

Case Report

Accidental neck injury by wood cutting machine: A case report

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Lacerated wounds of the neck can be of any origin-accidental, homicidal, or suicidal. In this case report, a case has been presented where a part of metallic saw of a wood cutting machine flew as a projectile and cut the throat of a middle aged male who was operating the machine inside metro construction area. Death occurred as result of exsanguinations caused by the injuries to major blood vessels of the neck. In the case we presented, although the cut in the neck initially suggested homicide, it was found to have occurred as a result of an accident after the autopsy and death scene investigation.

Key words: Accidental neck injury, wood cutting machine, saw blade.

INTRODUCTION

Lacerations differ from incised wounds in that the continuity of the tissue is disrupted by tearing rather than clean slicing. But the distinction is often blurred when the laceration is caused by jagged projections ripping into the skin in much the same manner as a blunt knife or axe (Saukko and Knight, 2004). A high velocity tangential impact by the sharp pointed edge of a weapon first stretches and then tears the skin. In such cases the bruising of margins may be a very narrow zone which is often difficult to appreciate. Some authors in the field have started using the term 'cut laceration' to describe such wounds, where one will find features of both incised wound and laceration (Reddy, 2009; Nandy, 2000).

The investigation of a penetrating wound to the neck, without any associated injury, is often a daunting task both to the forensic pathologist as well as the law enforcement authorities. The task becomes increasingly difficult, when the wound is small and has directly resulted in death. Furthermore, the investigation turns out to be more challenging, when there are no eye witnesses to the incidence. The slightest disturbance in the scene of crime may further make matters worse.

A critical analysis of the wound and of the crime scene

may be of help to determine the manner of death.

CASE REPORT

A middle aged man was found unconscious in a pool of blood at his work place (metro construction area). He was alleged to be operating a wood cutting machine. However, there was no eye witness to the incident. The person was shifted to a hospital in unconscious state, where he was declared brought-dead. During inquest, investigating police officer seized the wood-cutting machine and found a piece of the saw blade to be missing. Later, when the body was subjected to post-mortem examination, the investigating police officer requested for preservation of blood sample of the deceased and fragmentary remnants of the saw blade, if found inside.

External examination

Radiograph of the body prior to autopsy revealed no metallic fragment in the body. There was a single cut laceration of size 2 × 0.8 × 1 cm (muscle deep) situated horizontally on the right side front of the neck, 2 cm away from the midline and 5 cm above medial end of right clavicle (Figure 1). Margins of the wound were appearing regular at places on naked eye examination but under

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Figure 1. Cut laceration on the neck

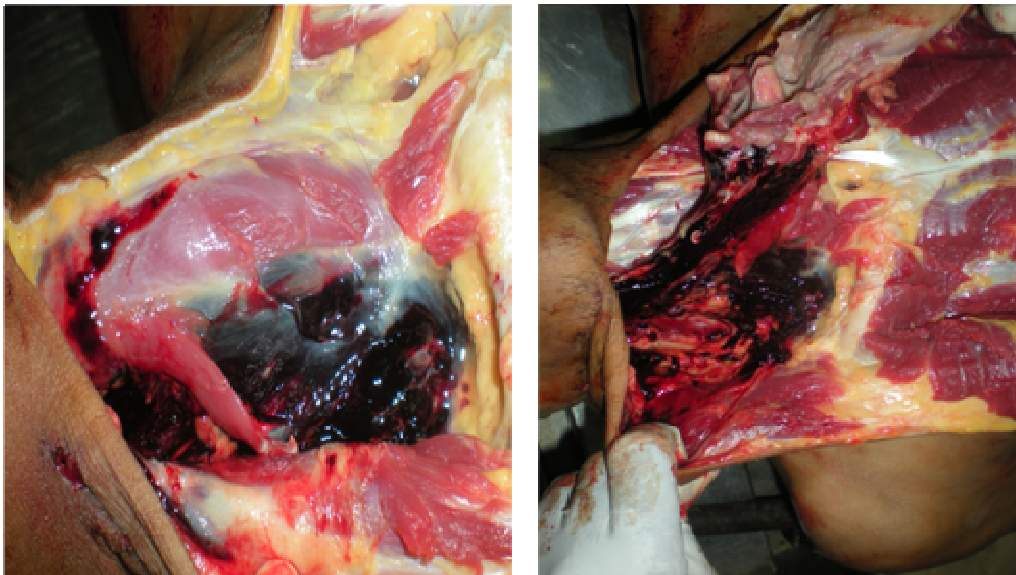


Figure 2. Internal extravasation of blood.

magnifying lens, found to be irregular with bruising at one end. No other external injury of any type was present on the body.

Internal examination

Dissection of the neck revealed extravasation of blood

into the neck muscles of right side. The upper part of right common carotid artery and internal jugular vein were found torn. The extravasation of blood extended up to the upper part of right chest wall (Figure 2). No odour of alcohol found inside the stomach. All the internal organs were pale. Based on paleness of the internal organs in a healthy adult body, we opined the cause of death as hemorrhagic shock as a result of injury to right common

carotid artery and right internal jugular vein.

Examination of the scene of incident

Necessary instructions were issued to the investigating police personnel not to disturb the scene of incident, and immediately following autopsy, scene investigation was arranged. The site from which the victim was shifted to hospital showed thick pool of blood over an area 30 × 20 cm, percolating deep into the soil. One saw-blade fragment was recovered near by the pool of blood, which revealed reddish brown stain, appeared to be fresh blood stain smudged against old rust stain. From this area, blood spots could be traced up to the wood cutting machine; lying about 5 m away. The wood cutting machine had a round thick metallic blade with serrated margins. At one place, a part of blade was found broken and missing. The edge of the broken area showed evidence of rusting. On alignment of recovered saw-blade fragment against the metallic blade of the wood cutting machine, some part of the metallic blade of the wood cutting machine was found to be still missing, corresponding to the area showing rust deposition. This suggested that metallic blade of the wood cutting machine was broken earlier to the day of the incident and therefore the victim was operating a defective instrument.

DISCUSSION

Neck is the target site for cut throat injury and asphyxial deaths by constriction. As most of the vital structures barring spinal cord lie on the anterior compartment, both suicidal and homicidal neck injuries are seen mostly on the anterior aspect of neck. In the present case, the injury was present on the mid-part of right anterior aspect of the neck.

Incised wounds of the neck can be accidental, homicidal, or suicidal (Demirci et al., 2008), whereas lacerated wounds can either be accidental or homicidal, but rarely suicidal in nature (Reddy, 2009; Maiharan and Patnaik, 2006). In the present case, the fatal penetrating injury was a small cut laceration, lying horizontally on the mid-part of the front of neck. As the wound had mixed features of both incised wound and laceration, initially it was difficult to ascertain the exact nature of causative agent.

Firearm projectile or projectile emerging out of bomb blast can penetrate different depth of human body depending upon its mass and velocity. Here, saw blade fragment broken out of rotating metallic saw blade acted as a projectile due to the centrifugal force gained by it. But, because of its shape, size and comparatively low velocity, it was not able to penetrate deep into the neck. There was extravasation of blood extending up to the upper part of right side front of chest, as if the saw blade fragment had penetrated into the neck in a downward direction. Moreover, neither wound track nor any foreign object was found inside.

Penetrating neck wounds can cause injury to one or more of the major organ systems of the neck, including the great vessels, larynx and trachea, esophagus, and spinal column. Injuries to the vascular system occur in 25 - 56% of penetrating neck wounds, and injuries to the carotid and subclavian arteries are the most common cause of mortality. Approximately 20 - 30% of penetrating neck wounds result in laryngeal, tracheal or esophageal injuries. In addition to the major structures, numerous smaller structures in the neck can be injured with penetrating trauma, which often results in significant morbidity (Lydiatt et al. 1990). In middle cervical injury, the common carotid artery is the most vulnerable vessel, although other large vessels such as the external and internal carotid arteries as well as the internal jugular vein may be involved, often causing neurological deficits and shock (Arai et al., 1992). In the present case, the projectile had gained kinetic energy that was sufficient enough to tear the jugular vein and carotid artery, leading to death by exsanguinations.

Accidental injury to the neck can be resulted from blunt force, sharp force or firearm projectile. But suicidal and homicidal injuries to the neck are mostly caused by sharp force. Suicidal and homicidal penetrating neck traumas are mostly caused by firearms and sharp pointed weapon.

Accidental penetrating neck traumas are usually caused by penetration of the platysma by a foreign object such as those made of metal, glass or wood, when the foreign object acts as a projectile or the human body falls over it. Such injuries usually do not result in extensive collateral tissue damage, but foreign bodies may remain in the neck (Lydiatt et al). In the present case, injury was caused by metallic saw blade fragment that flied out of wood cutting machine. Although extravasation of blood underneath the subcutaneous tissues was extended up to supraclavicular fossa, no foreign object could be found inside.

Prahlow et al. (2001) had reviewed twenty-two cases of accidental sharp force injury to the neck where they found that about half of the cases involved some type of motorized machinery. Injuries resulting from the use of angle grinders are numerous. The most common sites injured are the head and face (Carter et al., 2008).

Hellstrand (1989) reported fifteen cases of accidental injury caused by firewood splitting machines. The study was based on the machine, with a rotating spiral cone, and usually the victims' gloved fingertips were caught by the point of the cone. This led to either amputation, usually of radial fingers and/or penetrating wounds through the middle of the hand; with no fatality at all. Death reports on accidental neck injury from wood cutting machine are very few.

Demirci et al. (2008) reported a death case where a spinning circular saw of a cutting machine in a workshop came off its place and cut the throat of a 30-year-old male who was operating the machine. There was an incision (15 × 5 cm) that began in the middle of the neck

down the thyroid cartilage, extended horizontally to the left of the neck and ended on the outer part of the neck in the outer left side trapezius muscle. Death occurred because of exsanguinations caused by the cutting of carotid artery and jugular vein. Initially it appeared as a case of homicide, but accidental death was confirmed after the autopsy and death scene investigation (Demirci et al., 2008).

Karger et al. (1990) reported a similar case of accidental death from wood cutting machine in which carotid and vertebral arteries were transected on one side after sustaining injury, and person was able to walk for 10 m before collapse (Karger et al., 1999).

An individual who commits suicide with an electric saw, such as a chain saw, band saw and circular saw is rare. Asano et al. (2008) described a case of a suicide of a 32-year-old female using an electric circular saw where right external carotid artery, the right internal jugular vein and the right internal carotid artery were cut. But, in that case the female was a psychiatric patient. In the present case, exterior of the penetrating neck trauma was a cut laceration of 1 cm deep, situated horizontally on the mid-part of right anterior aspect of neck. As cut laceration shows mixed features of incised wound and laceration, initially it raised suspicion of non-accidental injury, compounded by absence of any eye witness. However, suicidal cut throat injury was excluded on the basis of absence of hesitation cut, nature, location and direction of the wound, absence of any suicidal note or reason for suicide and absence of sharp cutting weapon at the scene of death. Superficial nature of the wound, absence of any motive, analysis of circumstantial history and findings ruled out homicidal injury and proved it as a case of accidental neck injury. In the absence of wound track and foreign body inside the body, extravasation of blood into the lower tissues was possible only by gravitational drainage from torn major blood vessels, while the victim was maintaining upright position prior to his death. It was reported by an investigating officer that the victim was lying about 5 m away from the wood cutting machine. Hence the deceased must have survived for some time to maintain his upright position.

Injury or fatality from motorized machine is mostly due to faulty operating technique or alcohol intoxication. The other main reason for injury is the use of the wrong size/type of disc or a worn/chipped disc. This will increase the likelihood of excessive vibration and of the disc shattering. This usually results in foreign body type injuries (Demirci et al., 2008). In the present case, during examination of metallic saw blade and recovered saw blade fragment, rust stains were found on some parts. One small part of the metallic saw blade found missing could not be recovered, either from the dead body of the deceased or from the scene of death. This clearly indicated that the person was operating the wood cutting machine having broken metallic saw blade. Therefore, the operator and his supervisor were negligent for working with such a compromised wood cutting machine.

Thus, after carefully analyzing the autopsy findings, examination of wood cutting machine and recovered portion of the blade, it was concluded to be a case of accidental neck injury, for not following proper precautions.

Conclusion

A small penetrating wound to the neck may look superficial and innocuous but may end fatally by extensive damage to the internal vital structures. In the instant case, the victim sustained injury while operating a wood cutting machine. Similar instruments (electric saw) are regularly used at various workplaces including mortuaries and operation theatres. Hence, operator must take proper precautions while handling such kind of instruments, for his own safety as well for the safety of persons in the close vicinity. This case reemphasizes scene investigation as an important tool of medico-legal autopsy for determination of proper mechanisms of injuries and precise manner of death.

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