DENTAL PROFILING AND FINDINGS OF MULTIPLE JAW FRACTURES IN TRAFFIC ACCIDENT VICTIMS

(PROFIL GIGI DAN TEMUAN PEMBENGKAKAN RAHANG GANDA PADA KORBAN KECELAKAAN LALU LINTAS)

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ABSTRACT

Motorcycle riders have a high rate of death and severe injury. Traffic accidents can cause blunt trauma. In this case report, authors present cases of accidents with findings of facial trauma to the forehead, nose, cheeks, and multiple fractures of the maxilla and mandible due to a rigid object impact. High-speed crashes are common in polytraumatized motorcycle crashes and often display facial injuries. If regarded from the biomechanics of trauma, there is a suspicion that the victim was wearing a helmet, with direct face trauma shown by minimal abrasions on the victim's face and more bruises instead. The woman was suspected of riding the motorcycle at high speed, with her face directly hitting a blunt object.

Keywords: blunt trauma; mandibular fracture; maxillary fracture; motorcycle accident

ABSTRAK

Pengendara sepeda motor memiliki tingkat kematian dan cedera yang tinggi. Kecelakaan lalu lintas dapat menyebabkan trauma tumpul. Dalam laporan kasus ini, para penulis menyajikan kasus kecelakaan dengan temuan trauma wajah di dahi, hidung, pipi, dan patah tulang rahang atas dan rahang bawah akibat dampak benda keras. Tabrakan berkecepatan tinggi umum terjadi dalam kecelakaan sepeda motor yang menyebabkan politrauma dan sering menunjukkan cedera wajah. Jika dilihat dari biomekanika trauma, ada kecurigaan bahwa korban mengenakan helm, dengan trauma langsung pada wajah yang ditunjukkan oleh goresan minimal di wajah korban dan lebih banyak memar. Wanita tersebut diduga mengendarai sepeda motor dengan kecepatan tinggi, sehingga wajahnya langsung terkena benda tumpul.

***Kata kunci**: kecelakaan sepeda motor; patah rahang atas; patah rahang bawah; trauma tumpul*

INTRODUCTION

Based on a report from the Police Traffic Corps (Korlantas), the number of traffic accidents throughout Indonesia reached 94.6 thousand cases from January - September 13, 2022. This number bounced 34.6% from the previous year's period, around 70.2 thousand cases. All traffic accident cases from January - September 13, 2022, have resulted in 19,054 people perishing. The death toll from the accident increased by 683 people, up 3.7% compared to the same period last year. The main factor in traffic accidents is distracted attention by road users, which can be caused by using cell phones or high-speed driving.[1]

Motorcycle riders have a high prevalence of accident risks. These accidents can result in severe injuries and can even lead to death. The death prevalence among motorcyclists is three times higher than that of car passengers, six times higher than that of pedestrians, and almost 50 times higher than that of bus occupants.[2]

By definition, blunt force trauma is a forced injury caused by a blunt object on the surface of the body and results in injury.

This blunt trauma is caused by objects with a blunt surface, such as stone, wood, hammer, or fist, which includes falling from a high place, traffic accidents, and gunshot wounds (with rubber bullets/round bullets).[3]

The most frequent injury seen in forensic pathology practice is blunt force trauma. Even though skin injuries are typically not lethal and seem unimportant, their documentation is valid as evidence in forensic trials. Blunt trauma injuries with patterns are uncommon. On the other hand, the distribution of internal and external injuries may follow a pattern appropriate for the specific injury scenario. There is a distinct pattern of injury in deaths involving motor vehicles. Most of the injuries that happened at the scene clearly show the reason and mechanism of death (e.g., bleeding, physical disruption). However, the cause of death of the person may not be known, especially with certain types of craniocerebral trauma (e.g., commotio cordis). Sometimes (fat emboli, for example), microscopy helps determine death due to blunt trauma.[4]

An injury is caused when a localized quantity of mechanical energy is absorbed during an impact with a blunt surface, irreversibly changing the injured part's anatomical integrity. Pulling apart (tension), pressing down (compression), or applying a differential force (friction or shear) can all result in structural changes. Trauma that is both internal and externally sustained can be directly attributed to force. Still, interior problems can happen even when there are no outward symptoms. Internal trauma is indicative of a physiological problem that results in mortality and can be observed under a microscope or at an autopsy. Rarely does a fatal injury go unreported.[4]

In this case report, authors present cases of accidents with findings of facial trauma to the forehead, nose, cheeks, and multiple fractures of the maxilla and mandible due to a rigid object impact. The primary purpose of this case report is to understand the clinical picture of blunt trauma due to motor vehicle accidents.

CASE REPORT

An external examination was performed (including the condition of the oral cavity and teeth) on a female corpse on October 20, at 07.30 WIB, at the request of the West Jakarta Regional Head of Traffic Unit. The examination of the female corpse discovered fractures to the bones of the face and upper right arm, injuries accompanied by bruises on the left side of the forehead, the right eye's top and bottom lids, the left eye's top and bottom lids, right and left cheeks (Figure 1).

Figure 1. The results of the external examination uncovered wounds on the left side of the forehead (blue arrows), wounds on the right eye's top and bottom lids (red arrows), wounds on the left eye's top and bottom lids (green arrows), and wounds on the right and left cheeks (yellow arrows).

The picture above shows that the blue arrows were wounds accompanied by bruising on the left side of the forehead, which was located approximately 4.5 cm from the front midline, 3 cm from the front hair growth line, with a wound size of approximately 3x0.5 cm and a wound appeared approximately 3.5 cm from the front midline, 1 cm above the eyebrows with two open wounds with uneven edges. Red arrows show a wound on the right eye's upper lid, which was approximately 2.5 cm from the front midline; purple bruises accompany two abrasions with a size of approximately 2x0.8 cm and 1x0.1 cm, then a wound on the lower eyelid of the right eye, approximately 3 cm from the front midline, and bluish-purple bruises accompanied by two abrasions measuring approximately 1.5x0.3 cm and 0.5x0.2 cm. Green arrows show a wound on the upper eyelid of the left eye, which was located approximately 4 cm from the front midline; there were two abrasions with a size of approximately 0.5x0.1 cm, 1.5x0.3 cm, accompanied by purple bruises bluish, then a wound on the left lower eyelid, approximately 4 cm from the front midline, there were two abrasions with a size of approximately 0.7x0.2 cm and 2x0.3 cm, accompanied by bluish-purple bruises. Yellow arrows show a wound on the right cheek, which was located approximately 3.5 cm from the front midline, 4 cm below the outer corner of the eye; there was an open wound with uneven edges measuring 1x0.3 cm, accompanied by a bluish bruise, then a wound on the left cheek, approximately 4.5 cm from the front midline, 3.5 cm below the outer corner of the eye, there was an uneven edge wound with a size of approximately 1x0.2, accompanied by a reddish-purple bruise.

There were injuries to the upper lip on the right and left sides (Figure 2) and to the lower lip on the outer side on the right and left chin (Figure 3) due to blunt trauma. Furthermore, signs of skull base fractures were found.

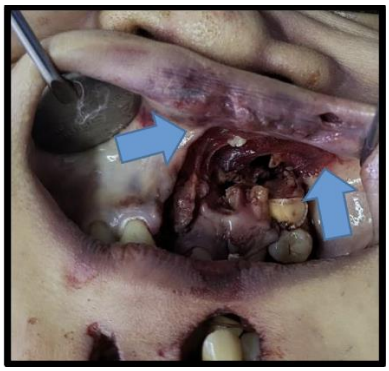

Figure 2. The external examination discovered wounds to the upper lip inside the right and left sides (blue arrows).

The picture above shows the blue arrows representing a wound on the upper lip on the right side, approximately 2 cm from the front midline; abrasions accompanied by bruising reddish purple and wounds on the upper lip on the left side. Approximately 1.5 cm from the front midline, there was an open wound with uneven edges with a size of roughly 2 x 0.5 cm.

Figure 3. The external examination revealed wounds to the lower lip outside the right and left sides (blue arrows) and the chin (red arrows).

The picture above shows the blue arrows representing a wound on the lower lip on the outside of the right side, approximately 2 cm from the front midline, with a size of roughly 0.3 x 0.2 cm, accompanied by black-purple bruises, and wounds on the lower lip on the outside of the left side, approximately 1.5 cm from the mid-front line; there is an open wound with uneven edges measuring approximately 0.3 x 0.2 cm, accompanied by black-purple bruises. The red arrow shows wounds on the chin, which was precisely on the front midline; there were two open wounds with uneven edges, measuring approximately 2x1 cm and 1.5x0.5 cm, accompanied by bluish-purple bruises.

From the dental examination performed on the victim, evidence was found in the form of 4 missing anterior teeth (loose from the tooth socket) due to the accident: 11, 22, 32, 42 (Figure 4 and Figure 5), fractures on teeth 21, 24 (Figure 6) accompanied by bleeding and laceration of the surrounding gingival tissue.

Figure 4. Intra-oral clinical picture, results of dental examination discovered missing post-mortem on teeth 11, 22 (blue arrows).

Figure 5. Intra-oral clinical picture, results of dental examination discovered missing post-mortem on teeth 32, 42 (blue arrows).

Figure 6. Intra-oral clinical picture, results of dental examination discovered fractures on teeth 11, 24 (blue arrows).

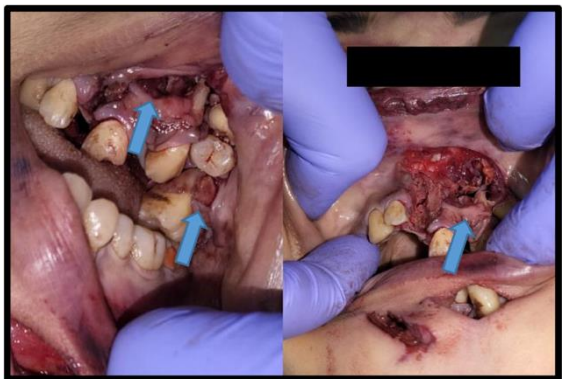

Figure 7. Intra-oral clinical picture, presence of maxillary fracture (blue arrow).

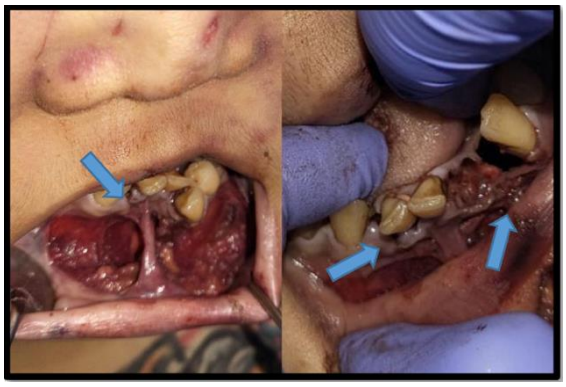

Figure 8. Intra-oral clinical picture, presence of mandibular fracture (blue arrow).

It is known that the victim had an accident after attending a party with her friends and drinking alcoholic beverages during the night. The urine test results by performing nine types of drug tests were negative. The cause of death could not be determined as no autopsy examination was performed.

DISCUSSION

One of the most vulnerable victim groups in traffic accidents is motorcyclists. The frequency of traffic incidents involving these road users has increased due to the intrinsic riskiness of these vehicles and their growing use by young people.[5] This is due to overconfidence, inexperience in the young age group, and even the relatively low price of motorcycles compared to cars in low-income countries, leading to increased motor vehicle use by the young generation.[6] According to WHO data gathered in 2014, motorbike deaths usually make up 12% of all traffic deaths in high-

income nations; in middle-income countries, however, this percentage increases to 26%.[7]

The head, neck, chest, and limbs are the most often wounded body parts mentioned in the literature, with head trauma being the most lethal.[8] More than 80% of patients who died in motorbike accidents had brain injuries, according to research by Hadi et al.[6] High-speed crashes are common in motorcycle collisions. They frequently cause inevitable injuries such as significant crushing, skull fractures with brainstem lacerations, and transections of the upper cervical spine.[2]

Petit et al. research indicates that when an accident starts with a head hit, there is a possibility of stress-related skull fractures as well as soft tissue injuries to the face. Because there is a strong association between brain trauma and spinal injuries, motorcyclists who sustain head injuries also need to have a high degree of examination of spine injuries.[9]

Victims with polytrauma often exhibit facial injuries. These wounds can range in severity from minor ones like cuts to the soft tissues or teeth to potentially fatal ones like bleeding from a major artery, such as the maxillary artery. Comparing bicycle to motorcycle accidents, cyclists tend to sustain more facial injuries. On the other hand, facial injuries among motorcycle riders are less common. These findings suggest that full-coverage helmets offer superior facial skull protection compared to open-face or cycling helmets.[10]

Pietzka et al. said twenty per cent of all victims exhibit injuries in the maxillofacial region, mostly lesions in the mid-face, lower jaw, and nose.[11] The numerous additional injuries indicate that high-energy forces are required to fracture the palate. It has been suggested that the enormous energy required to fracture the midline palate is a selective mechanism for the most severe fractures with the highest injury rates.[12]

The mandible is the primary or second most frequently fractured face bone in blunt-force trauma situations. Every impact causes a fracture at the impact site or close by. These results indicate that if there is one mandibular fracture, the fracture's location reflects the impact's location, such as an impact on the left mandible, resulting in a fracture in the left mandible. More fractures are typically caused by strikes to the ramus and midline than by implications to the mandibular body.[13]

Depending on the collision, the driver may be propelled forward, sideways, or in both directions when the motorcycle abruptly decelerates after impacting other vehicles or stationary obstacles like guardrails or trees. Individuals who perish

in motorcycle accidents are usually caused by head or neck injuries. Large-scale skull fractures are frequently seen particularly basal ones. The injury occurred due to impacts on the ground or other objects, such as a curb or a lamp post. Even if the person is wearing protective garments, sliding on the concrete will result in significant abrasions like scratches. Wearing a motorcycle helmet can lower the risk of brain injury in low-speed collisions. But when travelling at medium and high speeds, the helmet's primary purpose is to keep brain matter from scattering across the road.[14–17]

The strongest predictor of all possible accidents is the use of alcohol and illegal drugs. Approximately 28% of motorbike riders involved in fatal collisions have blood alcohol concentrations of at least 0.10 g/dl.[14] Compared to 26% of deaths from other vehicle accidents, alcohol poisoning accounts for 49% of motorbike collision deaths in the United States, according to an analysis of police reports. Compared to crashes involving multiple vehicles, alcohol is a factor in the majority of single-vehicle crashes. Single-vehicle crashes involving alcohol are more likely to happen at night.[2] Various studies have revealed a 2-3 times increased risk of death in accidents that occur in the early hours of the day. The increased death rate in the early morning hours could be caused by laxer traffic regulations and lighter traffic, which encourage drivers to travel more quickly and increase the danger of fatal accidents.[18]

CONCLUSION

A woman's corpse, aged 29 years, discovered abrasions, bruises, and swelling of the head and face. Fractures are also found in the maxilla and mandible. Furthermore, there are signs of broken bones in the forehead, cheeks, and nose. The dental examination discovered missing post-mortem, fracture, attrition, remaining roots, and visible impaction. If viewed from the biomechanics of trauma, there is a suspicion that this victim was wearing a helmet, with face-hitting direct trauma (not the asphalt, could be a pole/wall/vehicle) because the abrasions on her face were minimal, more bruises. Usually, if the injury is because of direct contact with asphalt, the face will have many abrasions. The woman was suspected of driving the vehicle at high speed, with her face hitting a blunt object directly. The cause of death could not be determined because an autopsy examination was not performed. The authors recommend the finding of such cases be performed further examinations such as X-rays to gain an idea of the possible location of the fracture and to do a blood alcohol level test.

CONFLICT OF INTEREST

We declare no conflict of interest in the scientific articles we write.

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