



CASE SERIES

Maxillofacial Injuries due to Motorcycle Accidents Caused by Stray Animals: An Etiology 'Kept Out Of Sight': A Report of 5 Cases

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Abstract

The oral and maxillofacial region occupies the most prominent position of the human body rendering it vulnerable to injuries quite frequently. These injuries are commonly associated with high morbidity resulting in increased costs of care and varying degrees of physical, functional, and cosmetic disfigurement. Multiple etiologies of oral and maxillofacial trauma include road traffic accidents, falls, assaults, industrial injuries etc. out of which road traffic accidents is the commonest etiology in many regions across the globe. Among these, road traffic accidents caused due to stray animals remains an undisclosed and a scarcely documented issue. The Current case series highlights five cases of maxillofacial injuries presented to Oral and Maxillofacial Surgery Unit, District General Hospital Gampaha, Sri Lanka within a short span of time following road traffic accidents associated with stray animals.

Keywords

Maxillofacial trauma, Stray animals, Road traffic accidents

Abbreviations

OMF: Oral and Maxillofacial; RTA: Road Traffic Accidents; AVC: Animal-Vehicle Collision; CRIS: Clinical Record Interactive Search; WHO: World Health Organization

Introduction

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. Common causes of Oral and Maxillofacial (OMF) trauma include road traffic accidents (RTA), falls, assaults, sports and work injuries with RTA on the lead in many regions of the world except in some European countries where assaults and falls are the commonest causes [1,2].

RTA are one of the major causes of morbidity and mortality of which victims may succumb to multiple serious injuries including maxillofacial injuries. Within the category of traffic accidents, bicycle and motorcycle accidents deserve special significance as they play a substantial role in the etiology of maxillofacial trauma [3].

According to the Global status report of Road safety 2018 launched by the World Health Organization (WHO), the number of deaths caused by RTA is approximately 1.35 million per year with nearly 15-20 million people injured [4]. The incidence of RTA are on the rise due to increasing numbers of vehicles, lack of road infrastructure, lack of discipline on the road including driving under the influence of alcohol [5]. The situation remains no different in Sri Lanka. According to the latest WHO data published in 2018, deaths caused due to RTA have reached 3,554 or 2.80% of total deaths in Sri Lanka [6]. Currently, there is very limited data available



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Table 1: Details of the cases.

Age/Gender	Mode of travel	Animal involved and injuries to animal	Injuries to the rider	Type of road
26 Male	Motorcycle	Stray dog: No injuries	Soft tissue lacerations Dento-alveolar injuries	Side road
34 Male	Motorcycle	Cow: No injuries	Soft tissue lacerations Dento-alveolar injuries	Side road
35 Male	Motorcycle	Stray dog: Visible injury with limping	Soft tissue lacerations Mandibular fractures	Main road
50 Male	Motorcycle	Stray dog: Has not hit the dog	Soft tissue lacerations	Side road
29 Male	Motorcycle	Stray dog: Has not hit the dog	Soft tissue lacerations Mandibular fractures	Main road

on the percentage of trauma involving the OMF region. Among the few reports done on OMF trauma in Sri Lanka a study done in 1988 revealed, fall from height as the commonest cause of mandibular fractures in children in Sri Lanka [7]. A recent update on the etiology of OMF trauma has not been documented. However, RTA can be deduced as the commonest cause of OMF trauma in Sri Lanka as of today.

Among the many factors that are responsible for RTA, animal-vehicle collision (AVC) remains an under described and an unrecognized etiology which is on the rise due to increasing traffic intensities coinciding with wildlife habitats [8] Even though this is deemed to be responsible for a significant percentage of OMF trauma globally, this can be relatively more common in certain geographical areas. It is reported that nearly 200 people, often motorcyclists lose their lives on U.S roadways each year from collisions involving wild or domestic animals, and thousands more are seriously injured [6]. Also, An Australian study conducted Between 2007 and 2016 revealed, that 1.5% of the major trauma cases due to RTA were due to animal-related crashes [9]. An Indian study revealed that the most common etiology for OMF trauma is RTA (78%) especially involving two-wheelers. This was further documented to be either due to self fall from bikes caused by an inability to control the speed due to poorly built roads or colliding with animals such as stray dogs and cattle [10]. However, it was found in a study carried out in Brazil in 2011 that accidents involving animals were relatively more common in rural areas [3].

In Sri Lanka, where the incidence of RTA is extremely high, a significant percentage of OMF trauma may be caused due to AVC irrespective of the geographical location, even though those cases may not be recognized or reported. The animal species that are frequently involved in AVC may include dogs, cattle and birds such as peacocks. Two or three-wheeled vehicles are a common mode of transport in developing countries such as India and Sri Lanka. These vehicles are often being encountered in such accidents and carry an inherent potential of being left with detrimental injuries.

The facts that motorcyclists and bicycle drivers are more susceptible to maxillofacial injuries and that they're more prone to relatively more serious injuries sustained due to AVC have been revealed in multiple studies [9,10] Therefore, the postulation that AVC could frequently give rise to OMF trauma cannot be dismissed. Hence it is important to identify AVC as an emerging etiology of OMF trauma and spread awareness and implement strategies to mitigate the occurrence of these injuries.

The current report is an effort of documenting a unique series of 5 cases of OMF trauma caused due to animal-vehicle collisions presented to District General Hospital Gampaha, Sri Lanka within a short span of time.

Summary of Case Reports

All five patients were young adult males who were riding a motorcycle at night. All patients were under the influence of alcohol at the time of injury except for case 1, all others had been travelling over the designated speed limit (Table 1).

Discussion

Maxillofacial trauma poses serious challenges to every stratum in the trauma management team from the primary caregiver to an oral and maxillofacial surgeon. A certain proportion of maxillofacial injuries are complex [11]. Being the most uncovered and unprotected part of the body, the face is particularly more susceptible to trauma [5]. Contrarily, injuries to the maxillofacial region may also lead to a number of detrimental outputs especially since it is the region of specialized functions such as vision, hearing, olfaction, respiration, mastication and speech that consists of vital vascular and neural structures [12,13]. Therefore, OMF trauma can be considered a huge health hazard and an enormous social and economic burden. However, the pattern of injury sustained by the maxillofacial region greatly depends on the etiology and nature of the impact [14].

AVC are an unidentified etiology of OMF trauma all over the world. As brought into light in the above series

of cases these can give rise to multiple non-fatal but disfiguring and debilitating injuries.

AVC can be classified into two as direct and Indirect collisions. A direct collision is when the vehicle directly hits the animal and results in either the animal being thrown to a side, vehicle running over the animal or the animal getting thrown in the air following the collision and falling on the windshield out of which the third could result in more critical injuries to the driver of the vehicle and the animal. The outcome of direct collisions may depend on the speed of the vehicle and the speed of the incoming or outgoing animal. An indirect collision is when an accident occurs because the driver of one vehicle changes the direction of his driving trying to avoid the animal and hits another vehicle, person or road infrastructure, or gets overturned [11,15].

Previous studies claim that less than 62% of animal-related crashes do not involve the vehicle striking an animal, but rather the vehicle swerving to avoid an animal and resulting in another subsequent action. However, 68.8% of the fatal crashes were attributable to direct collisions [16,17].

A Spanish study conducted in 2018 revealed that most AVC involve domestic animals (> 95%), particularly dogs (> 80%). This pattern contrasts with that of some other regions of Spain and European regions, where collisions are mostly caused by game species [8]. In the present case series 4 out of the 5 accidents involved collision with dogs. Reports estimate that the Gampaha district where the cases were reported has a dog to human ratio of 1:4 [18].

All five of the above cases involved motorbikes. Based on observations from the Clinical Record Interactive Search (CRIS) data during the years 2010-2016 motorcycles comprised only 2.2-3.5% of total reported AVCs, yet accounted for at least half of all fatal or injurious crashes [19]. These animal-motorcycle collisions are particularly injurious, as motorcycles are two-wheeled single-track vehicles that lack lateral stability when stationary. In addition, the driver has no physical protection between himself and the animal except for a helmet in which's presence OMF trauma can still be inevitable [9].

A study conducted in the U.S. from 1995 to 2004 revealed that 89.5% of fatal AVC occurred on rural roads, 85.4% on straight sections of road, 91.1% occurred in dry weather conditions, and 28% of the victims were motorcyclists. A large proportion of injuries from AVC in the U.S. involved deer [17,20].

The above study also highlighted that 64.8% of the AVC occurred in darkness which was also emphasized as a major risk factor in several other studies. Most AVCs (71%) occurred at night in unlit locations. Reported crash frequencies were also much higher in dark settings [9].

All of the patients discussed in the present case series were under the influence of alcohol when they met with the accidents. Alcohol can affect a driver's cognition, vigilance, attention, reaction, judgment and especially distance and depth perception which are closely related to driving ability. Even at low doses, alcohol can significantly affect driving-related skills such as vision, braking behavior, and vigilance [21]. At the same time, drivers' information process and attention are heavily affected by alcohol. Therefore, in the case of a sudden obstacle such as an animal, the action of instantly acting to avoid the obstacle cannot be anticipated from a driver who is under the influence of alcohol.

Evasive behavior of animals is one of the major factors associated with AVCs. An animal that suddenly encounters an oncoming vehicle is likely to rely on its antipredator behavioral actions to face the situation. For example, moving away from the line of the vehicle's travel will be an effective evasive response in most cases.

However, this response may not be observed in all species. Several species might respond to an oncoming vehicle by freezing to avoid detection as they would do in the face of a predator. This can lead to definite indirect or direct collisions depending on the driver's reaction. Species with inappropriate or ineffective defensive responses are more likely to be greatly affected by road associated mortality [22]. Hence, it is important to make drivers aware of these behaviors and instant actions and techniques that would aid in minimizing the magnitude of these accidents.

Even though it is underreported AVC remains an important etiological factor of RTA leading to OMF trauma. The present study aims to address the knowledge gap and draw attention to implementing preventive strategies such as introducing speed limits to areas where a high risk of AVC prevail and also instate road infrastructure such as roadway lighting, fences and road rails to avoid animals crossing the road from potentially dangerous locations such as steep hills and bends and straight sections of road. Moreover, behavioral strategies such as spaying and neutering domestic animals can also be implemented to minimize the count of stray animals. Further, with the use of the continuously developing technology, digital Animal detection systems which are currently being developed can be expected to be seen in modern vehicles in near future [15]. Nevertheless, a continuing audit of the etiology of OMF trauma is mandatory as it reflects the effectiveness of the existing preventive strategies and would also act as an important indicator that would aid in changing resource and training needs in oral and maxillofacial surgery [23].

Conclusion

AVC are a rising etiology for OMF trauma that is unrecognized and in 'hindsight'. The current case reports highlight that motorcyclists travelling over the speed

limit with intoxication by alcohol are more prone to encounter stray animals and sustain injuries from a fall. More detailed studies and education of riders will help to alleviate the problem.

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Conflicts of interest/Competing interests

None.

Ethical clearance

Not applicable.

Patient consent

Patients' consents have been obtained.

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