



Case Report

Circular saw-related fatalities: A rare case report, review of the literature, and forensic implications



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ABSTRACT

Fatalities attributed to powered circular saws appear to be vanishingly rare events with highly wounding and rapidly incapacitating effects. When they do occur, they are mainly self-inflicted in nature. We report the suicide committed by a 79-year-old man using a self-made circular table saw. Autopsy confirmed that the man received multiple heterogeneously distributed saw-type impacts to the head and neck resulting in complete amputation of the upper skull and partial beheading. Homemade or modified commercial sawing instruments and the resultant injuries pose a number of forensic challenges starting from the death scene investigation, continuing with technical examinations, and concluding with determining the manner of death. As with all deaths due to sharp force injuries, fatalities involving power tools such as chainsaws, circular, and band saws warrant a high degree of suspicion of criminal activity and require diligence during all phases of the death investigation.

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1. Introduction

Circular saw-related fatalities are vanishingly rare events with highly wounding and rapidly incapacitating effects. When they do occur, they are mainly self-inflicted [1–8], although several studies have discussed accidental circular saw-associated deaths [9,10]. An exception is the category of sawing to death secondary to homicidal violence, particularly against infants and young children [11]. In addition, saw-related injuries have been reported in conjunction with self-mutilation, intended hand injuries in cases of insurance fraud, or criminal body dismemberment in order to conceal a body following homicide [12–14]. Finally, from a historical perspective, human body morselization by sawing has been used extensively as an extreme method of execution, particularly in ancient time and the Middle ages. Nonetheless, literature analysis indicates that the sawing of a living person is performed mainly with suicidal intent. In such cases, where the circular blade or the chainsaw is employed, the decedents have typically received one fatal wound to the neck or head. The devastating potential of circular saw injuries reflects the fact that a standard 40-tooth circular blade with a spinning speed about 4000 rotations per minute can make a cut every 370 microseconds [15].

This article documents suicidally inflicted multiple cerebrocranial wounds resulting in complete upper skull amputation and partial beheading produced by a self-made circular table saw. To the best of our knowledge, such a self-directed pattern of injuries has not been previously described in the forensic scientific literature. Although limited by the rarity of the condition, the authors also provide a synopsis of the available literature describing saw-related deaths in an attempt to delineate forensic issues involved in assessing such cases.

2. Case history

A newly widowed 79-year-old man was found dead in front of the garage of his family home, lying in a supine position between a running circular table saw and a pile of sawn wooden pallets (Fig. 1A). There was a heavy pool of blood around his head and neck. A workbench and the floor underneath the saw showed a distinct pattern of blood spatter consistent with its having originated from the position of the circular saw blade (Fig. 1B). Evaluation of the body revealed multiple gaping, saw-type wounds of the neck and face (Fig. 1C). The head showed complete amputation of the upper skull associated with extruded portions of the brain on the floor within a radius of approximately 2.5 m from the decedent's head (Fig. 1A, blue arrows). There were no obvious signs of intervention by a third party, forced entry, or a struggle. The decedent had no history of suicidal declarations, psychiatric problems, or

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Fig. 1. Scene of death – (A) view of the body lying next to the homemade circular table saw. Note the extruded portions of the brain (blue arrows). (B) Blood spatter is consistent with the position of the circular saw blade. (C) Close-up view of the head shows complete amputation of the upper skull and a large gaping wound of the neck. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

alcohol abuse. According to the relatives, however, several days prior to his death, he exhibited bizarre, non-talkative behavior. No suicidal note was found. He was formerly employed as a locksmith.

3. Technical examination of the circular saw

Technical examination of the homemade table saw revealed a steel circular blade with a diameter of 70 cm. The width of the blade was 4.0 mm, and the blade had 60 rough, sharp teeth that were spaced equidistantly around the circumference of the blade. Maximum cut depth was set at 29 cm. The circular blade was mounted on an arbor, which was driven by an electric motor with a real output power of 4200 W. The speed of rotation was measured to be 3000 revolutions per minute. The saw blade was not protected by a blade guard.

4. Autopsy findings

The body of an asthenic man was received for autopsy clothed in a white undershirt, jogging pants, and textile shoes. The fabric of the front parts of the undershirt and the pants were soaked with blood with evidence of brain spatter and discharged bone dust. The decedent's face, neck, and hands were covered with dense, dried blood.

He measured 172 cm and weighted 72 kg. Radiographs of the entire body were unremarkable. Major findings were confined to the neck and the head (Fig. 2A–D). The head was partially separated from the trunk. There was a deep gaping wound measuring 18 cm in length and up to 10 cm in width on the right anterolateral

neck region (Fig. 2D). The wound edges were ragged, non-abraded, and irregularly shaped. Internally, the neck injuries consisted of serrated cuts of the laryngohyoid complex, laceration of the right thyroid lobe, transection of the pharynx, severance of the right carotid artery and jugular vein and partial transection of the cervical column at the level of the fifth cervical vertebra. Examination of the spinal cord failed to disclose any traumatic stigmata. The head had a gaping curvilinear wound with slightly abraded margins starting on the left facial region (Fig. 2B), continuing toward the forehead and vertex (Fig. 2A and C) and extending to the external occipital protuberance. In addition, a deep saw-type injury with parallel orientation to the facial injury described above was present on the nose. Examination of the underlying skull revealed a circumferential, almost autopsy-like, cut wound of the calvarium associated (Fig. 3) with transection of the *dura mater* and nearly complete evisceration of the both brain hemispheres. A sharply delineated sawing plane passed obliquely through the subcutaneous soft tissues of the left cheek, left zygomatic bone, left orbit with eyeball, frontal sinuses, and the bones forming the vault of the skull. The sawed calvarial fragment with adjacent left orbital roof and transected left eyeball measured 15 × 9 cm. In the lower part of the fragment were fine periodic striations on the cut bone surface. Subjacent to the circumferential sawing line, there were two parallel horizontal kerfs with well-defined edges strongly suggesting a second, incomplete sawing line on approximately two-thirds of the skull circumference. Both soft tissue and skeletal injuries were consistent with the application of a sharply-edged, toothed device such as a saw blade.

Additional autopsy findings included aspiration of blood into trachea and bronchi, generalized organ pallor, moderate atherosclerosis of the coronary arteries and aorta, chronic lung

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