiary trauma centre in central Kerala

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ABSTRACT

Aim & Objective: The aim of the study was to determine the clinical and radiological profile of patients with cervical spine injuries in maxillofacial trauma patients following road traffic accidents in central Kerala. Percentage of cervical spine injuries associated with maxillofacial injuries, age and sex distribution, frequency of the type of cervical spine injury were studied.

Materials and Methods: A descriptive cross sectional study was conducted on two hundred and fifty patients with maxillofacial trauma who reported to the Department Of Oral and Maxillofacial surgery, Government Dental College, Kottayam between July 2023 and June 2024 and who gave the consent for the study.Clinical evaluation of cervical spine was undertaken as the part of the initial assessment of all trauma patients. Neck pain was assessed with visual analog scale of 1-10 and altered sensations in upper limbs were evaluated. Lateral neck x-ray was taken to rule out cervical injury in all patients without C.T scan.

Result: The data was entered into MS excel spread sheet and analysed using SPSS version 20. Proportions were used to study categorical variables, mean and standard deviation were used for quantitative variables. Chi square test was used to test the difference in proportions of categorical variables. p values less than 0.05 was considered statistically significant in the data.

Conclusion: The study has shown that there is a statistically significant occurrence of cervical spine injuries in maxillofacial trauma victims in road traffic accidents. The presence of maxillofacial trauma with cervical spine injury mandates prompt management with immediate reference to neurosurgeon to reduce morbidity.

1. Introduction

Maxillofacial fractures are at high risk for concomitant cervical spine or spinal cord injury.[1,2] According to American College of surgeons, trauma occurring above the clavicle should raise a high suspicion for a potential cervical spine injury and it is mandatory to assess cervical spine injuries in all patients sustaining maxillofacial injuries[3] High velocity injuries like road traffic accidents are presumed to be at a higher risk for cervical spine injury than fall from height, work place accidents which are usually lower velocity injuries.[3–5]

Trauma protocols including the Advanced trauma life support ® manual, stress the importance of association between maxillofacial trauma and cervical spine injury and the catastrophic consequences that can occur if the diagnosis is missed or its presence ignored.[6] Study by Timothy J. et al has shown 5-10 percent of patients were found to sustain cervical spine injury and missed diagnosis can lead to significant neurological damage.[7] The present study is carried out in the Department of Oral and Maxillofacial Surgery, Government Dental college, Kottayam where a large segment of urban and rural population of central

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districts of Kerala are being treated and hence representative of a large area of the state. Aim of the study is to find out the proportion of cervical spine injuries associated with maxillofacial trauma, to determine the soft tissue and hard tissue injury in the maxillofacial region associated with cervical spine injuries and to determine the age and sex of the patients involved..

2. Materials and Methods

The descriptive cross sectional study was done in the Department of Maxillofacial Surgery, Dental College, Kottayam. Sample size was calculated using n master software and was 250. Two hundred and fifty patients reporting to the department, meeting the inclusion criteria and who gave consent for the study were selected. The study period was for one year from July 2023 to June 2024. Data obtained were compared with the total number of 250 patients who sought treatment in the department for maxillofacial injuries.

2.1. Inclusion criteria

All patients with maxillofacial injuries coming to the Department of Oral and Maxillofacial during the study period who gave consent for the study were included.

2.2. Exclusion criteria

Unconscious patients, mentally challenged patients, pregnant patients.

250 subjects who gave consent for the study were clinically and radiologically evaluated for the presence or absence of cervical spine injury. Neck pain was assessed with visual analog scale of 1-10, altered sensations of upper limbs were evaluated. Lateral neck X- ray was taken in all the patients except those with CT to rule out cervical spine injuries. Percentage of cervical spine injuries detected in association with maxillofacial injuries, sex distribution of patients involved, frequency of age of the patients with cervical spine injuries and the maxillofacial injuries associated with cervical spine injury under the headings of soft tissue injuries only, maxilla fracture, mandibular fractures and zygomaticomaxillary complex fractures were studied. The type of cervical spine injuries observed were under the heading of cervical spine straightening and cervical spine fracture.

2.3. Statistical analysis

The data was entered into MS excel spread sheet and analysed using SPSS version 20. Proportions were used to study categorical variables, mean and standard deviation were used for quantitative variables. Chi square test was used to test the difference in proportions of categorical variables. P values less than 0.05 was considered statistically significant in the data.

Ethical approval was obtained from Institutional Ethics committee of Government Dental College, Kottayam [No: IEC/M26/2023/R494/DCK, dated 21/09/2023]. Informed consent was obtained from all the patients.

3. Result

A total of two hundred fifty patients with maxillofacial injuries were studied. Out of this, eight patients sustained cervical spine injuries along with maxillofacial injuries. Etiology for all were road traffic accidents. The profile of patient data showed that the maximum number of patients who suffered road traffic accidents with cervical spine injuries were between 35 to 45 years (Table 3) and with male gender predominance which was 87.5% (Table 2).

Table 1: Showing total number of cervical spine injuries (8 numbers) detected in association with maxillofacial injuries among the 250 patients

S. No.	Total number of maxillofacial trauma cases	Patients with cervical spine injuries associated with maxillofacial trauma	Percentage
1	250	8	3.2

Table 2: Showing sex distribution of patients with cervical spine injuries associated with maxillofacial trauma

		Number	Percentage
Sex of the patient	Male	7	87.5
	Female	1	12.5
	Total	8	100

Table 3: Showing age distribution of patients with cervical injury associated with maxillofacial trauma

Frequency of cervical spine injury among different age group		
Age group	**Frequency**	**Percentage**
< 25	2	25
25-34	0	0
35-44	4	50
45-54	2	25
55-64	0	0
>75	0	0
Total	8	100

Among the 250 patients, 8 were detected to have cervical spine injury which was 3.2% (Table 1). Cervical spine straightening as well as cervical spine fracture detected were 50% each (Table 6).

All the patients presented with injuries in maxillofacial region ranging from soft tissue injury (12.5%), fracture of

Table 4: Chi square test (Test statistics)

Chi square	12.700
df	6
Asymp Sig	0.000

maxilla (25%), fracture of mandible (37.5%) and fracture of zygomaticomaxillary complex (25%) (Table 5). The number of patients who were maximally affected was of the age group of 35 to 44 years (50%) (Table 3).

Table 5: Proportion of soft tissue and hard tissue injury associated with cervical spine injury

Type	Frequency	Percentage
Soft Tissue	1	12.5
Maxilla	2	25
Mandible	3	37.5
Zygomatic	2	25
Total	8	100

As per the chi square test (Table 4), the obtained Chi square value 12.700 was greater than the table value 12.59 at 0.05 level of significance with df 6 and p value is 0.048. Thus there exists a significant difference in the incidents of cervical spine injuries associated with maxillofacial injuries with respect to the age of the patients.

Table 6: Frequency of cervical spine injury (straightening injury and fracture)

Type	Frequency	Percentage
Straightening injury of cervical spine	4	50
Fracture of cervical spine	4	50
Total	8	100

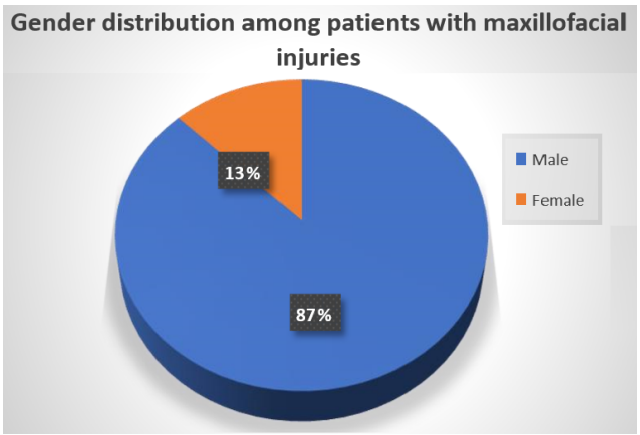

Figure 1: Showing sex distribution of patients with cervical spine injury associated with maxillofacial trauma

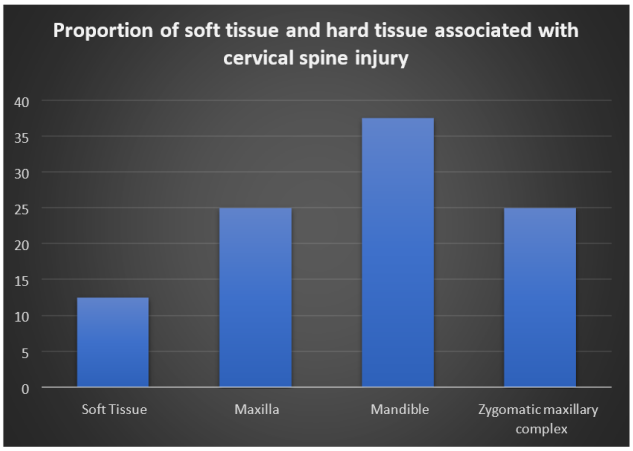

Figure 2: Showing proportion of soft tissue and hard tissue injuries of maxillofacial region associated with cervical spine injury

4. Discussion

This study was carried out in a tertiary hospital which had a good representation of both urban and rural population. The present study recognized the co-existence of cervical spine injuries in maxillofacial injury victims in road traffic accidents which has a high potential for mortality and neurological morbidity. Incidents of cervical spine injuries in the study was detected to be 3.2% and is consistent of studies which reported 0% to 8%.[1,2,5,8–20]

Wolfgang Hackl in his study to assess association between facial and cervical spine injuries among patients sustaining facial trauma, the percentage was 10.8%.[21]

According to National Highway Traffic Safety Administration. Traffic safety facts 2005, men were more likely to sustain neck fractures than women.[22] This was found consistent in our present study where cervical spine injury was detected in 87.5% of male patients.

Manson has shown high incidence of head, Maxillofacial and cervical spine injuries in about 75% road traffic accident victims.[23] When a forward moving vehicle is stopped abruptly the unrestrained occupants will be thrown upwards and forwards until the movement is arrested by some part of the vehicle, or thrown on ground when forcefully ejected from the vehicle and this causes injuries to the victims. In our study also road traffic accident was the etiological factor obtained for all the patients.

Charles. N. Bartolami and Leonard. B.Kaban describes representative patients with fractures of cervical spine and that of mandible secondary to chin trauma and suggests a protocol for efficient diagnosis.[24] As per the present study, mandible fracture noted was high (37.5%) compared to zygomaticomaxillary complex fractures (25%) and soft tissues injuries (12.5%) which proved similar.

Detection of cervical spine injury can be missed especially when pain or symptoms from other parts of the body dominate.[21] Diagnosis of an unstable spinal injury

and its subsequent management can be difficult, and a missed spine injury can have long term consequences.[25] Spinal column injury must therefore be presumed until it is excluded. Trauma victims should be transported to hospital with protective measures like backboard, collar or sand bags, whether or not they have neck symptoms.[26] In our study, lateral neck X–rays were taken in all road traffic accident patients without having CT scan to rule out cervical spine injury and thus immediate cross reference was done to neurosurgery department and treatment for cervical spine injury was started without delay.

5. Study Limitations

This prospective study was limited to 250 patients and for a period of one year. Hence it represents a small volume of patients and only eight patients were found to have cervical spine injury. Thus small subgroup sizes with low frequencies might have introduced statistical errors. Thus analysis of a larger cohort would have strengthened our study.

6. Conclusion

The study though limited, has proved that occurrence of cervical spine injuries associated with maxillofacial trauma is statistically significant (3.2%). Hence it is mandatory to give all trauma patients with hard and soft tissue injuries of maxillofacial region, cervical spine stabilization while transporting and also in the emergency room until cervical spine injury is ruled out.

The age group affected maximum was between 35 to 44 years and road traffic accident was the etiological factor found. Highest incidents of cervical spine injury was associated with mandibular fracture (37.5%). Zygomaticomaxillary complex fracture and maxillary fracture accounted for (25%) each which clearly showed that neck injury should be ruled out in all patients with hard tissue injuries of the face. Soft tissue injuries of face alone with cervical spine fracture was 12.5% as per the study which shows that force of the trauma, not dampened by fracture of facial skeleton might have got transferred to the neck.

Surgical procedure for maxillofacial injury in cervical spine injured patients should be performed under general anesthesia by using inline traction of head or Philadelphia collar to stabilize the neck and with fibro optic intubation to minimize manipulation of neck and prevent further damage to the existing cervical spine injury.

The study has proven that maxillofacial trauma victims in road traffic accidents is associated with statistically significant incidents of cervical spine injuries. Hence it mandates prompt management with immediate reference to a neuro surgeon to reduce morbidity.

7. Source of Funding

None.

8. Conflict of Interest

None.

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