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HEAD INJURY CASE WITH BLUNT FORCE TRAUMATIC: CASE REPORT AT BHAYANGKARA HOSPITAL KEDRII INDONESIA

Purwanti T.[1,2,3]*, Erfan Kusuma M.S.[1], Yudianto A.[1]

[1] Department of Forensic Medicine and Medicolegal Studies, Faculty of Medicine, Universitas Airlangga, Soetomo Teaching Hospital, Surabaya, Indonesia
[2] Department of Forensic Medicine and Medicolegal, University of Muhammadiyah Malang, East Java Indonesia
[3] Department of Forensic Medicine and Medicolegal, Bhayangkara Hospital, Kediri East Java, Indonesia

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Abstract

Child abuse has negative impact for children including emotional performance, mental dysfunction, and decrease intelligence.

According to the 2014 Surveillance Report of Traumatic Brain Injury, in the United States, there are approximately 2.87 million head injury patients. Head injury, or so-called head trauma, is a blunt force/sharp force on the head or face that results in temporary cerebral dysfunction. It is one of the leading causes of death and disability in the productive age group, primarily traffic accidents.

A boy went to the emergency room at Bhayangkara Kediri Hospital. There was swelling on the left head, expanding on the forehead and bruising on the left ear. Also found signs of sodomy marks in the form of abrasions around the anus. There are also bruises on the back and neck of the end.

For a definitive diagnosis, the results of the CT scan were that the patient obtained extensive cerebral contusion and caused the deviation of the midline structure to the right as far as ± 0.9 cm with subgaleal hematoma and the dilation of cerebral blood vessels.

In cases of head injury due to blunt trauma, blood infiltration will be found in the layers of the scalp and muscles in the direction of the trauma. The presence of blood infiltration is an intravital sign of evidence of extravasation of blood cells in the tissue. Another finding may be a skull base fracture in the posterior fossa caused by a direct blow to the occipital region. At the base of the skull, a fracture in the posterior fossa can cause symptoms such as bleeding from the nose, mouth, and ears, damage to the cranial nerves and cause raccoon eyes. In head injuries caused by blunt trauma can also cause subarachnoid hemorrhage and subdural hemorrhage due to rupture of the superior cerebral vein and "bridging vein" due to pressure/trauma it can cause death, to distinguish subarachnoid hemorrhage from subdural hemorrhage needs to be done sprinkling with water.

Keywords: *children abuse, violence, skull fracture.*

Introduction

A brain hemorrhage can occur in any part of the brain, can be caused by various conditions, both traumatic and non-traumatic. According to the 2014 Surveillance Report of Traumatic Brain Injury, in the United States, there are approximately 2.87 million head injury patients. Around 2.53 million people came to the Emergency Room, of which more than 812,000 patients were children. There are about 288,000 head injury patients who are hospitalized, and about 23,000 of them are children. Head injury patients who died there were around 56,800 people, of which 2,529 were children [*Langlois J et al., 2006; Peterson A et al., 2019*].

According to Kemenkes R. (2018), the prevalence of head injury in Indonesia is 11.9%. Injuries

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Address for Correspondence:
Tutik Purwanti; Department of Forensic Medicine and Medicolegal Bhayangkara Hospital Jl. Kombes Pol Duryat No.17, Dandangan, Kediri, East Java 64122, Indonesia
E-mail: tutikpurwanti4n6@gmail.com;

to the head occupy the third position after injuries to the lower limbs and upper limbs, with a prevalence of 67.9% and 32.7%, respectively. Head injury, or so-called head trauma, is a blunt force / sharp force on the head or face those results in temporary cerebral dysfunction. It is one of the leading causes of death and disability in the productive age group, primarily traffic accidents. This is due to high mobility among the productive age while maintaining road safety is still low [*Apuranto H et al.,2010; Kemenkes R, 2018*] The case report is to report one case of the mechanism of blunt trauma in head injury, findings on the picture of blunt trauma in head injury victims at East Java, Indonesia.

CASE REPORT

In the case report, it was found that a victim came to the Bhayangkara Kediri Hospital on December 31, 2020, at around 23.16 WIB. The victim is suspected of having been assaulted by a group of people. When he was taken to the hospital, the victim was dead.

With a brief explanation of the incident: initially on Thursday, December 31, 2020, at approximately 23.16 WIB on Tembeleng, Jombang, there has been a one-on-one duel between the perpetrator and the victim in a duration of approximately three minutes. Because the victim was wearing IKSPI Kera Sakti college clothes and uploaded them to social media, but the victim was not a resident of IKSPI Kera Sakti before the incident, the victim was picked up by GE's brother, AN, FA with address Peterongan, Jombang was known by a witness named: AR but did not know where the victim was taken. The next day the victim was dropped off at AD's brother at the address Peterongan, Jombang by three people GE, AN, and FA, in an unconscious state, full of wounds on the head, and breath was running out. An hour later, the victim was in a lifeless state due to the one-on-one duel in Tembeleng, Jombang for the act was then reported to the Jombang Police SPKT for further investigation.

To overcome it is possible, due to the uniting the knowledge and will of all doctors in the world

EXAMINATION RESULT

External inspection: The investigation findings can be seen on the table below. All images are authors' documentation.

DISCUSSION: Coup and contercoup damage, when the moving head suddenly slows down, such as during a fall, although there may still be a "coup" lesion at the impact site, there is often cortical damage on the opposite side of the brain - a "contrecoup" lesion [*Payne W et al., 2019*]. In external scalp injuries that need to be seen [*Post A, Hoshizaki T, 2012*]. The most reliable interpretation of contrecoup lesions is in the form of cortical contusions or lacerations. Meningeal hemorrhage, either subdural or subarachnoid, can also be associated with contrecoup lesions but has almost no diagnostic value compared with cortical damage when interpreting falling or fixed head injuries. If there is no associated cortical contusion, then it is highly unsafe to rely on unilateral meningeal hemorrhage to indicate the type of head injury.

External Examination of Head Trauma: External physical examination in patients with head trauma is the same as for other skin disorders. In patients with head trauma, blisters, bruises, and lacerations may occur. These wounds tend to occur more quickly because the skin covers a hard base, and the presence of wounds often indicates internal abnormalities. Head trauma in trauma events **(**acts of violence) is most often due to blunt force violence, which can result in injury to the brain and can result in death. Violence due to blunt objects is the most common case and consistently ranks first in forensic medicine. The blunt object in question is an object that does not have sharp edges **(**unable to slice, stab, or pierce. Has a hard or rubbery consistency, the surface can be rough or smooth [*Apuranto H et al., 2010*]. Blunt objects are widely available around us, wherever we are. If the object is hit, hit, or hit the body hard, it will cause pain. The way of death in cases of violence due to blunt objects is unnatural. The most common are traffic accidents, falling from a high place, murder, or suicide by crashing into the train [*Kokiko O, Hamm R, 2007*].

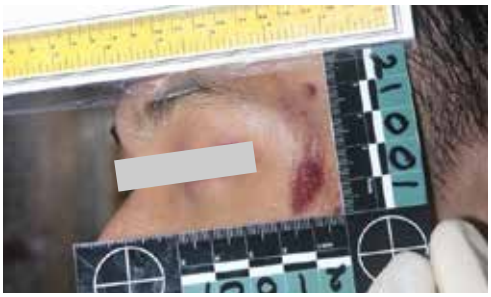
EXTERNAL INSPECTION

The investigation findings can be seen on the table below. All images are authors' documentation.

On the left side of the back of the head, seven centimeters behind the midline, ten centimeters from the earlobe, bruises were found, irregular in shape, purplish-red in color, five centimeters by ten centimeters in size.

On the left forehead, three centimeters in the middle of the front, a wound was found, in the form of a horizontal line, brown in color, measuring three centimeters by two centimeters.

On the right chest, ten centimeters from the midline, fifteen centimeters from the top of the shoulder, a bruise of an irregular shape was found, measuring five centimeters by seven centimeters.



On the cheek, five centimeters from the front midline, three centimeters from the ear canal found abrasions of irregular shape, brownish-red color, measuring five centimeters by five centimeters.

Red fluid was found from both nostrils.

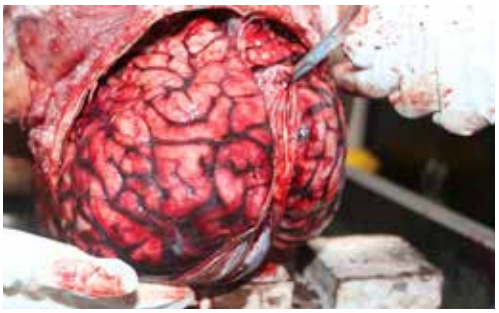
On the outer edge of the left eyelid, a blister was found, irregular in shape, brown in color, measuring two centimeters by three centimeters by two centimeters.

On the back of the hand, five centimeters from the wrist, bruises were found with blisters of irregular shape, purplish-red in color, measuring five centimeters by five centimeters.

BRAIN INSPECTION

Extensive blood infiltration was found on the top and back of the head. The thickness of the skin is zero point two centimeters. Found a blood leach, measuring four by four centimeters. The muscle thickness is zero point five centimeters.

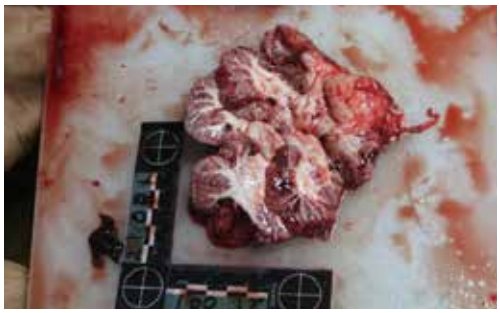
Blood infiltration was found in the back of the left neck muscle.



Meninges of the brain: Bleeding was found in the entire membrane of the spider's brain.Bleeding was found in the upper hindbrain.

At the base of the skull: fracture was found at the base of the skull on the left side.

Big Brain Weight: One thousand seventy-five grams.
Slices: No abnormalities found



In the cerebellum slices, no abnormalities were found

Blunt trauma or a force on the outer surface of the body by an object that has a blunt angle or surface. Blunt trauma can cause three types of damage mechanisms, namely bruising **(**contusions), abrasions (abrasio), and lacerations (vulnus laceratum), where bruising **(**contusions) occur when blood vessels under the skin or internal organs rupture [*Peterson A et al., 2019*]. The causes of death of victims of violence due to blunt objects are damage to vital organs, bleeding, shock, infection, thrombosis, and embolism [*Tamuli R, 2014; Celcilia E, 2015*]. According to the size of the affected body, blunt force trauma is divided into two, namely local and generalized. Local blunt trauma is trauma that only affects a small part of the body and results from violence from an object with a relatively small area. The violence that arises can be on the skin, subcutaneous tissue, or deeper body organs. This violence is usually found in human attacks such as being punched, kicked, beaten with wood, and so on, animal attacks such as being kicked by a horse, being crushed by a large animal, and colliding or falling. Blunt violence, followed by generalized violence, affects the whole body or a large part of the body. There are three ways this can happen, namely being thrown due to a traffic accident, falling from a high place, and so on. Trauma can be direct where the damage is at the contact site or indirect, i.e., the damage is not at the contact site. Next up is being crushed, for example, in a traffic accident, collapsing buildings, and so on. Trauma is mainly due to direct contact and finally due to tearing, which occurs when the direction of violence is tangential, for example, in traffic accidents.

Blunt force on the skin can cause abrasions. Scratches are damage that affects the upper layer of the epidermis due to violence with objects that have a rough surface so that the epidermis becomes thin, part or all of the layers are lost. Characteristics of abrasions are as follows: a) some or all of the epithelium is lost, b) then the surface is covered by dry exudation or crusts, c) an inflammatory reaction occurs in the form of accumulation polymorphonuclear leukocytes, d) usually leaves scar tissue [*Stainsby D, 2000*]. Blisters can occur antemortem and post mortem. In post mortem abrasions, there are reddish-brown wounds due to exudation, and microscopically there are epithelial remnants and intravital signs. While post mortem abrasions are wounds that look shiny yellowish color, microscopically, the epidermis is completely separated from the dermis. There are no intravital signs, and they generally occur in bony prominences [*Hoeflich M, 2003; Apuranto H et al., 2010*]. Bruises can also occur as a manifestation of blunt force trauma. In bruises, the subcutaneous tissue is damaged so that the blood vessels (capillaries) are damaged and ruptured so that blood seeps into the surrounding tissue. Here the surface of the skin is not permanently damaged. The part of the body that is prone to bruises is the part that has fatty tissue underneath and is thin-skinned. Bruises cannot indicate the severity of the violence, nor can they indicate the type of object causing it. People who have abnormalities in the blood clotting process are more prone to extensive bruising, even though the cause is only mild violence, for example, in hemophiliacs.

The age and characteristics of contusions are as follows; a) only swelling at first, b) changing to a bluish red color, c) on days 1 to 3, the color becomes blackish blue, d) then the color becomes turquoise, then brown and finally disappears in 1 to 4 weeks [*Robertson C et al., 2010*]. On external examination in this autopsy case, several abrasions and bruises were found on the head. On external examination, it was found on the back of the head on the left side, seven centimeters in the mid-back line, ten centimeters from the earlobe, bruises were found, irregular in shape, purplish-red in color, measuring five centimeters by ten centimeters later on the left forehead, three centimeters in the front midline, blisters were found, in the form of a horizontal line, brown in color, measuring three centimeters by two centimeters and also found on the outer edge of the left eyelid, blisters were found, irregular in shape, brown in color, measuring two centimeters by three centimeters by two centimeters and on the cheeks, five centimeters from the mid-front line, three centimeters from the ear canal found abrasions of irregular shape, brownish-red color, measuring five centimeters by five centimeters [*Patrascu E et al., 2017; Munifah A et al., 2020*].

Examination, in this case, is appropriate that the possible cause of the victim's death was head trauma caused by blunt force trauma. The discov-

ery of several wounds on the head supports further investigations regarding the exact cause of death and any abnormalities in the head cavity. Abnormalities caused by blunt force trauma to the head include skull base fractures, cranial vault fractures, contusion cerebri, laceracio cerebri, cerebral edema, epidural hemorrhage, subdural hemorrhage, subarachnoid hemorrhage, and brain commotions which will be found on internal examination. autopsy. The findings of bruises and tears were not found on the head in this patient's case. This is because blunt force trauma can occur according to the object or tool used to hit the limb [*Apuranto H et al.,2010*].

Injuries from blunt objects: Blunt force injuries are the most common cases. The "blunt" object in question is an object that does not have sharp edges (not capable of slicing, slashing, or stabbing). In this case, extensive blood infiltration was found on the upper and back sides of the head, blood infiltration in the back of the left neck muscle, red fluid from both nostrils, and fractures at the base of the skull on the left side. Following the theory, the injuries that occur are localized, only affecting a small part of the body, namely the back of the left side of the head, resulting from violence from an object with a relatively small area. The violence that arises can be on the skin, subcutaneous tissue, or deeper body organs. Usually found in human attacks **(**punched, kicked, hit with wood). Violence due to blunt objects in the head can cause abrasions, bruises, or tears. These injuries are easy to occur because the skin covers a hard base. Besides that, the existing wounds are often an indication of abnormalities on the inside.

Based on the anatomy of the head, the outermost layer is the scalp which has soft tissue but has excellent protection. If the scalp does not protect the skull, it can only withstand blows of 40 *pounds/inch*, but if it is protected from the scalp, it can withstand blows of 425-900 *pounds/inch* [*Irianto K, 2013*]. After the scalp, there is also a skull bone that protects its inner contents, namely the brain. The essential part of all is the which is the center of all parts of the body. I brain n this case, extensive blood infiltration was found on the top and back of the head, blood infiltration in the subcutaneous and muscle tissue is an intravital sign, namely as evidence of an inflammatory reaction process or extravasation of blood cells in the tissue, which indicates that trauma occurred before someone died. The possibility of the victim experiencing death is caused by losing much blood in a relatively short time. This process is known as massive bleeding, which can cause disturbances in percussion and oxygenation of the body, including percussion and oxygenation of the brain. This triggers the failure of the respiratory and cardiovascular systems as pillars of life [*Stansfield K et al., 2012*].

In this case, blood infiltration was found in the back of the left neck muscle, and this may have arisen due to the force of a blunt object on the left side of the neck. Following the theory, local violence can cause bleeding in the muscles or fractures of the neck. Death due to severe shock, laryngeal spasm, vagal reflex, or tearing of the trachea/larynx may occur, then emphysema develops that extends to the neck and mediastinum, causing asphyxia. Blow → rapid displacement of tissue → damage to blood vessels followed by bleeding, tissue injury, and edema. Cranial base fractures **(**cranium fractures) are a type of linear fracture that occurs at the cranium base, most commonly in the temporal part of the cranium. Patients with skull base fractures have a high risk of extra-axial bleeding due to the tendency of fractures to affect a cerebri media [*Patrascu E, et al., 2017*]. The fracture forms of the case were 'hinge' fractures at the base of the skull, in which the fracture line ran from side to side to the floor of the medial cranial fossa. And linear fracture of the posterior fossa due to a fall in the occiput area. The fracture usually traverses the thinner bone and ends near the foramen magnum.

In this case, it was found that there was a fracture of the posterior fossa of the left cranial base, according to the anatomy of the posterior cranial base formed by the posterior part of the temporal bone and the occipital bone. It is bounded anteriorly by the petrosal bone of the temporal bone and posteriorly by the clivus. The lower border of the posterior cranial base is formed by the occipital condyle and the mastoid portion of the temporal bone, while the posterior portion of the posterior cranial base extends to the squamous pars of the occipital bone [*Baugnon K, Hudgins P, 2014*]. Posterior fossa fractures are usually caused by a

direct blow to the occipital area. These fractures usually involve the occipital and petrosal bones of the temporal bone [*Bobinski M et al., 2016*]. Fractures of the occipital bone, or often referred to as fractures of the occipital condyle, are fractures caused by the force of a blunt object blow and are very common.

Subarachnoid Hemorrhage: The results of the autopsy examination of the head cavity, in this case, it was found that there was bleeding in the entire brain spider membrane. This follows the theory, which states that this occurs due to rupture of the superior cerebral vein. In severe trauma and instant death, thorough bleeding is found and characteristically found at the base of the brain [*Erfan Kusuma M, Purwanti T, 2020*]. In the brain, it should be checked for bleeding by flushing with water. Subdural bleeding with watering will disappear. This is different from subarachnoid. This is in line with a case report of two men who were involved in a violent altercation, one hitting the other on the head with a hard blow. The victim fell to the ground and never moved again, was pronounced dead a few minutes later. At autopsy, fresh subarachnoid hemorrhage was found typical of a ruptured aneurysm. The most immediate deaths indicate bleeding into the cranial base at autopsy, the brainstem, and cranial nerve roots bathed in a thick layer of blood and blood clots. Because blood in the subarachnoid space can enter the medulla, suddenly, it can cause rapid cardiorespiratory failure [*Saukko P, Knight B, 2015*].

Subdural Hemorrhage: The results of the autopsy examination of the head cavity, in this case, found bleeding in the covering layer of the brain between the arachnoid and dura mater. This follows the theory that this occurs due to rupture of the bridging veins, especially those located in the superior sagittal sinus, due to acceleration and deceleration of the head caused by traumatic and non-traumatic processes [*Bigler E, Maxwell W, 2012*]. The fracture does not play a role in the pathogenesis of hemorrhage, which arises from a torn communicating vein, called the connecting vein, that traverses the subdural space between the cortical veins and the dural sinus. Less often, the sinus itself or the superficial cerebral arteries cause bleeding. In open head injuries or when a comminuted fracture penetrates the membranes and the brain itself, subdural hemorrhage is only part of a complex that includes subarachnoid hemorrhage, as well as cerebral lacerations and contusions. These lesions are often pure, but are associated with closed head injuries where the only other sign may be bruising on the scalp - or not at all, as the blunt impact may leave no marks on the scalp, externally or internally, and no skull fractures. If the bleeding volume is >100cc, a new neurological abnormality appears [*Saukko P, Knight B, 2015*].

Conclusion

In cases of head injury due to blunt trauma, blood infiltration will be found in the layers of the scalp and muscles in the direction of the trauma. The presence of blood infiltration is an intravital sign of evidence of extravasation of blood cells in the tissue. Another finding may be a skull base fracture in the posterior fossa caused by a direct blow to the occipital region. At the base of the skull, a fracture in the posterior fossa can cause symptoms such as bleeding from the nose, mouth, and ears, damage to the cranial nerves and cause raccoon eyes. In head injuries caused by blunt trauma can also cause subarachnoid hemorrhage and subdural hemorrhage due to rupture of the superior cerebral vein and “bridging vein” due to pressure/trauma it can cause death, to distinguish subarachnoid hemorrhage from subdural hemorrhage needs to be done sprinkling with water.

Ethical clearance: Taken from ethic committee of Bhayangkara Hospital, Kediri.

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Armen A. Muradyan

Address for correspondence:

Yerevan State Medical University
2 Koryun Street, Yerevan 0025,
Republic of Armenia

Phones:

(+37410) 582532 YSMU
(+37410) 580840 Editor-in-Chief

Fax: (+37410) 582532

E-mail: namj.ysmu@gmail.com, ysmiu@mail.ru

URL: http//www.ysmu.am

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Director: Ruzanna Arakelyan
Armenia, 0018, Yerevan,
Tigran Mec 48, 43
Phone: (+374 91) 19 29 00,
E-mail: armana6@mail.ru