

An unusual mechanism for patterned bruising in a fatal fall from a building

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Case report

A 90-year-old man was found dead lying on the ground in front of a building. He had committed suicide by jumping from the 5th floor (approximately 15 m height) of the building where he had lived in his apartment. His medical records revealed that the man had suffered from dementia with a history of psychiatric disorders and suicidal tendencies. A suicide note was found in his apartment. External examination of the body revealed blunt force injuries on the skin (abrasions and hematomas) of the thorax and on the limbs. Of note, an unusual finding was that of patterned bruising of the right forearm with parallel linear stripes along the posterior surface of the arm overlying the right radius and ulna (Fig. 1). At autopsy, multiple fractures of the thoracic cage including the sternum, the ribs and the thoracic spine, were found. Complete transmural tears of the heart were also observed together with extensive contusions and tears of both lungs and the liver. In addition, there were comminuted fractures of the lower limbs. Toxicological examination was negative. Death was attributed to multiple trauma. The manner of death was ruled as a suicide.

Discussion

In cases of fatal falls from height, the determination of the manner of death (homicide, suicide or accident) is often quite difficult because of the multiplicity of the injury patterns. The main issue for the forensic pathologist is to exclude homicide by differentiating between fall-induced injuries and other findings, possibly inflicted by someone else before the fall [1, 2]. Even if signs of homicide, suicide and accident are difficult to evaluate, the observation of blunt force injuries such as those arising from finger tip marks to the upper arms from grabbing, or defense-type injuries of the extremities, or sharp force hesitation marks could be strongly indicative of the manner of death [2]. Nevertheless, the interpretation of findings from external examination and autopsy should be always taken with considerable caution.

In the reported case, in addition to the external and internal injuries related to the fall [2], a particular patterned bruising of the right forearm was observed, which could have been interpreted as being due to an inflicted blow with a blunt object. Similar, although slightly different lesions may be observed in the form of so-called ‘tramline’ bruises which occur when the skin surface is struck by a firm, smooth-surfaced, cylindrical or rectangular object (e.g., a pipe, a rod or a cane) producing an area of central pallor outlined by two narrow parallel lines of bruising [3, 4]. The mechanism responsible for this particular lesion is crushing of the skin at the site of impact so that the edges drag the tissue downwards, tearing the marginal blood vessels and leaving an area of central pallor with parallel lines that imprint the contour of the weapon [5, 6]. The same occurs with an impact of a hand slapping, with parallel linear lines representing the spaces between the fingers. The blunt injury resulting in the particular bruises observed in the

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Fig. 1 Parallel bruising along the posterior surface of the right forearm

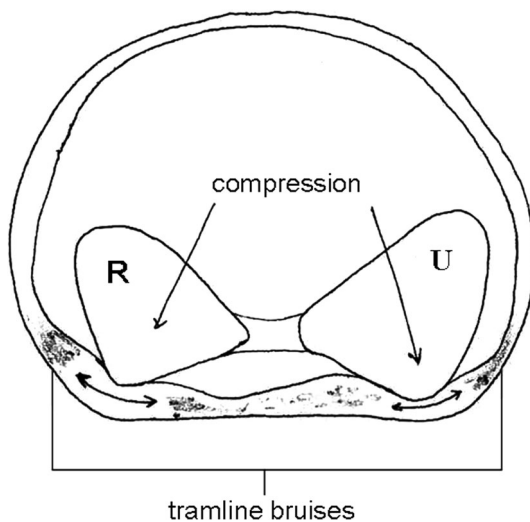


Fig. 2 Schematic cross-section through the middle of the right forearm: parallel bruising caused by skin and soft tissue by the radius (*R*) and ulna (*U*) from within

case reported here occurred when the body hit the ground after the fall. Although the bruises were not as well defined as typical tramline bruising (Fig. 2), the mechanism of their formation was of interest in that the linear bruises derived from the crushing of the skin and soft tissues between the shafts of the radius and ulna and the impacting surface, and not from impact with a typical blunt object. Thus, the mechanism of formation of these types of linear injuries is the same irrespective of whether the body moves toward an object, or an object moves toward the body, i.e., the forearm bones have similar morphological features of a

cylindrical object but were able to compress the overlying skin from within.

The finding of an *internal* cause for parallel bruising as described here is highly unusual as typical ‘tramline’ bruises are found in cases of child maltreatment [7, 8], elderly abuse [3], battery and torture [9, 10] where the imprints can be indicative of the used object. From a medicolegal point of view, this demonstrates that not all patterned bruises may result from classical external blunt force [11]. Nevertheless this phenomenon is rarely mentioned in the scientific literature even if the presence of such distinctive injuries can provide evidence for secondary impacts or the position of the victim during the fall [12].

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