CASE REPORT

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An alleged murder due to blunt head injury from a viewpoint of forensic investigation: a case report

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ABSTRACT

Background: Blunt violence on the head often occurs in the community, which often causes fatal conditions and even death. Death due to blunt force on the head can be caused by intracranial bleeding or destruction of brain tissue.
Case description: A case of suspected murder was reported due to blunt violence on the victim's head with the initials RA, 16 years old, a student at an official school. On forensic medical examination found signs of blunt violence in the form of bruises on the forehead and face, and the results of an autopsy found the destruction of the bones forming the face, fracture of the skull with the release of brain tissue. In the police investigation, the suspect admitted to committing violence with a kick on the head of the victim using shoes without other tools. There was a mismatch between the strength of the violence recognized by the suspect and the autopsy findings so that the forensic examination focused on seeing whether blunt violence that occurred on the victim could result in death or not.
Conclusion: It is necessary to deepen police checks on suspects about how violence was carried out, how the power of violence was carried out, and what were the motives for violence. During the trial, the panel of judges stated that there was a possibility that the perpetrators would use hard objects to attack the victim.

Keywords: Alleged murder, blunt violence, forensic investigation.
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INTRODUCTION

Head trauma affects the scalp, skull bones, and bones that form the face or brain.[1] Head trauma is more precisely defined in traumatic brain injury (TBI), which is a change in brain function with symptoms that often occur, such as confusion, change in consciousness, convulsions, coma, motor and sensory disorders neurological deficits. The cause of head trauma is usually due to the strength of a blunt object or penetration above the head.[2]

Head trauma is a cause of high mortality and morbidity in both developed and developing countries, making it a global health problem. In 2013, there were approximately 2.8 million head trauma cases in the United States, and around 56,000 deaths were related to head trauma. Research reports from 29 countries show that the mortality rate from head trauma ranges from 5.2 in France to 80.73 in South Africa per 100,000 population/year. In Indonesia, the proportion of the national average incidence of head trauma is 0.4% and increases according to the age group.[2] In 2017, cases of head trauma coming to the Regional General Hospital of dr. Zainoel Abidin Banda Aceh is as many as 167 patients with a relatively younger age of 31-36.[3]

Blunt trauma is one of the causes of death, either instantaneously or a few moments after trauma due to bleeding. Central nervous system bleeding due to intracranial trauma usually occurs in the epidural space, subdural space, subarachnoid space, brain tissue (intracerebral hemorrhage), and cerebral ventricles.[4,5]

This article reported a case of alleged murder was caused by blunt violence on the victim's head with the initials RA, 16 years old, a student at an official school. On forensic medical examination found signs of blunt violence in the form of bruises on the forehead and face, and the results of an autopsy found the destruction of the bones forming the face, rupture of the skull with the release of brain tissue.

CASE DESCRIPTION

External post mortem examination

The body ceased of a 16-year-old man was sent to the Regional General Hospital of dr. Zainoel Abidin Banda Aceh by investigators accompanied by a letter requesting of *visum et repertum*. The victim allegedly died due to blunt force on the front and rear heads. Based on the information, the police and family suspected that the victim had experienced an act of murder.

The external examination found bruises on the forehead totaling ten pieces, each one centimeter long and one centimeter wide. The face looks swollen and blackish in color. It was found that the eyelid skin developed further decay with the eyes closed with a line between the two petals filled with maggots, there were bruises in both eyes. In the left eye, bone tears were

found in the torn bone, and there were bruises around it. In the left eye, the bone of the eye cavity was found with bone crunch, five centimeters from the midline of the body and bruising around it.

Internal post mortem examination

The autopsy results were found to have extensive blood absorption in the middle forehead area to the left forehead, eleven centimeters long and ten centimeters wide. A forehead fracture was found, which leads from left to right along one centimeter, and from the left side was four centimeters from the axis of the body, from the right, was two centimeters from the axis of the body. In the forehead, bones were found cracks that pointed from the bottom up along the seven centimeters to form a square angle and were four centimeters from the axis of the body. The left forehead bone was broken, three centimeters from the axis of the body with a length of four centimeters. In the forehead and nose joints, a fault with a length of two centimeters was found (Figure 1).

The bone in the left eyewall was broken, on the right forehead bone a blackish-colored bruise, the nasal bones were found broken to pieces starting from the base of the nose to the bottom to the left tear bone. In the joint bones between the sphenoid and the right and left lower mandibles. At the left lower jaw bone was broken apart was three centimeters from the axis of the body. The lower part of the lower jaw bone was broken with a length of four centimeters. In the maxillary bone, it was found broken (Figure 1).

At the opening of the back scalp found blood absorption as wide as the back of the head with a length of twenty-four centimeters and a width of twenty-five centimeters. In the back of the skull, a square bone fracture was found. On the surface of the back skull was found the discharge of brain tissue debris (Figure 2).

DISCUSSION

Forensic investigations in head trauma cases must be able to answer several questions, including: (1). Was the death of the victim caused by blunt trauma to the head?, (2). What is the mechanism of death due to blunt head trauma?, (3). Is the case of the victim murder, suicide or accident ?, (4). Who is involved in this case, both individuals and groups?. Autopsy examinations and forensic investigations are needed to answer the questions above.[6]

The first question, Is the death of the victim caused by blunt trauma to the head?, a forensic medicine examination can answer the question. The autopsy results found the destruction of the bones forming the face, rupture of the skull with the release of brain tissue. The effect of trauma on the head can be a wound on the scalp, fractures, contusions, epidural bleeding, subdural bleeding, subarachnoid hemorrhage up to intra-cranial damage.[7-9] The effects of the head are proportional to the amount of impact energy that affects the head, head movement, linear acceleration, circular head, and pressure and stretching.[8,10] When viewed from the location of head trauma and type of fracture, it can be assumed that the perpetrator carries out at least eight movements. Also, when viewed from the destruction of the bones forming the face and head, it is estimated that blunt impact is carried out several times at each location.

The cause of death in head trauma is bleeding, which means bleeding in the brain's surface area and a lot of bleeding volume in the head cavity. To answer whether the bleeding can cause death, appropriate measurement of the bleeding from the statistics is needed. In this case there are several possible types of bleeding

Figure 1. Fractures of the forehead bones and facial forming bones (Source: Documentation of the Forensic Medicine Department, Regional General Hospital of dr. Zainoel Abidin Banda Aceh)

Figure 2. Occipital bone fracture (Source: Documentation of the Forensic Medicine Department, Regional General Hospital of dr. Zainoel Abidin Banda Aceh)

in the head cavity or intracranial bleeding, which is: First, epidural hemorrhage (EDH) may cause death, one study found that the volume of bleeding measured by CT scans of more than 200 cm^3 or above 10% of the intracranial volume of human adult men affected the occurrence of deterioration in the victims with EDH.[11] Secondly, subdural hemorrhage (SDH). A 16-year-old victim, can be said to be still in the age group can experience an increase in intracranial pressure when the amount of subdural blood reaches 30-50 ml. In adults, 100-150 ml of subdural blood will produce mass effects.[5] Thirdly, subarachnoid hemorrhage (SAH), the interval between the time of trauma and death (can be minimal if death occurs immediately after trauma) is proportional to the amount of subarachnoid hemorrhage and the size of the source of bleeding. Usually most clearly located close to the source even though subarachnoid blood vessels can spread widely.[12-14] Fourthly, intracerebral hemorrhage (ICH), the mortality in ICH depends on the size and diameter of the hematoma in the victim's brain. The study results show that large volumes of ICH (more than 25 mL) associated with poor results in victims and increased bleeding volume will increase mortality.[15] The cause of death from an autopsy examination is due to the destruction of several facial bones and the fracture of the front and back of the skull. Bleeding was not found in this case because the corpse has decayed with cerebrospinal fluid has dissolved it is estimated that the victim died 3 to 4 days before the forensic examination.

The second question, what is the mechanism of death due to blunt trauma to the head?. This case is interesting because in the police investigation, the suspect claimed to have committed violence with a kick on the victim's head using shoes without other tools, there was a mismatch between the magnitude of the force of violence recognized by the suspect and the findings of the autopsy. Judging from some of the fractures suffered by the victim it seems impossible only due to the kick. The fracture is likely due to a hard blow from a blunt object. In a study conducted by Penzkofer et al, repeated kicks can cause more damage because the bones will crack due to acceleration. Kick in the head has two effects that can occur simultaneously, namely deformation of the bone structure in the form of skull fractures, the base of the skull, facial and mandibular bones, and can also occur brain injury due to acceleration the head cavity.[16]

The question is how much the power of violence breaks the bones forming the face, and the release of brain tissue accompanies the skull. Based on the strength received by the victim's head, head trauma is classified as static head trauma and dynamic head trauma. Static head trauma occurs in trauma for a long time, usually more than 200 milliseconds, and causes head damage. Static trauma rarely only causes the head to crumble and occurs when a heavy object presses the head. Stationary head trauma can result in facial skeletal fractures, skull fractures, lacerations to the brain, basilar skull fractures and contusion fractures. Dynamic head trauma is a result of head accelerations.[4,5]

In contrast to static head trauma that lasts a long time, dynamic head trauma usually results from the force that hits the head in a fast time (usually less than 200 milliseconds). Dynamic head trauma usually occurs in cases of direct collision of the head that is free to move or with collisions or actions on the body, which causes the head to move.[4,5] The description of the type of skull fracture suffered by the victim can be seen in Table 1.

The third question, Is the case of the victim murder, suicide, or accident ?. In cases of death due to murder due to blunt trauma, usually frequent wounds and the location of the wound can occur in all places, especially in locations where it is difficult to reach the victim's hand. As in this case there are bruises on the forehead and the back of the head. The location is difficult to reach with the victim's hand. Unlike the case of accidents, injuries to accidents are usually located on one side of the body.

The last question, who is involved in this case, both individuals and groups?. During the police investigation, the investigator only found one suspect involved in this murder, and at the court hearing, the suspect admitted that violence repeatedly hit the victim's head so that the victim died. During the trial,

Table.1. Types of Injuries and Fractures experienced by victims[4]

No.	Type	Definition	Causes	Location
1	Bruising	Wounds characterized by tissue damage without accompanied skin discontinuity	Blunt injury	Right forehead
2	Depress	Fractures in the bone where there is a downward depressed collision	Lacing a blunt object at high speed caused by a force with low mass	Left forehead
3	Comminuted	There are several fracture lines in the bone	Lacing a blunt object with low speed / high impact	Tear bone on the left
4	Blow out fracture	Fracture of the medial wall of the orbit into the ethmoidal sinus	Sudden blow to the eye	Tear bone on the left
5	Le fort I	The fracture line in the lower maxilla can separate the palate from the maxillary corpus	A lower force directed at the edge of the maxilla towards the bottom	Maxilla
6	Le fort III	Maxillary fracture that crosses through the nasal-frontal suture, through the orbital medial wall and frontal-zygomatic suture and through sphenoid	Blunt trauma to the middle of the nose or maxilla over the nose and maxillary bones	The nose and maxillary bones
7	Dentoalveolar fraktur	Separation of mandibular fragments contained	Traumatic teeth directly anteriorly or laterally	Mandible
8	Depress	Fractures in the bone where there is a downward depressed collision	The impact of a blunt object at high speed caused by a force with a low bone mass	Occipital bone

the panel of judges stated that there was a possibility that the perpetrators would use hard objects to attack the victim.

CONCLUSION

A forensic examination concludes that an examination of a male named RA, 16 years old, has been examined. From the results of external post mortem examinations, in the skin found bruises on the forehead totaling ten pieces and open wounds on the left forehead. From the internal post mortem examination, a front and back skull fracture and a fracture of the face forming bone with a fracture consisting of eight types was found. From the external and internal examinations, it can be concluded that the cause of death is due to the destruction of several facial bones and the fracture of the front and back of the skull caused by blunt force. The medicolegal aspect, in this case, is the alleged murder by seeing the typical signs of injury.

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CONFLICT OF INTEREST

The authors reports no conflicts of interest in this work.

CONSENT FOR PUBLICATION

Consent for publication represented by the Police investigator because it included a medicolegal case and autopsy performed at the request of the police investigator.

AUTHOR CONTRIBUTION

TS: forensic medicine specialist and ethics-medicolegal consultant who is responsible for the forensic medicine investigation in the case and to make basic concept and final editing in the manuscript preparation. KK: anesthesiologist and neurosurgery anesthesiology consultant, who is responsible for English improvement and to make basic concept of management of traumatic brain injury and mass bleeding.

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